EARNINGS MANAGEMENT:
DETECTION, APPLICATION AND CONTAGION

By

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To my family

with lots of love

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LIST OF ACRONYMS *

Acronyms	Full names
AAER	Accounting and Auditing Enforcement Releases
CAPM	Capital Asset Pricing Model
EU	European Union
FRRP	Financial Reporting Review Panel
FRS	Financial Reporting Standard
FTSE	Financial Times Stock Exchange
GAAP	Generally Accepted Accounting Principles
GAO	Government Accountability Office
IPO	Initial Public Offering
ISIN	International Securities Identification Number
LSE	London Stock Exchange
M&A	Merger and Acquisition
OLS	Ordinary Least Square
R&D	Research and Development
SEC	Securities and Exchange Commission
SEO	Seasoned Equity Offering
SEDOL	Stock Exchange Daily Official List
UK	United Kingdom
US	United States (of America)

* This list provides full names of the acronyms used in the thesis to provide the readers with a way to make quick reference upon encountering acronyms while reading. The list excludes definitions of variables used in statistical analyses which could be found in the 'Definitions of variables' sections at the end of Chapter 2, 3 and 4. Acronyms are presented in alphabetical order.

ABSTRACT

The accounting scandals in the 2000s and 2010s have led to a number of large-scale reforms in financial reporting and corporate governance regulations around the world, and still attract a lot of public debates recently. In that context, the demand for further knowledge on earnings management is very topical. What we have known is earnings management does exist. What we have not known, however, seems still overwhelming. We need to know more about issues such as how earnings management could be detected, to what extent earnings management has an impact on investment decisions, what drives earnings management behaviour etc. The accounting research community has responded to such demand by producing a very large, and still growing, volume of publications on the topic during the last few decades. In fact, earnings management has now been one of the largest strands in the mainstream accounting literature.

This thesis aims to make original and important contributions to the literature on earnings management. The main components of the thesis comprise of three empirical chapters which analyse secondary data on the United Kingdom's (the UK hereafter) stock market during the period from 1995 to 2011. The contributions are made on three important and inter-related research strands within the earnings management literature, namely the earnings management detection models, the impact of earnings management on stock market investment, and the spread of earnings management as a corporate decision through board network.

The first empirical chapter constructs a signal-based composite index, namely ESCORE, which captures the context of earnings management. Specifically, ESCORE aggregates fifteen individual signals related to earnings management based on prior relevant literature. Empirical results using UK data shows that when

ESCORE is higher, firms do manage earnings with greater magnitude and are more likely to be most aggressive using both accruals and real earnings management. Firms which are investigated for financial-statement-related irregularities are also shown to have significantly higher ESCORE. The composite score can be easily applied in practice as well as replicated in subsequent studies, especially in emerging market where small samples technically constrain the use of other existing earnings management detection models. The approach to construct ESCORE is innovative and it only measures the likelihood rather than the magnitude of earnings management. This aspect of ESCORE is important given the growing criticisms that none of the existing earnings management models could actually measure the magnitude of earnings management.

Using ESCORE as a measure that captures the general context of earnings management, the second empirical chapter asks if investors rationally price the information contained in such context. Empirical evidence shows that firms with low ESCORE outperform those with high ESCORE by 1.37% per month after controlling for risk loadings on the market, size, book-to-market and momentum factors in up to one year after portfolio formation. The relationship between ESCORE and future returns is still significant, in both economic and statistical terms, after controlling for various other known 'market anomalies', including the size, value-glamour, seasoned equity offer, market irrational reaction to financial distress, balance sheet bloat, profitability and discretionary accruals. This finding is in line with the behavioural explanation that investors tend to ignore the observable context of earnings management under the influence of the well-documented base rate fallacy. This is an original piece of knowledge which makes significant and interesting contributions to the literature on market anomalies.

The third and last empirical chapter investigates whether aggressive earnings management practices spread across firms sharing interlocked directors. The evidence shows that if a firm aggressively manages earnings (referred to as a ‘contagious firm’) via accruals (or production activities and discretionary expenses) manipulation in a year, any firms (referred to as ‘exposed firms’) which are interlocked with that contagious firm in that year and the two following years are more likely to aggressively manage earnings via accruals (or production activities and discretionary expenses, respectively) manipulation. The contagion effect is found to be more pronounced if the interlocked director is male, older, British, and charged with duties which could influence financial reporting. The contagion effect is robust after controlling for endogeneity issues and common characteristics of the interlocked firms. The evidence presented in this chapter is both original and a significant contribution to our knowledge on the impact of board networks on corporate decisions, a topic which attracts a lot of attention as it fits directly to the process of reforming corporate governance codes to enhance the efficiency and effectiveness of the boards of directors.

CHAPTER 1

THESIS INTRODUCTION

Many aspects of financial reporting are within the discretion of managers. For example, managers could make a choice between permitted accounting methods, exercise managerial judgements over accounting estimations (e.g. depreciation, allowance etc.), or even engage in more pernicious practices such as frauds to influence reported earnings. The popular wisdom among both academics and practitioners suggests that managers do manage earnings from time to time (Healy and Wahlen, 1999). Hence, “how far can we trust earnings numbers?”, as asked by Walker (2013), among many others, is a sensible and important question to ask.

The pursuit of a general answer to the above question attracts a great deal of interest from accounting academics during the last few decades and has since grown into one of the largest strands of the accounting literature, namely the literature on earnings management. Research in earnings management provides the insights for market participants to make more informed decisions, boards of directors to play more effective monitoring roles, and regulators to put in place more suitable rules to ensure well-functioning capital markets. The series of recent significant accounting scandals (such as Enron, WorldCom, Lehman Brothers, Toshiba to name just a few) could only make it more important that we investigate and understand more about earnings management. The importance of research in earnings management is, therefore, cannot be understated. Walker (2013) reports that research on earnings management on average accounts for between 7% to 10% of accounting publications in leading journals during the period from 2001 to 2011 and that the rate is still increasing. It is not an overstatement, hence, to say earnings management research is currently one of the major items on the agenda of the accounting research community. This thesis aims to make significant and meaningful contributions to that agenda.

The main component of the thesis comprises of three empirical chapters investigating three inter-related topics on the general theme of earnings management. The next section (Section 1.1) will set the background on which the empirical chapters are based by discussing the adopted definition of earnings management before Section 1.2 explores the theoretical framework which explains why and how earnings management would happen. The discussions in Section 1.1 and 1.2 are only meant to provide the background for the rest of thesis and put subsequent empirical chapters in context while a complete review of the whole literature on earnings management is avoided because the size of it is too large for the thesis to attempt[1]. Instead, only the definitions and theoretical foundations of earnings management are reviewed in this introduction chapter, while the literature which is directly related to the issues investigated in each of the empirical chapters will be reviewed separately later in the corresponding chapters. Section 1.3 will then introduce the topics investigated in each of the empirical chapters and highlight the original and important contributions made in each chapter. All empirical chapters in this thesis are based on the UK stock market. Section 1.4 will explain the characteristics of the UK stock market which makes it an interesting and suitable setting for the purposes of the thesis.

[1] See, for example, Ronen and Yaari (2008) for an excellent review.

1.1. DEFINITION OF EARNINGS MANAGEMENT

Although the term 'earnings management' has been used widely in the literature, it does not always mean the same thing. When used for different research purposes, earnings management could be defined differently. An early definition of earnings management is provided by Schipper (1989) with the aim is to provide a framework to analyse the implications and trade-offs between various research design choices and to describe the connection between research in earnings management and other accounting research areas. In particular, Schipper (1989, p. 92) defines earnings management as "a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain (as opposed to, say, merely facilitating the neutral operation of the process)". Schipper's (1989) definition does explicitly assume earnings management is only engaged for private gains and is restricted to the manipulation through intervening the financial reporting process regardless of whether or not such intervening has violated Generally Accepted Accounting Principles (hereafter GAAP). Healy and Wahlen (1999, p. 368), taking the view of standard setters, define earnings management as "managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers." The definition covers both accounting manipulation and changing real economic decisions to influence earnings, but it does emphasize the nature of earnings management is to "mislead" or "influence contractual outcomes".

Earnings management, however, is not always 'bad'. Managers could also manage earnings to make it more informative (Holthausen and Lefwich, 1983). Allowing for both the misleading and informative nature of earnings management, Walker (2013, p. 446) makes a broader definition of earnings management as "the use of managerial discretion over (within GAAP) accounting choices, earnings reporting choices, and real economic decisions to influence how underlying economic events are reflected in one or more measures of earnings." This definition, however, focuses only on practices which are allowed in existing regulations. Ronen and Yaari (2008, p. 27) provide a more complete definition of earnings management, which is also the one adopted in this thesis:

> Earnings management is a collection of managerial decisions that result in not reporting the true short-term, value-maximizing earnings as known to management.
>
> Earnings management can be
>
> Beneficial: it signals long-term value;
>
> Pernicious: it conceals short- or long-term value;
>
> Neutral: it reveals the short-term true performance.

The adopted definition does not exclude any means of earnings management or presume any intention of the managers so long as the resulting effect is that the reported earnings is different from the "true" earnings known to management. Earnings management under this definition is not necessarily "pernicious", but it could also be "neutral", or even "beneficial" if it could provide information for financial statement users to better understand the firm's long-term value. For policy makers and regulatory authorities, the above definition implies that rules in financial reporting should not be directed to eliminate earnings management by, for example, stifling away all flexibilities which managers could exploit to influence reported earnings. Studies which adopted the above definition, including this thesis, often take the stance that leaving room for earnings management, such as allowing flexibilities or development of principle-based accounting standards, could in effect even make financial reporting more informative. Therefore, all the policy implications drawn from the results of the thesis should be taken with this perspective in mind.

1.2. THE THEORETICAL PERSPECTIVE OF EARNINGS MANAGEMENT

As discussed in the previous section, the thesis adopts the definition of earnings management following Ronen and Yaari (2008) as any course of actions, regardless of intentions, which results in reported earnings being different from the earnings known to management. Having defined earnings management this way, it is important to understand the theoretical foundation which explains why managers would want to engage in earnings management. Theoretically earnings management could be explained within the framework of the well-developed agency theory (Jensen and Meckling, 1976). Under the agency theory, there are conflicts of interest between managers (the 'agent') and shareholders (the 'principal'). Managers often have more power and possess better information set compared to external investors, and they generally work to maximize their rewards (e.g. remuneration) and not necessarily shareholders' wealth (Goergen and Renneboog, 2011). Shareholders, on the other hand, rely on managers to run the business and are the residual claimants to what is left after all other stakeholders have taken their shares of the firm's profit (including managers' rewards). This creates a moral hazard problem in which managers could potentially abuse the power entrusted in them to report earnings in a way that maximizes their private rewards rather than shareholders' wealth. Earnings management in this case is costly, including direct cost (e.g. decline in share prices) and indirect cost (e.g. costs associated with establishing monitoring measures).

It has been argued earlier, however, that earnings management is not necessarily always 'bad'. The signalling theory suggests that in equilibrium, it could be the optimal solution that one party with information advantage (i.e. insiders) signals some private information to the other party (i.e. outsiders) (Spence, 1973; Myers and

Majluf, 1984). In the context of financial reporting, this could create an adverse selection problem in which shareholders would be reluctant to make capital investments because they know managers possess superior information and are afraid that managers could take advantage of such information to pursue their self-interest (Walker, 2013). To deal with this problem, managers might use earnings management as a signalling tool and therefore make reported earnings more informative (Holthausen and Lefwich, 1983). The positive accounting theory also suggests that earnings management could be a tool to optimize the nexus of contracts firms have signed up with various stakeholders (Watts and Zimmerman, 1986; Watts and Zimmerman, 1990).

1.3. THE MAIN COMPONENTS OF THE THESIS

This thesis aims at making contributions to the growing literature on earnings management. The main components of the thesis comprise of three empirical chapters, each contributing significantly to an important topic within the earnings management theme. This section is devoted to introduce the topic investigated in each of the empirical chapters and highlights the main contributions along the line.

1.3.1. Chapter 2: A signal-based composite index to detect the context of earnings management

The strand of the literature which develops models to detect earnings management is arguably one of the most important drivers behind the significant growth of academic research on earnings management (Walker, 2013). The introduction of the discretionary accruals model (Jones, 1991) provides accounting researchers with a useful metric to capture the component of total accruals which is within managerial discretion. Such 'discretionary accruals' has been widely used as an empirical proxy for earnings management. The Jones' model is perhaps one of the key milestones which fosters the development of the empirical earnings management literature. Several subsequent modifications to the Jones' model have significantly improved its statistical performance in various contexts (Dechow et al., 1995; Peasnell et al., 2000; Kothari et al., 2005). More recently, the literature starts looking beyond the manipulation of accruals arguing that managers might influence reported earnings via changing real decisions, such as altering sales policies, varying production levels or cutting discretionary spending. A notable contribution on this front is the study conducted by Roychowdhury (2006) which develops three models to capture real earnings management. Roychowdhury's (2006) models have attracted a lot of attention from the accounting community.

Apart from the discretionary accruals and real earnings management models which have the lion's shares of attention as highlighted above, many other studies also introduce various models to detect other types of earnings management, such as timing of asset sales, classificatory shift, earnings guidance etc. (Athanasakou et al., 2009; Gunny, 2010; Athanasakou et al., 2011). Nevertheless, the quest for a model to detect earnings management is still ongoing as almost all models of earnings management detection are subject to fierce criticism (for example, Holthausen et al., 1995; Fields et al., 2001; Ball, 2013; Owens et al., 2013; McNichols, 2000; Dechow and Skinner, 2000; Dechow et al., 2010; Gerakos and Kovrijnykh, 2013; Walker, 2013). The main concern lies with the lack of a comprehensive theory on the accruals generating process leading to potential model mis-specifications.

Chapter 2, the first empirical chapter of the thesis, attempts to address the above-mentioned weakness in the literature. The chapter proposes an innovative approach to assess the likelihood of earnings management without measuring the magnitude of earnings management (which, as discussed above, is arguably 'immeasurable' in the absence of a theory on the accruals generating process). In particular, the chapter develops a signal-based composite index, namely ESCORE, which accumulates fifteen individual signals. The fifteen individual signals are selected from the indicators of earnings management which have been established in the extant literature. Hence, ESCORE would capture the general context in which a firm is operating. The individual signals are translated into binary variables (i.e. having value of either one or zero) before the composite score ESCORE is created by adding up those fifteen binary variables. By design, the resulting ESCORE is an integer with value ranging from zero to fifteen. A lower (higher) ESCORE would imply the context surrounding the firm is less (more) susceptible to earnings management.

Empirical tests using all UK listed firms during the period from 1995 to 2011 show that ESCORE, despite being constructed using a completely different approach compared to existing models of earnings management, is generally consistent with most traditional models of earnings management, including discretionary accruals, real earnings management and *ex-post* cases of accounting investigations.

The ESCORE model is a novel approach in detecting earnings management. There are many advantages of using ESCORE. First, ESCORE does not directly measure the magnitude of discretionary accruals, hence it is free from the limitation of the lack of a comprehensive theory to explain the accruals generating process. Second, ESCORE has a lot to offer to investment practitioners, especially the less sophisticated ones, as it is easy to calculate based on data which is readily available in published financial statements. Last but not least, ESCORE could be useful for earnings management research in smaller markets where data is not sufficient to reliably estimate the traditional measures of earnings management because it does not require regressions within industry-years.

1.3.2. Chapter 3: Does the context of earnings management contain information about future stock returns?

Having constructed ESCORE in Chapter 2 as a composite index which could capture the context of earnings management, Chapter 3 empirically investigates whether the information contained in the context of earnings management is correctly priced by the market. Previous research has established that investors generally misprice the information contained in total accruals, especially the discretionary component (see, for example, Sloan, 1996; Teoh et al., 1998a; Teoh et al., 1998b; Xie, 2001; Desai et al., 2004; Iqbal et al., 2009; Iqbal and Strong, 2010). Since discretionary accruals is widely used as a proxy for earnings management, such mispricing could be attributable to investors not being able to fully reflect on the 'true' earnings which is not revealed to the market as a result of earnings management. In general, the extant literature suggests that earnings management is unobservable to outsiders, hence the pricing errors exist.

The chapter takes a step further arguing that even if the actual earnings management behaviour is unobservable, the context surrounding it could not be concealed. The key argument is similar to the old saying 'there's no smoke without fire'. If we see 'smoke' (i.e. when the context is susceptible to earnings management), we could guess there is a 'fire' (i.e. there is actual earnings management) without having to directly observe the fire. If the market indeed misprices earnings management, it must have underreacted to both the misleading reported earnings and the surrounding context. The chapter seeks to examine whether the market fails to reflect on the information contained in the context of earnings management.

Chapter 3 uses ESCORE as developed in Chapter 2 as a proxy for the context of earnings management. Empirical analysis using UK data from 1995 to 2011 reveals that the market indeed misprices the context of earnings management leading to large and significant abnormal returns being earned by trading strategies designed based on ESCORE. In particular, low ESCORE stocks typically earn higher returns than the high ESCORE counterpart, after adjusting for risk loadings on size, book-to-market and momentum factors.

Unlike the actual earnings management actions which are arguably concealable, the general context surrounding such actions is often observable. Therefore, that investors miss such observable information is an interesting and original piece of knowledge. The evidence is in line with the explanation in which investors, as human beings, suffer systematically from the base rate fallacy (Tversky and Kahneman, 1982). Under the influence of the base rate fallacy, judgement about the probability of earnings management is based more on specific information than on generic context leading to the information contained in the context of earnings management being mispriced. The evidence of abnormal returns earned from ESCORE-based trading strategies is an original and significant contribution to both the literature on earnings management and behavioural finance.

1.3.3. Chapter 4: The contagion of aggressive earnings management through board interlocks

Also contributing to the theme of earnings management, Chapter 4 empirically examines whether aggressive earnings management spreads from one company to another through the network of board directors. Board interlock, a practice which is allowed and quite common in the UK, once in place could have a range of implications for the decision making process at companies. The chapter looks particularly at the influence of board interlocks on the financial reporting function of connected companies. On this topic, a recent study by Chiu et al. (2013) provides some important initial insights. In particular, they define contagious firms as those which are asked to restate earnings by the government and any firms which are interlocked with a contagious firm as exposed firms. They then provide evidence that exposed firms are more likely to engage in earnings management and interpret it as evidence that earnings management is contagious through the board network.

The evidence provided by Chiu et al. (2013) is the first evidence on the contagion effect of earnings management, hence it is novel and very interesting. Nevertheless, a lot of further research is still needed before we could claim a thorough understanding of how and why earnings management spreads through the board network. One of the missing pieces from Chiu et al. (2013) evidence is whether real earnings management, which is often within the discretion of managers and hence rarely leads to restatements, is also contagious. The chapter hypothesizes that the interlocked directors would spread both accruals and real earnings management from one firm to another. The mechanism behind this contagion effect is the interlocked directors would influence the boards of the exposed firms to adopt aggressive accruals earnings management (or real earnings management) practices upon observing the use of accruals earnings management (or real earnings management) practices at the contagious firms. Using UK data from 2005 to 2012, empirical evidence reveals that interlocked directors act as a channel through which aggressive earnings management spreads across companies. In particular, the chapter defines contagious firms as those which are aggressive in financial reporting and the three-year period starting from and including the year in which a contagious firm is detected as an aggressive firm is defined as the contagious period. The chapter finds that exposed firms, defined as those which share a board link with a contagious firm during the contagious period, are significantly more likely to also be an aggressive firm. The evidence of the contagion effect holds for both accruals and real earnings management. Furthermore, the contagion effect is found to be more pronounced when the interlocked directors are male, older, British or those who are charged with financial-reporting-related duties.

The chapter makes original and significant contribution to the existing literature on the topic. Building up on the contagion of earnings restatements reported by Chiu et al. (2013), the chapter sheds further light on the contagion effect by showing that both accruals and real earnings management are also contagious. This is an original and significant contribution to the literature which shows that board interlocks would spread earnings management, even in the forms which does not violate any accounting regulations and thus does not necessarily result in restatements. The chapter also uses ESCORE to address an important research design issue which the existing literature has not resolved. In particular, the exposed and contagious firms might share some common characteristics which make them both more likely to manage earnings and at the same time more likely to appoint the same directors. Previous research on this topic generally interprets evidence that the exposed firm manage earnings as the result of the interlocked director spreading the behaviour from the contagious firm without being able to reject the alternative explanation that the shared common characteristics cause the exposed and contagious firms to appoint the same director. ESCORE as designed in Chapter 2 could identify the context in which firms are more likely to be aggressive and hence is useful to address this important issue. Using ESCORE and its components to control for the shared common characteristics of the exposed and contagious firms, the chapter establishes stronger evidence for the existence of the spread of earnings management through the network of board directors. The use of ESCORE in this context is an innovative research design which could help reject an important alternative explanation and subsequent studies on the contagion effect of earnings management could greatly benefit from this methodology.

Overall, the three empirical chapters together do make important and original contributions to the literature. The literature related to the topics investigated in this thesis is very large, but mainly concentrated on the United States of America’s (the US hereafter) market. The next section will explain how a UK study like this thesis could make an interesting and important contribution to both the academic literature and practitioners’ world.

1.4. THE EMPIRICAL SETTING: UK LISTED STOCKS FROM 1995 TO 2012

The thesis selects all UK listed stocks during the period from 1995 to 2012 as the primary setting. The empirical investigations build upon a rich literature on earnings management detection models, the market mispricing of accruals and the contagion of earnings management. Many existing studies in these areas focus on the US market. Nevertheless, the choice of the UK market as the setting for this study is justifiable for a variety of reasons which make the thesis an interesting and important contribution to the advancement of our knowledge on these topics. First, during the sample period, the UK market offers a unique setting shaped by several characteristics of the environment in which listed companies operate, ranging from financial reporting and corporate governance regulations, cultural factors and the norms in business and reporting practices, to the popular bases of share ownership in listed companies. During the 1990s and 2000s, which overlaps with the sample employed in this study, the UK experiences several major changes to its financial reporting and corporate governance regulations, for example, the mandatory adoption of International Financial Reporting Standards (IFRS) in 2005 or many revisions to the UK Corporate Governance Code. These changes at the regulatory level would create an interesting setting to investigate earnings management behaviour at the firm level. Existing evidence also suggests that the norms in business and financial reporting practices in the UK, especially when it comes to selecting the mechanism for earnings management, are quite different from other developed markets such as the US (e.g. Bond, 2000; Athanasakou et al., 2009; Athanasakou et al., 2011). In addition, institutional holdings tend to be more prevalent in the UK compared to other markets. Institutional stockholders, especially financial institutions and professionally-managed funds, typically play a more active monitoring role, which in turns constraints managers' discretion over financial reporting practices. Those characteristics jointly suggest that using the UK market as the setting for further research into earnings management detection, market mispricing and earnings management contagion would yield interesting and unique insights.

Second, the UK is one of the world's major economies with one of the largest stock markets. Hence, the importance of understanding how the UK market operates cannot be understated. Compared to the US, the UK-based literature on earnings management is remarkably thinner and that creates an important gap for further studies to fill in. This thesis does not simply replicate US studies in the UK, but rather it provides original evidence which is directly relevant in the UK context with a number of implications for other developed markets such as the US and the Europe.

Furthermore, using the UK market allows the use of unique datasets which could significantly add strength to the analyses as well as reinforce previous findings using US data. One of the recent strands in the earnings management literature is to employ an *ex-post* indicator of earnings management which has low Type I error (e.g. Dechow et al., 2010). This strand is most fruitful in the US thanks to the rich and readily available data on earnings restatements, such as the Securities and Exchange Commission's (SEC hereafter) accounting and auditing enforcement releases (AAER hereafter) or US Government Accountability Office's (GAO) releases of restatements. These *ex-post* measures of earnings management have significant advantages as well as drawbacks (see, for example, Dechow et al., 2010). One of the most notable pitfalls of the *ex-post* measures is the sample selection biases (Dechow et al., 2010). In particular, the SEC or GAO does not randomly select firms to investigate. Due to constrained resources, they have to adopt some strategies to target firms for investigation, such as to prioritize large companies, unambiguous cases or serious frauds. As far as the accounting profession is concerned, such pitfall could not be completely corrected. However, it could be mitigated by having more datasets where the investigated firms are selected by other authorities applying different sampling strategies. One of the analyses in Chapter 2 of this thesis employs the sample of firms subjected to investigation by the UK Financial Reporting Review Panel (FRRP henceforth), which has a rather different sampling strategy compared to the SEC and GAO in the US. Hence, the evidence linking the FRRP-investigated firms with earnings management is a complement to further mitigate the concerns of using *ex-post* measures of earnings management. Moreover, the use of the FRRP data also makes the thesis especially distinctive compared to previous UK-based studies.

Research on corporate governance thrives significantly in the US thanks partly to the very rich and readily available datasets on the characteristics of the boards of directors and executive compensation, such as Risk Metrics and ExecuComp. Although such data for the UK market is also available, it is laborious to collect the data and turn it to analysable datasets. Therefore, until recently research on corporate governance in the UK is quite thin compared to the US-based literature. Chapter 4 makes a major attempt to compile a dataset that covers compensation and biographical characteristics of executives and directors of all UK listed firms. The dataset enables the thesis to make original contribution by addressing interesting issues in the UK which have not been looked at before due to data constraint.

The time period starts from 1995 for a number of reasons. First, the Financial Reporting Standard 3 (FRS3) – Reporting Financial Performance, which became effective from 1993, is an important accounting standard that arguably enhances transparency in the UK accounting environment (Athanasakou et al., 2009). Second, Datastream's data availability, especially for cash-flows-related items, is quite serious for the years before 1994. Therefore, starting from 1995 ensures the sample is free from years with too few observations and to stay within the post-FRS3 period, including lagged values needed to calculate a range of variables in this thesis. For practical reason, the thesis only collects data up to June 2013. Starting from 1995, the main sample used in Chapter 2 and 3 includes all stocks with fiscal years ending in the calendar year of 2011 to allow for the measurement of stock returns in one year afterwards. For empirical analyses which require compensation and corporate governance variables, including the multivariate regressions in Chapter 2 (Section 2.5.5.2) and Chapter 4, the sample covers the post-2005 period only because compensation and corporate governance variables need to be hand-collected directly from annual reports and it is difficult to retrieve old annual reports. Hence, the main sample used in Chapter 2 and 3 spans from 1995 to 2011 (with the subsample being used in Section 2.5.5.2 covers only from 2005 to 2011) while the sample in Chapter 4 covers the period from 2005 to 2012. Please see the sample selection sections in each chapter (Section 2.3, 2.5.5.2, 3.4.1 and 4.4) for more discussions.

CHAPTER 2

A SIGNAL-BASED COMPOSITE INDEX TO DETECT THE CONTEXT OF EARNINGS MANAGEMENT[2]

2.1. INTRODUCTION

There are several aspects of the extant literature on earnings management that could still be improved. One of the most prominent issues is the question of how to detect earnings management. Among the most theoretically-appealing and popularly-used earnings management detection models are the Jones model and its variants to estimate discretionary accruals (Jones, 1991; Dechow et al., 1995; Peasnell et al., 2000). Those models are, however, recently subject to considerable criticisms. For example, Dechow et al. (2010) observe that "the majority of the studies... are about the determinants and consequences of *abnormal accruals* derived from accrual

[2] The chapter has been greatly benefited from the comments and advices of Beatriz Garcia Osma, William Rees, Ane Tamayo, Mark Clatworthy, Elisabeth Dedman, Daniel Coulombe, Karin Thorburn, Soo Hee Lee, Warwick Funnell as well as three anonymous reviewers, the reviewers and participants at the 2013 and 2014 British Accounting and Finance Association Annual Conference and Doctoral Colloquium, 2014 European Accounting Association Annual Congress and Doctoral Colloquium, 2015 European Accounting Association Annual Congress, 2015 Financial Management Association European Doctoral Student Consortium, 2015 European Financial Management Association Annual Conference and 2015 American Accounting Association Annual Meeting.

models, with the idea that abnormal accruals, whether they represent errors or bias, erode decision usefulness". In other words, the literature has over-relied on models, such as the accruals models, to disentangle the component of earnings subject to managers' discretion from the 'normal' level of performance without fully appreciating that discretionary accruals is a 'noisy' measure of earnings management. A number of studies share the same concern (for example, Holthausen et al., 1995; Fields et al., 2001; Ball, 2013; Owens et al., 2013). With the lack of a comprehensive theory on the accruals generating process (i.e. what accruals would be if there is no manipulation), as a profession researchers are using (allegedly) mis-specified model trying to measure the 'immeasurable' (McNichols, 2000; McNichols, 2002; Dechow et al., 2010; Owens et al., 2013). Other researchers also raise a concern about the implausibly large magnitude and high frequency of earnings management documented in the extant literature using accruals models (Ball, 2013; Gerakos and Kovrijnykh, 2013). Ball (2013) "worries" that the current practice that considers positive (negative) discretionary accruals as income-increasing (income-decreasing) earnings management seems to create "the incorrect belief" that earnings management is "rife" because technically "no observation sits exactly on the regression line".

This chapter attempts to mitigate the above-mentioned weaknesses of the literature. Given the well-acknowledged difficulties to reliably measure earnings management using accruals models, the key idea is to develop an approach to get round the problem by assessing the likelihood of earnings management without having to directly measure the magnitude of discretionary accruals. Hence, instead of measuring discretionary accruals, the chapter develops an empirical proxy that captures the context in which earnings management is more likely to occur[3]. The

[3] Within this thesis, 'the context of earnings management' is defined as the factors that reveal firm's incentives, pressures, constraints and innate factors which suggest earnings

advantage of this approach is that the resulting model does not affirmatively indicate the magnitude of earnings management if it does happen, the area which currently attracts great criticism in the earnings management literature. The model only ‘flags up’ firms which are suspicious based on the context surrounding it.

After decades of growth, the literature on earnings management now has quite a few generally accepted areas of consensus about the signals of earnings management behaviour (Dechow et al., 2010). For example, it has been well documented that firms would manage earnings when certain things happen or in certain conditions, such as prior to equity issues (Teoh et al., 1998b; Cohen and Zarowin, 2010; DuCharme et al., 2004; Siew Hong and Wong, 2002; Rangan, 1998; Shivakumar, 2000; Iqbal et al., 2009; Iqbal and Strong, 2010) or when earnings would otherwise miss an important benchmark (Burgstahler and Dichev, 1997; Gore et al., 2007). Such evidence is strong and has been documented in different markets and in different time periods. Based on the rich established literature on the indicators of earnings management, this chapter is the first attempt to develop a model of earnings management detection based on a systematic analysis of the financial statements for suspicious signals of earnings management. The signals are those which have been shown in the literature as effective indicators of earnings management.

In total, the chapter aggregates fifteen individual signals, all transformed into binary variables that take the value of either one (if suspicious) or zero (otherwise), into a composite index, namely ESCORE. The signals are grouped into four broad categories. The first category covers capital-market-driven incentives. The first three signals in this category includes binary variables which take the value of one if there is (i) an equity issue, (ii) a debt issue and (iii) a share-financed merger and acquisition

management is more likely to occur. Please refer to Section 2.4 for more discussion on this definition.

(M&A hereafter), zero otherwise. Intuitively, if a firm is going to raise capital (e.g. equity or debt) or finance an M&A by shares, the managers, assumingly working to maximize existing shareholders' wealth, might want to inflate earnings to temporarily boost stock price up to gain advantage in the transaction (e.g. Teoh et al., 1998b; Cohen and Zarowin, 2010, Athanasakou and Olsson, 2012, Botsari and Meeks, 2008). In addition, following Jensen (2005) who suggests that overvalued firms would manage earnings to avoid stock price correction, the fourth (iv) signal in this category is designed as a binary variable which is one if a firm's share is overvalued, zero otherwise.

The second category captures external pressures. To start with, listed firms are under strong pressures to meet or beat earnings benchmarks to avoid market penalty. The existing literature provides strong evidence that firms would inflate earnings when the unmanaged earnings is close to important benchmarks, including zero earnings, last year's earnings and cash dividend (e.g. Burgstahler and Dichev, 1997; Daniel et al., 2008). Consequently, the first three signals in this category are when reported earnings (v) is very small, (vi) has changed by a small margin compared to last year, and (vii) is slightly higher than total cash dividends. The rest of the signals in this category capture the pressures faced by (viii) firms which are in financial distress, (ix) those with limited use of debt, (x) small firms and (xi) those which are still in the early stage in their business life cycle. Firms operating in those situations have been shown to be highly susceptible to earnings management (e.g. Lara et al., 2009; Astami and Tower, 2006; Lang and Lundholm, 1993; Skinner and Sloan, 2002).

The third category captures the constraints to earnings management. The first signal in this category turns on when (xii) a firm's external auditor is not one of the reputable big auditing firms. The literature strongly suggest that being audited by more reputable external auditors would effectively constrain firms from manipulating its accounts (e.g. Becker et al., 1998; Francis et al., 1999). Another constraint to earnings management is the balance sheet bloat. Is has been shown that if a firm has managed earnings too much in the past, net operating asset on the balance sheet would be bloated and, because of the reversal nature of accruals, it would be increasingly more difficult for further earnings management to be engaged (e.g. Barton and Simko, 2002). Following this established intuition, the last signal in this category would turn on when (xiii) net operating asset is too low, a sign that there is still plenty of room for earnings management.

Lastly, the fourth category covers firm's innate characteristics. The first signal turns on for (xiv) firms with low tangible asset intensity, a factor which has been shown to be associated with higher likelihood of earnings management (e.g. Francis et al., 2004). Finally, the last signal is designed to take the value of one if (xv) reported earnings is too different from taxable income, zero otherwise. If this signal turns on, assuming that it is difficult to manipulate taxable income, it is a sign that reported earnings might have been managed (e.g. Hanlon and Heitzman, 2010).

Based on the above fifteen individual signals, each has a value of either one or zero, the composite ESCORE is constructed as the sum of the individual signals. ESCORE can, therefore, theoretically range from zero to fifteen, with higher values suggesting higher likelihood that the firm is engaging in earnings management.

Using a sample of UK listed firms during the period from 1995 to 2011, the chapter tests the efficacy of ESCORE in capturing the context of earnings management. The chapter provides evidence to support the effectiveness of ESCORE in capturing the context of earnings management by showing that high ESCORE stocks indeed engage in earnings management in larger magnitude and are more likely to engage in aggressive earnings management practices. The chapter also finds that firms which are investigated by the FRRP have higher ESCORE in the year to which the investigation is related. The FRRP is responsible for ensuring that public companies in the UK comply with applicable laws and financial reporting standards. Firms which are selected by the FRRP for investigation are typically those which have signs of violating accounting standards (such as being complained by the public) or have some sensitive operations which could easily attract frauds and/or errors. Hence, the evidence on the association of ESCORE with the likelihood of investigation by FRRP could further suggest that ESCORE indeed captures the context in which earnings management is more likely.

ESCORE is shown to be a simple, yet highly effective, model to detect earnings management. The model promises to be a useful tool for practitioners in accessing the trustworthiness of reported earnings, one of the most important figures on which practitioners base their investment decisions. The model is also useful for academic research, especially in settings where the problem of data unavailability is severe. In such settings, using ESCORE as a proxy for earnings management is superior to existing measures of discretionary accruals and real earnings management proxies since it does not involve data collection for whole industries or unreliable regressions with too few observations. As Dechow et al. (1995) point out, existing models of earnings management detection may need hundreds of observations to have a reasonable chance of detecting more subtle earnings management cases. ESCORE can also mitigate this limitation to enhance the ability to detect earnings management.

The rest of the chapter is organized as follows. Section 2.2 reviews the literature on existing models of earnings management and discusses the need for a new signal-based model. Section 2.3 explains the sample selection procedures. Section 2.4 describes the procedures to construct ESCORE. Section 2.5 presents and discusses the results of the main tests on the construction and efficacy of ESCORE. Section 2.6 reports the results of some robustness checks while Section 2.7 provides some concluding remarks. Section 2.8 provides the definitions of all variables used in this chapter.

2.2. EARNINGS MANAGEMENT DETECTION MODELS: A LITERATURE REVIEW

This chapter aims at developing a new model of earnings management detection which accumulates individual signals indicating the existence of earnings management. Therefore, the chapter makes a direct contribution to the literature on earnings management detection models which is reviewed in this section. The purpose of the review is to examine the strengths and weaknesses of major existing earnings management detection models and against that background argue how the new model introduced in this chapter could make a meaningful contribution. Furthermore, the chapter also builds upon the literature which looks at various internal and external factors which make a firm more likely to engage in earnings management. This literature will be reviewed separately in Section 2.4 along with the selection of the signals to be included in ESCORE.

2.2.1. Accruals earnings management

The adopted definition of earnings management as presented in Section 1.1 suggests earnings could be managed in various ways. As a result, there are several existing models to detect earnings management. The most popular method measures discretionary (unexpected or abnormal) accruals, the deviation of actual accruals from an expected level of accruals derived using some firm-specific characteristics (Jones, 1991; Dechow et al., 1995; Peasnell et al., 2000; Dechow and Dichev, 2002). Although there are a few variants to the models to estimate discretionary accruals, typically in the first stage a measure of accruals is regressed on some exogenous variables, such as revenues and plant, property and equipment, which are assumingly outside the discretion of managers. In the second stage, the estimated coefficients from the first-stage regression are then used to calculate a ‘normal’ level of accruals, from which the deviation of actual accruals is termed ‘abnormal’ and used as proxy for earnings management. The abnormal accruals model helps detect one type of earnings management, namely managers exercise their discretion over accounting methods to influence reported earnings.

Jones (1991) introduces one of the most widely-used models of earnings management detection. Jones estimates discretionary accruals for each firm using time-series data, an approach which is subject to several criticisms, including the potential structural changes to the relationship between the fundamentals and accruals across time and the issue of survivorship bias. DeFond and Jiambalvo (1994) suggest a cross-sectional approach which could mitigate these concerns. Dechow et al. (1995) provide an important improvement to the Jones model by adjusting for credit sales, a component of total sales which is within manager's discretion. Dechow et al. (1995) test the power of various earnings management detection models and confirm that the modified-Jones model is the most powerful one. Peasnell et al. (2000) reach similar conclusion for the UK market, although they also propose the 'margin model' that seems to outperform when cash flow performance is extreme.

Although the modified-Jones model is quite commonly used in the literature, there are still various disagreements on how the model is best specified. One line of argument comes from the concerns about the role of depreciation as a means of earnings management (Young, 1999). Following this argument, many studies employ working capital accruals rather than total accruals, which also results in the removal of gross property, plant and equipment on the right-hand-side of the Jones-type models. Another criticism is related to the concerns that accruals estimated using the balance sheet approach would suffer from potential errors in the presence of 'non-articulation' transactions, such as M&A or reclassification (Hribar and Collins, 2002). Following this study, researchers start using the cash flow approach to estimate accruals. On the contrary, however, several authors claim that the cash flow approach is itself not unproblematic (Gore et al., 2007). Kothari et al. (2005) suggest a performance-matched approach to account for the correlation between performance and accruals. Nevertheless, as argued by Dechow et al. (2010), the performance-matching approach may reduce the power of the model and add more noises to the residual accruals. Overall, the extant literature currently stands at a point where the modified-Jones model or one of its variants is used extensively, but there is a lack of consensus as to how best to specify the model.

2.2.2. Real earnings management

One may argue that to change reported earnings, managers do not necessarily resort to playing around with accounting methods and estimates, but rather they could change real operation decisions, such as sales policy, production level, discretionary expense spending etc. Graham et al. (2005) present influential survey evidence suggesting many US financial executives would manage earnings via changing real operation decisions. In the UK, a survey of financial analysts also suggests that real earnings management is preferred when it comes to meeting or beating consensus analysts' forecast (Choi et al., 2006). As a result, earnings management research in the late 2000s onwards has a clear shift towards real earnings management rather than focusing only on accruals earnings management.

To detect real earnings management, the existing literature normally measures the deviation of the actual level of real activities with the expected level derived using some firm-specific information. In an influential study, Roychowdhury (2006) finds that firms inflate earnings to avoid reporting losses via boosting up sales through more discounts and more lenient credit terms, overproduction and reduction of discretionary expenses. Roychowdhury (2006) models the 'normal' levels of cash flow, production cost and discretionary expenses as a function of some fundamentals such as the level and change in sales. In a manner similar to when discretionary accruals is estimated, the deviations of the actual levels from the 'normal' levels are then used as proxies for real earnings management. Roychowdhury (2006) argues that firms are managing earnings upwards if they exhibit low abnormal cash flows, high production costs and low discretionary expenses. A vast amount of subsequent studies employ Roychowdhury's (2006) model to capture real earnings management. Gunny (2010) introduces three measures of abnormal research and development expenses (R&D hereafter), selling, general and administrative expenses and gains on asset sales, generally using the same procedures as in estimating discretionary accruals. Zang (2012) finds that managers use accruals and real earnings management as substitutes based on the relative costs and benefits of each method. Real earnings management has also been shown to be increasingly more popular given the increase in financial reporting regulations (Cohen et al., 2008).

In general, real earnings management has attracted a lot of attention which results in various models to detect it. Those models, however, are developed in similar manner as the discretionary accruals models, hence they also suffer from the same pitfalls as applicable to the discretionary accruals models, including model mis-specification as a result of the lack of an underlying theory which could explain what the 'normal' level of real activities would be in the absence of real earnings management. Extant evidence obtained from applying existing models of real earnings management could, therefore, be attributable to measurement errors and is as a result subject to considerable scepticism.

2.2.3. Other earnings management detection models

Apart from the above accruals and real earnings management detection models which have been used very popularly in the literature, there are also a number of other notable ones. Gerakos and Kovrijnykh (2013) develop a model which could detect both accruals and real earnings management by exploring the time-series properties of earnings. They demonstrate that earnings management often results in serial correlation patterns in earnings, hence if the second-order autocorrelation of the residual from regressing current earnings on lagged earnings is negative, it would indicate the presence of earnings management. Leuz et al. (2003) create a composite measure of earnings management to be used in an international context which aggregates four existing measures of earnings management into an index. A body of the literature also develops different approaches to detect earnings management which are based on analyses of observed signals. Based on twelve signals which may reveal managerial incentives and/or ability to violate GAAP, Beneish (1997) develops a model to identify GAAP violators from accruals aggressors. Beneish (1999a) provides an accounting-based index which could help assess the likelihood of earnings overstatement. Dechow et al. (2011), however, argue that Beneish's model is difficult to be used in practice due to its use of indices and matching procedures. They, therefore, develop a new model, namely the FSCORE, which can help predict the likelihood of earnings restatement. They start with an analysis of the characteristics of restated firms and employ a logistic regression to estimate the relation between firm's characteristics and the likelihood of misstatement. FSCORE is used as a 'thermometer' for financial statement users to quickly and timely assess the likelihood of earnings misstatements.

Beneish (1997), Beneish (1999a) and Dechow et al. (2011) pave an innovative and highly practical way to detect earnings management. Nevertheless, these models are not entirely free from limitations. One issue is the focus on firms subject to enforcements by the SEC. Those firms are typically large since SEC would aim to maximize public benefits given its constrained budget. Moreover, Dechow et al. (2010) also highlight that SEC is more likely to target egregious misstatements and avoid ambiguity cases of aggressive but within-GAAP earnings management. Thus, the predictive power of the models cannot be generalized to other firms engaged in earnings management but not enforced by SEC.

2.2.4. Summary: Existing models to detect earnings management and the case for a new model

In general, the above-mentioned models of earnings management detection, albeit being used widely by academics, are subject to various criticisms. Dechow et al. (1995) note that existing discretionary accruals models typically require hundreds of observation to have a reasonable chance of detecting subtle earnings management. Data constraints and the complexity of econometric methods also mean existing models of earnings management detection is hard to be used in practice. To be more specific, using the Jones-type models, when an analyst wants to know if firm A is engaging in earnings management, he or she needs to gather information either for all firms in the same industry or for firm A across many years, then perform a regression before a measure of discretionary accruals can be estimated. From a practical perspective, even ignoring the complexity of the econometric procedures which can in many cases discourage an average investor, the approach suffers from the look-ahead bias, i.e. at the time firm A releases its financial statement, information for the whole industry may be incomplete since there are firms which release their financial statements later. In addition, if firm A is a newly listed firm with little historical information, the estimation of discretionary accruals using time-series approach is impossible. Furthermore, the problem of data unavailability could be intensified in smaller markets which effectively prevents us from gaining more knowledge on earnings management behaviour in those interesting settings. Existing real earnings management detection models also suffer from the same pitfalls highlighted above because the way they are estimated is generally similar to estimating discretionary accruals. Therefore, it would certainly be preferable if there is a more practical model that allows easy and realistic application in practice without having to collect large datasets.

Furthermore, the Jones-type and real earnings management models are also subject to fierce criticism regarding the possibility of model mis-specification. In the absence of an underlying theory which could predict what accruals and real earnings management levels would look like if there is no earnings management, the development of existing models seems *ad hoc*, if not unfounded. Consequently, the issue could lead to potentially large measurement errors (see, for example, Holthausen et al., 1995; Fields et al., 2001; Ball, 2013; Owens et al., 2013). Also, using Jones-type and real earnings management models to detect earnings management results in too high frequency of earnings management and too large magnitudes of those manipulation which also attracts a lot of scepticism (Ball, 2013; Gerakos and Kovrijnykh, 2013). The development of signal-based models to detect earnings management seems to be a good direction to respond to those criticisms. However, this line of research is still under-researched with only a few notable contributions which also have pitfalls, such as the sample selection bias (e.g. Beneish, 1997; Beneish, 1999b; Dechow et al., 2011).

The above-discussed literature creates the niche to which this chapter contributes. The chapter develops a model that can reliably detect earnings management, yet is easy to construct and apply in practice. The model developed in this study would base only on observable data and accumulate individual signals, all of which have been translated into binary variables to make it easy to construct. This approach is arguably more convenient for real-life application and the model can give implications beyond enforced manipulators. The next section (Section 2.4) will explain the sample selection procedures before the model construction and testing are presented in Section 2.5.

2.3. SAMPLE SELECTION

The following procedures are applied to derive at the sample which is used in both Chapter 2 and 3. The sample comprises all UK listed stocks on London Stock Exchange (LSE hereafter) during the period from 1995 to 2011. Data is collected mainly from Datastream, except for external auditor and M&A deals which are collected from Bloomberg. Data from Datastream and Bloomberg are combined using the International Securities Identification Number (ISIN hereafter). To avoid survivorship bias, both live and dead stocks are included.

The sample starts with Datastream's constituent lists which consist of all UK listed live and dead stocks. From these initial lists, the first screen is conducted to keep only ordinary shares traded on the LSE (i.e. preferred shares, indices, depository receipts and ordinary shares not traded on the LSE are excluded). To facilitate the matching between data from Datastream and Bloomberg, any stocks which do not have an ISIN are excluded. Financial and utilities firms are excluded due to their distinct financial reporting requirements. Following Gore et al. (2007), for firms which have more than one types of ordinary shares, only one is included in the sample. To ensure comparability, the sample is also restricted to include only firms which report financial figures in Pound Sterling (£) and whose financial years have between 350 and 380 days. Firms with market value less than £1 million are also excluded to avoid very small firms which are typically very thinly traded in practice but can influence the returns on the equally-weighted portfolios. The exclusion of small firms also mitigate the concerns about Datastream's returns data raised by Ince and Porter (2006). In addition, stocks with negative book value of equity are also excluded. Finally, further requiring data availability to calculate all variables needed for Chapter 2 and 3 results in a final sample of 11,920 firm-year observations, consisting of 1,866 unique firms across 43 Datastream level-six industries. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

2.4. THE CONSTRUCTION OF ESCORE

One of the key innovations of this chapter is the empirical measure of the context of earnings management. Within the scope of this thesis, the 'context of earnings management' is defined as the incentives to manage earnings, the pressures under which managers are more likely to resort to earnings management to respond, the constraints to earnings management and the innate factors of the firm which could indicate the existence of earnings management. This is certainly not a 'comprehensive' definition in the sense that it could not capture every signals which suggest earnings management. The chapter deliberately focuses mainly on the context which could be easily extracted from financial statement information, hence the exclusion of areas such as performance-linked compensation, corporate governance, institutional and managerial holdings etc. The reason is twofold. First, the chapter aims to create a parsimonious model which covers a reasonable range of signals for which data can be easily obtained in practice. This feature of the model makes it more useful for practitioners who want to apply the model in their trading practices. Second, if compensation, corporate governance, institutional and managerial holdings variables are included, the constraint of data availability could severely depress the sample size. Dechow et al. (2011) argue that an inclusion of those variables would introduce biases into the sample due to data unavailability. Nevertheless, those omissions do not affect the main conclusions obtained from this chapter. Future research is invited to expand the model to cover these aspects of the context of earnings management.

In this study, an aggregate index, namely ESCORE, is constructed as the sum of fifteen individual binary variables, each takes the value of one if a firm has a suspicious signal and zero otherwise. The selection of these signals is mainly guided by the extant earnings management literature. The signals are grouped into four categories and presented in Section 2.4.2, 2.4.3, 2.4.4 and 2.4.5 before Section 2.4.6

explains how the aggregate ESCORE is created based on those signals. A number of the individual signals need a 'benchmark' to construct. For example, although small firms might be suspicious of earnings management, a 'benchmark' is needed to determine which firms should be considered as 'small'. Such 'benchmarks' should reflect the characteristics of the corresponding industry. Therefore, before ESCORE and its components are explained, the next section will start by explaining how those benchmarks are constructed.

2.4.1. Benchmark construction procedure

First, for each industry-year, firms are ranked based on γ, where γ represents the relevant individual signals used in this study which need benchmarks to construct. For example, market-to-book ratio and book-tax difference require an upper benchmark to determine which sample firms have those signals being too high. Contrarily, firm's size, debt ratio, net operating assets and tangible asset intensity require lower benchmarks to determine which of the sample firms have those signals being too low[4]. For market-to-book ratio and book-tax difference (firm's size, debt ratio, net operating assets and tangible asset intensity), the 80th (20th) percentiles[5] in each industry-year are determined and used as the upper (lower) benchmarks. The upper and lower benchmarks are denoted as $\gamma_{k,t}^{80}$ and $\gamma_{k,t}^{20}$, respectively, where k = 1... 43 are the unique Datastream level-six industries remained in the sample, and t = 1995... 2011 represent the 17 sample years.

[4] The next four sub-sections discuss these variables in detail.

[5] The cut-off points are set at 20th and 80th percentiles to ensure the resulting individual signals would not flag up too many firms as 'suspicious'. However, it is admittedly an arbitrary choice. Although it is needed for the research to go ahead, all main analyses in Chapters 2, 3 and 4 which use ESCORE are replicated using the cut-off points at 25th and 75th percentiles as well as 10th and 90th percentiles. Unreported results show that none of the main conclusions of the thesis are sensitive to the choice of the cut-off points to construct ESCORE.

2.4.2. Incentives: Equity issue, debt issue, share-for-share merger and acquisition, and stock overvaluation

The first category of signals which constitute the aggregate ESCORE covers various incentives to engage in earnings management. Under the agency theory, managers could manage earnings to maximize personal incentives, such as performance-linked compensation (Jensen and Meckling, 1976). However, in this study, such personal incentives are deliberately excluded to keep the resulting model parsimonious and to restrict the model's inputs to only information which could be easily extracted from financial statements. Therefore, this category selects the incentives for earnings management based on the assumption that managers manage earnings in response to those incentives in order to maximize shareholders' wealth.

First, there is strong evidence that firms would inflate earnings prior to equity issues (Teoh et al., 1998b; Cohen and Zarowin, 2010; DuCharme et al., 2004; Siew Hong and Wong, 2002; Rangan, 1998; Shivakumar, 2000; Iqbal et al., 2009; Iqbal and Strong, 2010). To capture this incentive, ESEO, a dummy which turns on if a firm has a seasoned equity offering (SEO hereafter) in a year[6]. In particular, ESEO is defined as a dummy that takes the value of one if (i) a firm's outstanding shares increase by at least 5% compared to last year and (ii) there are positive proceeds from issuing ordinary/preferred stocks, zero otherwise[7]. If data on proceeds from issuing ordinary/preferred stocks is missing from Datastream, a value of zero is used

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[6] In this study, initial public offerings (IPOs hereafter) are not considered since many of the signals need up to two years of lagged data, hence data availability constraint would technically eliminate those initial public offerings. However, initial public offerings represent only a small number of observations in the sample.

[7] Firms which satisfy only (i) could have done a stock split rather than a stock issue, while those which satisfy only (ii) could have not issued ordinary shares (e.g. issuance of preferred stocks or proceeds from stock options… also yield positive proceeds from issuing ordinary/preferred stocks). Therefore, the chapter requires both conditions to be satisfied.

as a replacement rather than dropping the observation. This approach is to ensure the sample is not depressed unnecessarily because this data is more likely to be missing because the firm does not report the item if the value is zero rather than a real missing data (i.e. the item has a non-zero value but not retrievable from Datastream)[8]. Similar approach will be used for other data which shares this feature, i.e. a missing data is more likely to be a zero value and each time the replacement approach is used, it will be clearly stated.

Second, there is also a great incentive for managers to 'decorate' financial statements prior to a major debt issue to negotiate the cost of debt down and/or to have better terms of the debt contract. Athanasakou and Olsson (2012) find a positive relationship between an indicator of debt issue and earnings management. To capture the incentive to inflate earnings prior to debt issues, EDDEBT is defined as a dummy that takes the value of one if DDEBT is 5% or higher, where DDEBT is calculated as the percentage change of total of short- and long-term debts[9] compared to last year, zero otherwise. The 5% benchmark is employed to make sure the issue is large enough for managers to consider managing earnings.

Third, firms have strong incentives to inflate earnings prior to share-for-share M&A deals in an attempt to temporarily push stock price up to minimize the number of shares paid. Strong empirical evidence has been documented for the income-increasing earnings management prior to share-financed M&A deals in the US and the UK (Erickson and Wang, 1999; Botsari and Meeks, 2008; Louis, 2004). Following

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[8] To check the validity of this assumption, a random sample of 50 observations with missing proceeds from issuing common/preferred stocks in years 2010 and 2011 are selected and traced to original financial statements obtained through Key Note platform. In all of those sampled instances, the original financial statements show the firms do not have any proceeds from issuing common and preferred stocks or there is simply no such item in the financial statements.

[9] A value of zero is assigned to observations with missing Datastream's data for short-term and long-term debts.

this established literature, EMA is defined as a dummy that takes the value of one if a firm announces an M&A deal within the financial year for which share is proposed as (part of) the payment method. The data for share-financed M&A transactions is collected from Bloomberg.

The last signal in this category captures the effect of stock market overvaluation on earnings management. Jensen (2005) conjectures that overvaluation would create a pressure for firms to inflate earnings to maintain the high market valuation. Such conjecture has attracted a lot of attention as it can explain quite well the series of accounting scandals in the 2000s which involve many high profile firms. There is empirical evidence to support the case that overvaluation would induce income-increasing earnings management (Chi and Gupta, 2009; Houmes and Skantz, 2010; Badertscher, 2011). To capture this signal, the next variable, EOV, is defined as a dummy that takes the value of one if a firm's beginning market-to-book ratio (denoted MTB), calculated as market value of equity at the end of fiscal year divided by ordinary shareholders' equity, is higher than the corresponding $MTB_{k,t}^{80}$, zero otherwise.

2.4.3. Pressures: Meeting or just beating earnings benchmarks, financial distress, debt level, firm size and business life cycle

For companies whose stocks are listed on an exchange, there are several earnings benchmarks which need to be met if the companies do not want to be penalized by means of a drop in their stock price. Burgstahler and Dichev (1997) document a discontinuity of earnings around two important benchmarks, namely zero earnings and last year's earnings. A similar pattern has also been documented in the UK (Gore et al., 2007). Following Gore et al. (2007), to capture the pressure to meet or beat zero earnings benchmark, EROA is defined as a dummy that takes the value of one if a firm's returns-on-assets ratio (denoted ROA), calculated as earnings before extraordinary items scaled by beginning total assets, is equal to or larger than zero but smaller than 0.01, zero otherwise. EDROA, employed to capture the pressure to avoid reporting earnings decreases, is defined as a dummy that takes the value of one if a firm's DROA, calculated as the change of earnings before extraordinary items compared to last year scaled by beginning total assets, is equal to or larger than zero but smaller than 0.005, zero otherwise.

Furthermore, there is also evidence that firms would engage in earnings management if the unmanaged earnings fall short of the expected dividends by small amount (Daniel et al., 2008; Atieh and Hussain, 2012). To capture this pressure, EDIV is defined as a dummy that takes the value of one if a firm's dividend deficit, denoted as DIVDEF, calculated as the difference between net income and total cash dividends[10] scaled by beginning total assets, is equal to or larger than zero but smaller than 0.01, zero otherwise.[11]

Firms which are in financial distress are understandably under pressure to inflate earnings. Lara et al. (2009) provide evidence that financially distressed firms manage earnings upwards. Beneish (1997) reports that financial distress is a factor that leads to GAAP violation. To capture the presence of these pressures, the UK-based ZSCORE is calculated following Taffler (1983) as follows:

$$ZSCORE = 3.2 + 12.8x_1 + 2.5x_2 - 10.68x_3 + 0.029x_4 \quad \text{(E2.1)}$$

where: x_1 is pre-tax income divided by current liabilities; x_2 is current assets divided by total liabilities; x_3 is current liabilities divided by total assets; x_4 is quick assets

[10] A value of zero is assigned to observations with missing Datastream's data for cash dividends.

[11] Beside zero earnings, last year's earnings and dividends, consensus analysts' forecast is also an important earnings threshold. However, consensus analysts' forecast benchmark is not considered in this study since the data for this signal is not always easy to collect in practice.

minus current liabilities divided by daily operating expense, where daily operating expense is sales minus pre-tax income minus depreciation expense divided by 365.

Taffler (1983) and Agarwal and Taffler (2007) have showed that UK firms with negative ZSCORE is more likely to go bankrupt. Following the established evidence, EDISTRESS is defined as a dummy that takes the value of one if a firm's ZSCORE is negative, zero otherwise.

The use of debt also has implications about earnings management. Watts and Zimmerman (1986) suggest that debt contracts have vital influence on firms' accounting policy. On one hand, higher level of debt would induce pressure for firms to inflate earnings. Indeed, debts usually come with some covenants which firms need to comply with. Breaking debt covenants would lead to firms being penalized by means of higher cost of debt (Dichev and Skinner, 2002). Therefore, firms with more debt have a greater pressure to manage earnings to avoid violation of debt covenants. DeFond and Jiambalvo (1994) find that abnormal accruals is significantly higher in the years preceding debt covenant violation. Ghosh and Moon (2010) find that firms with high level of debt would have strong incentive to manage earnings. On the other hand, however, the literature also suggests that firms with low level of debt are also likely to engage in earnings management (Astami and Tower, 2006). In addition, the evidence that financial leverage is positively related to accounting conservatism (Watts, 2003a; Watts, 2003b; Pae, 2007) implies that firms with little debt are less bound contractually and their reported earnings are less subject to scrutiny from lenders, hence there are more scope for earnings management. In brief, the literature suggests that firms which have either too high or too low level of debt are suspicious of earnings management. The ZSCORE as explained earlier has already captured firms with high debt (x_3 in the ZSCORE is in fact a measure of leverage, the larger of which would reduce ZSCORE). To capture firms with low level of debt, EDEBT is defined as a dummy that takes the value of one if a firms' beginning DEBT, measured as the total of short- and long-term debts scaled by total assets, is lower than the corresponding $DEBT_{k,t}^{20}$, zero otherwise.

It has been found that it is more difficult for large firms to manage earnings due to their high public visibility (Lang and Lundholm, 1993; Dechow and Dichev, 2002). Smaller firms, on the contrary, usually face less public attention and struggle to perform under various financial constraints. Hence small firms are often more likely to engage in earnings management, especially if the managers believe the struggles are just transitory. To capture this signal, ESIZE is defined as a dummy that takes the value of one if a firm's beginning market value of equity (denoted MVE) is lower than the corresponding $MVE_{k,t}^{20}$, zero otherwise.

The last variable in this group, ECYCLE, is constructed to capture firms which are in the introduction and growth stage in their business life cycle. Young listed firms, most of which are using funds from the capital market for the first time, are usually under pressure to perform and grow. Earnings management could be a way for those young listed firms to respond to such pressure (Beneish, 1997; Dopuch et al., 1987). Growth firms usually face strong investment opportunities and are expected to deliver sound growth and financial performance. Fama and French (1995) show that growth firms typically report higher earnings. Lakonishok et al. (1994) suggest that the market generally places too much expectation on growth stocks which results in market overreaction. Under such pressure, firms might have to resort to earnings management should their underlying economic performance fall short of the expectation to avoid market penalty. Such prediction that growth firms manage earnings has been substantiated by empirical evidence (Skinner and Sloan, 2002; Sawicki and Shrestha, 2008). To capture the pressure to management earnings induced by business life cycle, following Dickinson (2011) ECYCLE is defined as a dummy that takes the value of one if a firm's operating cash flows are negative, financing cash flows are positive and investing cash flows are negative (introduction stage), or its operating and financing cash flows are positive while its investing cash flows are negative (growth stage), and zero otherwise.

2.4.4. Constraints: External auditor and balance sheet bloat

External audit quality also plays a major role in constraining accruals earnings management (Becker et al., 1998; Francis et al., 1999). Krishnan (2003) finds that firms whose external auditors have more industry experience on average have less discretionary accruals. Following the established literature, several studies have used an indicator of firms being audited by the Big 5 as a control variable in regression where the dependent variable is discretionary accruals and in general a significant negative relationship is found (Zang, 2012; Athanasakou and Olsson, 2012). In this study, EAUDIT is defined as a dummy that takes the value of one if a firm is not audited by the Big 5 accountancy firms[12].

Due to the reversal nature of accruals, past use of accruals earnings management would act as a constraint to further engagement (Barton and Simko, 2002; Baber et al., 2011). In the extant literature, net operating asset (denoted as NOA hereinafter) is usually used to measure the ‘balance sheet bloat’ which captures the constraint induced by past engagement in accruals earnings management (Houmes and Skantz, 2010). Firms with high NOA have been shown to engage extensively in income-increasing accruals earnings management in the past, which in turn constrains their ability to further manage accruals. Following the literature, NOA is calculated as the sum of net book value of equity and total debts minus cash

[12] The Big 5 is defined as the following firms and their affiliates: Arthur Andersen, Deloitte Touche Tohmatsu, Ernst and Young, KPMG, PriceWaterhouseCoopers. In the thesis, the term ‘Big 5’ is used for simplicity; however, during the period from 1995 to 2011, it could be Big 6 (before Price Waterhouse merged with Coopers and Lybrand) or Big 4 (after the collapse of Arthur Andersen). If data on the auditor is missing from Bloomberg for a firm in a year, it is assumed that the firm is not audited by a Big 5 auditor.

and cash equivalents, all scaled by total assets. EBLOAT is defined as a dummy that takes the value of one if a firm's beginning NOA is lower than the corresponding $NOA_{k,t}^{20}$, zero otherwise. EBLOAT would identify firms which has very low NOA, a sign that there is still scope for further engagement in accruals earnings management.

2.4.5. Innate characteristics: tangible assets intensity and book-tax difference

Earnings management is engaged not only because of managerial motives, but also due to some innate factors (Dechow and Dichev, 2002; Francis et al., 2005; Francis et al., 2004; Athanasakou and Olsson, 2012). Dechow and Dichev (2002) suggest some important innate factors which could imply earnings management, including the variability of some fundamentals such as sales or cash flows, firm size, operating cycle and incident of losses. It has also been shown that the intensity of intangible and tangible assets is inversely related to earnings quality (Francis et al., 2004; Athanasakou and Olsson, 2012). Several of these innate factors, including firm size, operating cycle and incident of losses, have been covered in the signals presented earlier. In this study, the variability of sales and cash flows, which requires long history of data to calculate, is not considered because requiring long history of data would eliminate young firms from the sample, a practice that may introduce bias to the sample since some earnings management signals (e.g. ECYCLE) are designed to capture young firms. The intensity of intangible assets is also not considered due to insufficient data to establish the industry benchmarks[13]. To capture the intensity of tangible assets, CAP is calculated as the ratio of property, plant and equipment divided by total assets. The literature has shown that smaller CAP is associated with

[13] Many UK listed companies during the sample period do not report research and development expenses. A common approach in the literature is to replace those missing values by zero. Nevertheless, having too many zero values makes the lower benchmarks in many industry zero, which is quite problematic to use.

poor earnings quality, hence the relevant firms are suspicious of earnings management (Athanasakou and Olsson, 2012; Francis et al., 2004). ECAP is defined as a dummy that takes the value of one if a firm's beginning CAP is smaller than the corresponding $CAP_{k,t}^{20}$, zero otherwise.

Lastly, the effect of book-tax conformity on earnings management is also strongly documented in the literature (Hanlon and Heitzman, 2010; Athanasakou and Olsson, 2012). If one agrees that taxable profits are generally difficult and costly to manipulate, the more accounting earnings diverge from taxable profits, the more likely that such accounting earnings have been manipulated. There is empirical evidence in support of such intuition (Desai, 2005). Following the literature, BOOKTAX is calculated as the absolute value of the difference between reported pre-tax income and an estimate of total taxable profits, denoted TTP, all scaled by sales. In the UK during the period from 1995 to 2011, the particular rules on corporate tax vary considerably, but most of the changes are for the tax rates and marginal reliefs while the principles could be summarized as follows. If taxable profit is below the lower limit for marginal tax relief, corporate tax is calculated using the small profit tax rate. If taxable profit is above the upper limit for marginal tax relief, corporate tax is calculated using the main tax rate, but for firms with profit fall between the lower and upper limit, they could claim some marginal relief which essentially makes the effective tax rate higher than the small profit tax rate but smaller than the main tax rate. The chapter works back the total taxable profit based on the corporate tax expenses reported by firms (denoted TXT) and the above simplified principles of calculating corporate tax. For this calculation, the lower and upper limit for marginal tax relief (denoted LL and UL, respectively), small profit tax rate (SR) and main tax rate (MR) applicable in each sample year are sourced from HM Revenue & Customs (2013). With only published information, it is almost impossible to estimate TTP. Therefore, some assumptions need to be made to simplify the estimation. First, it is assumed that the reported tax expenses represent solely the amount of income tax levied in the considered period (i.e. no extraordinary penalty or retrospective payment or anything else of that nature). Second, for the profits that fall between the lower and upper limit for marginal tax relief, the tax rate is assumed to be the average of the small profit tax rate and the main tax rate to avoid complicated calculation. The average tax rate is denoted as AR. With those assumptions being made and the corporate tax system being simplified as summarized above, TTP is worked back from the tax expenses as follows:

- If $TXT \leq 0$, then $TTP = 0$
- If $0 < TXT \leq LL \times SR$, then $TTP = \frac{TXT}{SR}$
- If $LL \times SR \leq TXT \leq (UL - LL) \times AR$, then $TTP = \frac{TXT-(LL\times SR)}{AR} + LL$
- If $TXT \geq (UL - LL) \times AR$, then $TTP = \frac{TXT-(LL\times SR)-[(UL-LL)\times AR]}{MR} + UL$ (E2.2)

EBT is defined as a dummy that takes the value of one if a firm's BOOKTAX is higher than the corresponding $BOOKTAX_{k,t}^{20}$, zero otherwise. EBT, therefore, captures firms which have reported accounting earnings too different from taxable profits, an indication that accounting earnings might have been managed.

2.4.6. The ESCORE

The individual signals as presented above capture four dimensions of the context surrounding a firm which might suggest the existence of earnings management. The more a firm exhibits those signals, the more likely that the firm has actually managed earnings. Following that intuition, the composite ESCORE is finally calculated as the sum of all fifteen individual binary signals as follows:

$$ESCORE = ESEO + EDDEBT + EMA + EOV + EROA + EDROA + EDIV + EDISTRESS + EDEBT + ESIZE + ECYCLE + EAUDIT + EBLOAT + ECAP + EBT \quad (E2.3)$$

As designed, ESCORE is an integer which can range from zero to fifteen. The smaller (larger) ESCORE is, the less (more) suspicious the context surrounding a firm is. ESCORE has undeniably not been designed to capture *all* signals of suspicious earnings management. As explained earlier, a number of signals have been ignored (such as meeting or just beating consensus analysts' earnings forecast, sales and cash flows variability etc.). Besides, ESCORE does not cover many other areas, such as performance-linked compensation, managerial and institutional holdings, corporate governance etc. With those limitations being fully acknowledged, however, ESCORE has covered a wide range of financial-statement-based signals across different dimensions. Having designed ESCORE as an aggregate index which accumulates fifteen individual signals suggesting earnings management exists, it is important to examine whether ESCORE is appropriately constructed and whether it could actually capture earnings management. The next section will address these issues.

2.5. TESTS OF THE CONSTRUCTION AND EFFICACY OF ESCORE

The purpose of this section is two-fold. First, it provides evidence in support of the proper construction of ESCORE. In particular, the chapter looks at the efficacy of each individual signal in capturing the context of earnings management and if the model could be improved by developing some principal components. Second, the section examines whether ESCORE could indeed capture the context of earnings management in relation to the other established models of earnings management detection. Before presenting those tests, the section starts with explaining the procedures to estimate the established measures of earnings management used as benchmarks in the tests (Section 2.5.1) before the descriptive statistics and correlations of the sample are discussed (Section 2.5.2). Finally, the results of the tests are presented and discussed in Section 2.5.3, 2.5.4 and 2.5.5.

2.5.1. Empirical proxies for earnings management

To test if ESCORE could actually capture earnings management, the chapter examines how ESCORE is correlated with other traditional proxies of earnings management. This section explains how those traditional measures of earnings management, including two measures of accruals earnings management and four measures of real earnings management, are estimated.

2.5.1.1. Discretionary accruals

The chapter employs the modified-Jones model (Jones, 1991; Dechow et al, 1995) to estimate discretionary accruals as follows. First, total accruals is calculated as the difference between income before extraordinary items and net operating cash flows. The calculation of total accruals follows the cash flows approach to avoid the potential measurement errors identified by Hribar and Collins (2002). In particular, the balance sheet approach, as used in Dechow et al. (1995), may induce errors into the measurement of total accruals in the presence of non-articulation transactions, such as M&A or divestitures. Second, the cross-sectional version of the modified-Jones model (Dechow et al., 1995) is estimated for each (Datastream level-six) industry-year with at least fifteen observations:

$$\frac{AC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \qquad \text{(E2.4)}$$

where: $AC_{i,t}$ is total accruals of firm *i* in year *t,* which is calculated as income before extraordinary items minus net operating cash flows; $TA_{i,t-1}$ is total assets of firm *i* at the end of year *t – 1*; $\Delta REV_{i,t}$ is change in sales from year *t – 1* to year *t* of firm *i*; and $PPE_{i,t}$ is gross plant, property and equipment of firm *i* at the end of year *t*.

The level of discretionary accruals is then estimated as:

$$DAC_{i,t} = \frac{AC_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right)\right] \qquad \text{(E2.5)}$$

where: $DAC_{i,t}$ is discretionary accruals of firm *i* in year *t*; $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$ are the estimated coefficients from Equation (E2.4); $\Delta REC_{i,t}$ is the changes in receivables from year *t – 1* to year *t* of firm *i*.

Although there are competing models to estimate discretionary accruals (Dechow et al., 1995; Guay et al., 1996; Bernard and Skinner, 1996; Young, 1999; Thomas and Zhang, 2000; Peasnell et al., 2000; Fields et al., 2001), the existing literature generally suggests that there is no other model that clearly outperforms the modified-Jones model (Peasnell et al., 2000; Botsari and Meeks, 2008). Nevertheless, an issue that attracts considerable attention, especially in the UK context, is the treatment of depreciation in calculating accruals. Many UK studies focus only on working capital accruals arguing that depreciation is not a suitable means to manage earnings since it is highly visible and if earnings are managed through depreciation, the effects could be unwound quite easily by financial statement users (Young, 1999; Peasnell et al., 2000; Gore et al., 2007). To account for this argument, the second measure of earnings management is estimated using the 'margin model' introduced by Peasnell et al. (2000), which has been shown to work well in the UK context. In particular, working capital accruals is firstly estimated as:

$$WAC = (\Delta CA - \Delta CHE) - (\Delta CL - \Delta STD) \qquad \text{(E2.6)}$$

where: ΔCA is change in current assets; ΔCHE is change in cash and cash equivalents; ΔCL is change in current liabilities; ΔSTD is change in short-term debts.

Then the following regression is estimated within each (Datastream level-six) industry-year with at least fifteen observations:

$$\frac{WAC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \qquad \text{(E2.7)}$$

where: $WAC_{i,t}$ is working capital accruals, defined as in (E2.6), of firm *i* in year *t*; $REV_{i,t}$ is sales of firm *i* in year *t*.

Having obtained the estimated coefficients $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$ from Equation (E2.7), the discretionary working capital accruals, denoted DWAC, is calculated as:

$$DWAC_{i,t} = \frac{WAC_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t} - \Delta REC}{TA_{i,t-1}}\right)\right] \qquad \text{(E2.8)}$$

Table T2.1 presents some basic statistics of estimating the above two models of discretionary accruals to facilitate comparison with previous studies. The table reports the average coefficients across industry-years together with the t-statistics comparing the average coefficients with zero. In general, all coefficients have the predicted signs and are of similar magnitudes compared to previous studies, such as those statistics reported in Peasnell et al. (2000) and Roychowdhury (2006).

2.5.1.2. Real earnings management

As mentioned in Section 2.2, to manage earnings managers might not necessarily have to 'cook the book', but rather they could even change real activities to influence reported earnings. To consider real earnings management, the chapter follows Roychowdhury (2006) to estimate three measures of real earnings management by running the following regressions in each (Datastream level-six) industry-year with at least fifteen observations:

$$\frac{CFO_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \qquad \text{(E2.9)}$$

$$\frac{PROD_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_4\left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.10)}$$

$$\frac{DISEXP_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t-1}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.11)}$$

where: $CFO_{i,t}$ is net cash flows from operation of firm *i* in year *t*; $PROD_{i,t}$ is production cost, calculated as cost of goods sold plus change in inventory, of firm *i* in year *t*; $DISEXP_{i,t}$ is discretionary expenses, calculated as selling and general administrative expenses plus R&D expenses[14], of firm *i* in year *t.*

Using the respective sets of estimated coefficients from Equation (E2.9), (E2.10), (E2.11) above, abnormal cash flow (DCF), abnormal production cost (DPROD) and abnormal discretionary expense (DDISEXP) are then calculated as:

$$DCF_{i,t} = -1 \times \left\{\frac{CFO_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right)\right]\right\} \quad \text{(E2.12)}$$

$$DPROD_{i,t} = \frac{PROD_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_4\left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}}\right)\right] \quad \text{(E2.13)}$$

$$DDISEXP_{i,t} = -1 \times \left\{\frac{DISEXP_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t-1}}{TA_{i,t-1}}\right)\right]\right\} \quad \text{(E2.14)}$$

DCF, DPROD and DDISEXP are estimated using separate samples which require data availability only for the variables needed for each case. Table T2.2 presents some basic statistics of estimating the above models of real earnings management. The table presents the average coefficients across industry-years together with the t-statistics under the null that the average coefficients are zero. In

[14] If R&D expense is missing from Datastream, it is replaced by a value of zero.

general, all coefficients have the predicted signs and are of similar magnitude compared to those reported in Roychowdhury (2006).

Table T2.1. Average parameters across industry-years in models to estimate discretionary accruals and discretionary working capital accruals

	AC_t/ TA_{tm1} (E2.4)		WAC_t/ TA_{tm1} (E2.7)	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
Intercept	-0.0357	-9.54***	0.0036	1.32
$1/TA_{tm1}$	-0.0252	-0.71		
$\triangle REV_t/TA_{tm1}$	0.0365	4.62***		
PPE_t/TA_{tm1}	-0.0377	-5.43***		
REV_t/TA_{tm1}			0.4534	19.98***
$(REV_t - \triangle REC_t)/TA_{tm1}$			-0.4607	-20.22***
R^2	0.3007		0.3408	

Notes: Within each industry-year with at least 15 observations of available data, the following models are estimated:

$$\frac{AC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.4)}$$

$$\frac{WAC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}-\Delta REC}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.7)}$$

The table reports the average across industry-years of the parameters estimated from the above models, together with the t-statistics estimated from using the standard errors of the mean across industry-years. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.2. Average parameters across industry-years in models to estimate real earnings management

	CFO_t/TA_{t-1} (E2.9)		$PROD_t/TA_{t-1}$ (E2.10)		$DISEXP_t/TA_{t-1}$ (E2.11)	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Intercept	0.0317	1.97**	-0.2104	-14.58***	0.1757	10.37***
$1/TA_{t-1}$	-0.6555	-7.18***	-0.3496	-4.69***	1.4085	12.52***
REV_t/TA_{t-1}	0.0703	3.74***	0.7804	57.26***		
REV_{t-1}/TA_{t-1}					0.1014	7.35***
$\triangle REV_t/TA_{t-1}$	-0.0396	-0.73	-0.0241	-1.15		
$\triangle REV_{t-1}/TA_{t-1}$			-0.0373	-1.74*		
R^2	0.4570	35.1***	0.8478	107.18***	0.4055	28.93***

Notes: Within each industry-year with at least 15 observations of available data, the following models are estimated:

$$\frac{CFO_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.9)}$$

$$\frac{PROD_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_4\left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.10)}$$

$$\frac{DISEXP_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t-1}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.11)}$$

The table reports the average across industry-years of the parameters estimated from the above models, together with the t-statistics estimated from using the standard errors of the mean across industry-years. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

DCF, DPROD and DDISEXP capture three dimensions of real earnings management, namely the manipulation of sales activities, production activities and discretionary expenses. Those three ways of managing earnings could be engaged as substitutes, i.e. a manager would manipulate earnings through changing real operation decisions in one or two areas of the three, not necessarily all of them. As a result, for example, when the context suggests a firm is managing earnings and the firm decides to do it through sales manipulation, DPROD and DDISEXP are not necessarily high. It is, hence, important to look at the overall real earnings management strategy rather than just the individual ones. To facilitate this, a composite measure which pools together the three measures of real earnings management is constructed as follows:

$$TOTALRM_{i,t} = \left[\frac{DCF_{i,t}-\overline{DCF_{t,k}}}{\sigma(DCF)_{t,k}} + \frac{DPROD_{i,t}-\overline{DPROD_{t,k}}}{\sigma(DPROD)_{t,k}} + \frac{DDISEXP_{i,t}-\overline{DDISEXP_{t,k}}}{\sigma(DISEXP)_{t,k}}\right]/3 \ (i \in k) \quad \text{(E2.15)}$$

where: $TOTALRM_{i,t}$ is the composite measure of real earnings management of firm *i* in year *t*; $\overline{DCF_{t,k}}$, $\overline{DPROD_{t,k}}$, $\overline{DDISEXP_{t,k}}$ [$\sigma(DCF)_{t,k}$, $\sigma(DPROD)_{t,k}$, $\sigma(DISEXP)_{t,k}$] is, respectively, the mean [standard deviation] of DCF, DPROD, DDISEXP of all firms in industry *k* in year *t*; *k* = 1…43 are 43 unique Datastream level-six industries remained in the sample.

The above procedure converts DCF, DPROD and DDISEXP into standardized variables with similar distributions (i.e. within each industry-year, the standardized DCF, DPROD and DDISEXP are all distributed with an expected mean of zero and standard deviation of one) before adding them together. TOTALRM, therefore, captures the combined effects of the three real earnings management proxies employed in this study.

2.5.1.3. Transformation of earnings management proxies in tests of the efficacy of ESCORE

The six measures of earnings management as described above are then transformed as follows before being employed to test the efficacy of ESCORE in capturing the context of earnings management. ESCORE is primarily designed to capture the context in which earnings management is more likely to occur, not the *sign* of such manipulation. Some components of ESCORE, including ESEO, EDDEBT, EMA, EOV, EBLOAT, EROA, EDROA, EDIV, EDISTRESS, ECYCLE, predict inflationary (i.e. aggressive) earnings management, while others, including EAUDIT, EBT, ECAP, EDEBT, ESIZE, only suggest the possible presence of earnings management behaviour regardless of the sign.

Therefore, the chapter tests the effectiveness of ESCORE in two ways. First, the chapter examines if ESCORE is able to indicate the presence of earnings management, in both directions, by looking at how the absolute value of DAC, DWAC, DCF, DPROD, DDISEXP and TOTALRM (denoted ADAC, ADWAC, ADCF, ADPROD, ADDISEXP and ATOTALRM, respectively) vary across ESCORE groups.

Second, as most of the components of ESCORE suggest an inflation of earnings as discussed above, it is also expected that ESCORE could identify the context in which the most aggressive earnings management occurs. For investors, aggressive earnings management is arguably more harmful, hence it is important to see if ESCORE can indicate those circumstances. For this purpose, the chapter examines the association of ESCORE with the indicators of aggressive earnings management, denoted by HDAC, HDWAC, HDCF, HDPROD, HDDISEXP and HTOTALRM. These variables are defined as the dummy variables that take a value of one if the stock is in the top quintile ranked in each industry-year by DAC, DWAC, DCF, DPROD, DDISEXP and TOTALRM, respectively[15].

Taken together, the chapter employed twelve measures of earnings management in subsequent tests of the construction and efficacy of ESCORE (i.e. ADAC, ADWAC, ADCF, ADPROD, ADDISEXP, ATOTALRM, HDAC, HDWAC, HDCF, HDPROD, HDDISEXP and HTOTALRM).

2.5.2. Descriptive statistics and correlations

Table T2.3 reports some descriptive statistics of the sample. The mean DAC is small (0.0066) but different from zero because the variable has been winsorized. The same applies for all other earnings management variables (DWAC, DCF, DPROD, DDISEXP and TOTALRM). The mean of ROA is –0.0072 while the median is 0.0451, which shows the existence of some very large negative values. This could be a sign of the presence of firms which 'take a bath' since such practice typically involves booking very large losses. Mean market value of equity, MVE, (£390 million) is significantly larger than the median (£44 million) which suggests the existence of some very large observations. Those large firms could significantly influence the returns of value-weighted portfolios[16]. Overall, the descriptive statistics do not exhibit any abnormal pattern and are quite comparable to previous UK studies (e.g. Athanasakou et al., 2009).

Table T2.4 presents the correlations between ESCORE and its components. By construct, ESCORE is also positively correlated with all of the individual signals. The correlations between individual signals are quite low (the largest coefficient is

[15] Unreported results show that defining stocks in the top quartile or decile as aggressive firms would not qualitatively change the main results of the chapter.

[16] This aspect of the sample motivates the use of the equally-weighted scheme in forming portfolios in the main tests of Chapter 3.

0.381 between EDISTRESS and EBT) and insignificant in many cases. It suggests that the individual signals capture different uncorrelated dimensions of the context of earnings management which reinforces the construction of ESCORE as the sum of all factors.

2.5.3. Principal component analyses

Being aggregated from fifteen individual signals, an immediate question regarding the construction of ESCORE is whether those signals are correlated and thus could be reduced to a more parsimonious model through, for example, principal component analyses. To start with, it could be observed from Table T2.4 that the correlations between the individual signals are quite low, with the largest coefficient is only 0.381 (between EDISTRESS and EBT), and are insignificant in many cases. It suggests that the individual signals capture different dimensions of the context of earnings management.

Nevertheless, the chapter conducts principal component analysis to mitigate any residual concerns. Table T2.5 reports the Eigen values from principal components analysis. The first principal component, which has the largest variance of any linear combinations of the individual scores, could explain only 12.83% of the total variance. Subsequent principal components contribute about the same proportion, ranging from 9.37% to 3.96%.

Looking at the Eigen vectors in Table T2.6, there seems to be no significantly high loading on any particular variables, which suggests that none of the individual scores play a too large role in the variance of the composite ESCORE. Overall, it is unlikely that a variable reduction through principal component analysis would significantly enhance ESCORE compared to the simple sum-of-binary-variable approach. Therefore, the thesis proceeds with ESCORE as designed in Equation (E2.3) above.

Table T2.3. Descriptive statistics (n = 11,920)

	Mean	**25th percentile**	**Median**	**75th percentile**	**Standard deviation**
DAC	0.0066	-0.0447	0.0096	0.0621	0.1251
DWAC	0.0017	-0.0383	0.0026	0.0441	0.0926
DCF	0.0033	-0.0793	-0.0060	0.0661	0.2176
DPROD	0.0112	-0.0996	0.0199	0.1423	0.2627
DDISEXP	0.0059	-0.1021	0.0266	0.1486	0.3196
TOTALRM	-0.0202	-0.3648	0.0092	0.3610	0.6446
TA (£ million)	402	16	54	200	1,204
SALE (£ million)	409	14	55	232	1,149
NI (£ million)	19	-1	2	10	73
DIV (£ million)	10	0	1	4	33
MVE (£ million)	390	12	44	188	1,246
DDEBT	1.3388	-0.2759	-0.0023	0.4303	7.0904
MTB	3.3217	1.0471	1.8317	3.3463	5.0650
ROA	-0.0072	-0.0288	0.0451	0.0965	0.2201
DROA	0.0135	-0.0309	0.0095	0.0449	0.1850
DIVDEF	-0.0311	-0.0417	0.0236	0.0626	0.2091
ZSCORE	12.7507	3.0669	9.1751	18.3813	27.0573
DEBT	0.1565	0.0190	0.1292	0.2521	0.1467
NOA	0.5004	0.3636	0.5398	0.6690	0.2363
CAP	0.4524	0.1507	0.3817	0.6906	0.3463
BOOKTAX	0.8242	0.0082	0.0252	0.0997	4.1755
DAC	0.0066	-0.0447	0.0096	0.0621	0.1251
ESEO	0.2107	0	0	0	0.4078
EDDEBT	0.3790	0	0	1	0.4852
EMA	0.0498	0	0	0	0.2176
EOV	0.2161	0	0	0	0.4116
EROA	0.0344	0	0	0	0.1823
EDROA	0.0496	0	0	0	0.2171
EDIV	0.0553	0	0	0	0.2285
EDISTRESS	0.1573	0	0	0	0.3641
EDEBT	0.2436	0	0	0	0.4293
ESIZE	0.2163	0	0	0	0.4117
ECYCLE	0.0273	0	0	0	0.1631
EAUDIT	0.4453	0	0	1	0.4970
EBLOAT	0.2159	0	0	0	0.4115
ECAP	0.2157	0	0	0	0.4113
EBT	0.2149	0	0	0	0.4108
ESCORE	2.7313	1	2	4	1.7346

Notes: The table reports the mean, 25th, 50th (the median), 75th percentiles and standard deviation of selected variables. Definitions of variables are in Section 2.8.

Table T2.4. Correlations

	ESEO	EDDEBT	EMA	EOV	EROA	EDROA	EDIV	EDISTRESS	EDEBT	ESIZE	ECYCLE	EAUDIT	EBLOAT	ECAP	EBT
EDDEBT	0.078	1.000													
EMA	0.218	0.103	1.000												
EOV	0.053	*0.013*	0.034	1.000											
EROA	-0.025	*-0.008*	*-0.014*	-0.043	1.000										
EDROA	-0.049	0.022	*-0.017*	-0.026	0.021	1.000									
EDIV	-0.048	*-0.011*	*-0.010*	-0.056	0.333	0.024	1.000								
EDISTRESS	0.134	-0.042	*-0.007*	0.035	-0.049	-0.055	-0.058	1.000							
EDEBT	*-0.003*	-0.205	*0.008*	0.067	-0.043	-0.019	-0.044	0.041	1.000						
ESIZE	0.101	-0.056	*0.001*	-0.117	0.024	-0.026	*0.000*	0.153	0.058	1.000					
ECYCLE	0.101	0.029	*0.009*	*-0.003*	*-0.012*	-0.019	-0.023	0.117	*-0.003*	0.072	1.000				
EAUDIT	0.108	-0.030	0.021	*-0.003*	*-0.017*	*-0.015*	-0.037	0.061	0.089	0.223	0.029	1.000			
EBLOAT	0.025	-0.071	0.026	0.224	*-0.015*	-0.035	-0.035	0.119	0.233	0.023	*0.010*	0.020	1.000		
ECAP	0.089	-0.025	0.031	0.053	*-0.003*	-0.027	*-0.005*	0.096	0.118	0.047	0.023	0.064	0.173	1.000	
EBT	0.148	-0.056	*0.011*	*0.007*	-0.071	-0.069	-0.103	0.381	0.082	0.149	0.108	0.100	0.063	0.126	1.000
ESCORE	0.435	0.200	0.232	0.304	0.089	0.057	0.071	0.434	0.344	0.386	0.202	0.431	0.420	0.415	0.448

Notes: The table reports Pearson correlation coefficients between selected variables. Definitions of variables are in Section 2.8. Values reported in *italic* indicate the corresponding coefficients are *not significant at 5% level.*

Table T2.5. Eigen values of the correlation matrix from principal components analysis

Principal components	Eigenvalue	Difference	Proportion	Cumulative
1	1.9246	0.5198	0.1283	0.1283
2	1.4048	0.0552	0.0937	0.2220
3	1.3496	0.0909	0.0900	0.3119
4	1.2587	0.1562	0.0839	0.3959
5	1.1025	0.1143	0.0735	0.4694
6	0.9882	0.0511	0.0659	0.5352
7	0.9371	0.0084	0.0625	0.5977
8	0.9286	0.0288	0.0619	0.6596
9	0.8999	0.0930	0.0600	0.7196
10	0.8068	0.0561	0.0538	0.7734
11	0.7507	0.0328	0.0500	0.8234
12	0.7179	0.0493	0.0479	0.8713
13	0.6686	0.0012	0.0446	0.9159
14	0.6673	0.0726	0.0445	0.9604
15	0.5947	-	0.0396	1.0000

Notes: The table reports the Eigen values of the correlation matrix resulted from principal component analyses on 15 individual components of ESCORE. Definitions of variables are in Section 2.8.

Table T2.6. Eigen vectors from principal components analysis

	Prin. 1	Prin. 2	Prin. 3	Prin. 4	Prin. 5	Prin. 6	Prin. 7	Prin. 8	Prin. 9	Prin. 10	Prin. 11	Prin. 12	Prin. 13	Prin. 14	Prin. 15
ESEO	0.2906	0.3144	-0.1603	0.3480	0.1554	-0.0540	-0.0399	-0.1708	0.1037	-0.3294	-0.3382	0.5928	-0.1539	0.0519	-0.0249
EDDEBT	-0.1154	0.3318	-0.3374	0.2857	-0.0613	0.1666	0.0492	0.4290	-0.1839	0.4405	0.3512	0.2924	0.1514	0.0562	0.0218
EMA	0.0966	0.1836	-0.2373	0.4637	0.3249	-0.1199	-0.2119	-0.4092	0.1207	0.1918	0.1445	-0.5245	0.0409	-0.0555	0.0353
EOV	0.1282	-0.3619	-0.2578	0.3311	-0.1377	0.0668	0.3126	0.2919	0.3823	-0.2704	-0.1217	-0.1652	0.4454	0.0935	0.0410
EROA	-0.1648	0.0835	0.5299	0.3882	-0.1477	-0.0148	0.0308	0.0349	0.1097	-0.0249	0.0550	0.0944	0.1175	-0.6768	0.1174
EDROA	-0.1317	-0.0058	0.0296	-0.0258	0.1346	0.9340	-0.1825	-0.1428	0.1766	-0.0523	-0.0470	-0.0005	-0.0004	-0.0038	-0.0271
EDIV	-0.2021	0.0679	0.5192	0.3767	-0.1471	-0.0278	-0.0117	-0.0153	0.0636	-0.0326	0.1106	-0.0397	-0.0771	0.6850	-0.1617
EDISTRES	0.4301	0.1431	0.0655	-0.0800	-0.4248	0.0692	-0.1968	0.0535	0.2535	0.1131	0.0684	-0.0772	-0.1914	0.1142	0.6478
EDEBT	0.2622	-0.4336	0.1731	-0.0240	0.2657	-0.0134	0.0384	-0.3443	-0.0302	0.1647	0.4151	0.4126	0.3275	0.0999	0.1845
ESIZE	0.2793	0.2704	0.3306	-0.1542	0.2875	0.0211	0.1135	0.1528	0.0387	0.4213	-0.4988	-0.0869	0.3906	0.0853	-0.0355
ECYCLE	0.1841	0.2291	-0.0082	0.0195	-0.2786	0.2080	0.7077	-0.3993	-0.3295	-0.0399	0.0580	-0.1341	-0.0096	-0.0138	-0.0132
EAUDIT	0.2537	0.1465	0.1809	-0.0659	0.5259	0.0532	0.2711	0.4003	0.0947	-0.2957	0.3891	-0.1474	-0.3037	-0.0325	0.0332
EBLOAT	0.2844	-0.4571	0.0181	0.2652	-0.0448	0.0934	0.1107	0.0994	0.0101	0.4489	-0.1688	0.0183	-0.5383	-0.1084	-0.2732
ECAP	0.2760	-0.1559	0.0888	0.2342	0.0037	0.1289	-0.3284	0.1950	-0.7356	-0.2611	-0.1063	-0.1614	0.1280	0.0086	0.1057
EBT	0.4517	0.1607	0.0440	-0.1370	-0.3098	0.0150	-0.2673	-0.0011	0.1484	-0.0833	0.2982	-0.0188	0.1965	-0.1078	-0.6429

Notes: The table reports the Eigen vectors resulted from principal component analyses on 15 individual components of ESCORE. 'Prin.' Is abbreviation for 'Principal component'. Definitions of variables are in Section 2.8.

2.5.4. The efficacy of individual signals in capturing the context of earnings management

Although all of the fifteen selected signals have been shown in the extant literature to be strong determinants of earnings management, it is important to see if after being transformed into binary variables, as in this study, they are still able to capture earnings management. To examine this, a t-test is performed to compare the mean of the twelve selected measures of earnings management (see Section 2.5.1) between the group of suspicious firms (i.e. those with an individual score of one) and the rest of the sample (i.e. those with an individual score of zero). Table T2.7 reports the number of susceptible firms based on each individual signal, which is graphically illustrated by Figure F2.1. The signals which require a benchmark to construct (see Section 2.4.1), including EOV, EDEBT, ESIZE, EBLOAT, ECAP, EBT, flag up approximately one fifth of the sample by design. The number of firms which issue equity and debt is quite high (2,512 and 4,518 observations, respectively), while share-financed mergers and acquisitions seem to be rather rare events (only 594 observations with EMA being one). It is also observed that there is not a lot of firms which just meet or beat earnings benchmarks (only 410, 591 and 659 observations with EROA, EDROA and EDIV, respectively, being one).

Table T2.8 and T2.9 shows that all of the individual signals can effectively identify firms suspicious of earnings management, although the power of each signal varies. Looking at Panel A of Table T2.8, suspicious firms are shown to be associated with significantly higher ADAC (except for EDDEBT, EROA, EDROA and EDIV) and higher HDAC (except for EROA, EDROA, EDIV and EDISTRESS). In Panel B of Table T2.8, the only signals which do not exhibit the expected power to identify firms with higher level of earnings management are EROA, EDROA, EDIV and EBT. In Table T2.9, most signals tend to be able to detect real earnings management, with only a few exceptions (e.g. EDROA, EDIV). It is noted that EROA, EDROA and EDIV could flag up only a small number of firms which just meet or slightly beat the earnings benchmarks (see Table T2.7). There is evidence that only a few firms with unmanaged earnings being close to the benchmarks would manage earnings to meet or just beat earnings benchmarks while firms which need to a lot of earnings management to meet the benchmarks would refrain or even take a bath to make the benchmarks more achievable in the future (DeGeorge et al., 1999). Hence, the extant literature suggests firms which slightly fall short of earnings benchmarks would engage in earnings management (see Section 2.4.3), but the magnitude of such earnings management would not necessarily be too large, nor would those firms be the most aggressive firms. In other words, firms only need to manage earnings with a moderate magnitude to meet or beat earnings benchmarks. Therefore, the evidence observed in Table T2.8 and T2.9 that firms with EROA, EDROA and EDIV of one do not have higher measures of earnings management is more likely to be attributable to the measures of earnings management employed in this chapter being unable to detect the type of earnings management engaged by those firms rather than because those firms do not manage earnings. The chapter, therefore, proceeds with EROA, EDROA and EDIV being all kept to reflect the current state of the literature supporting those signals.

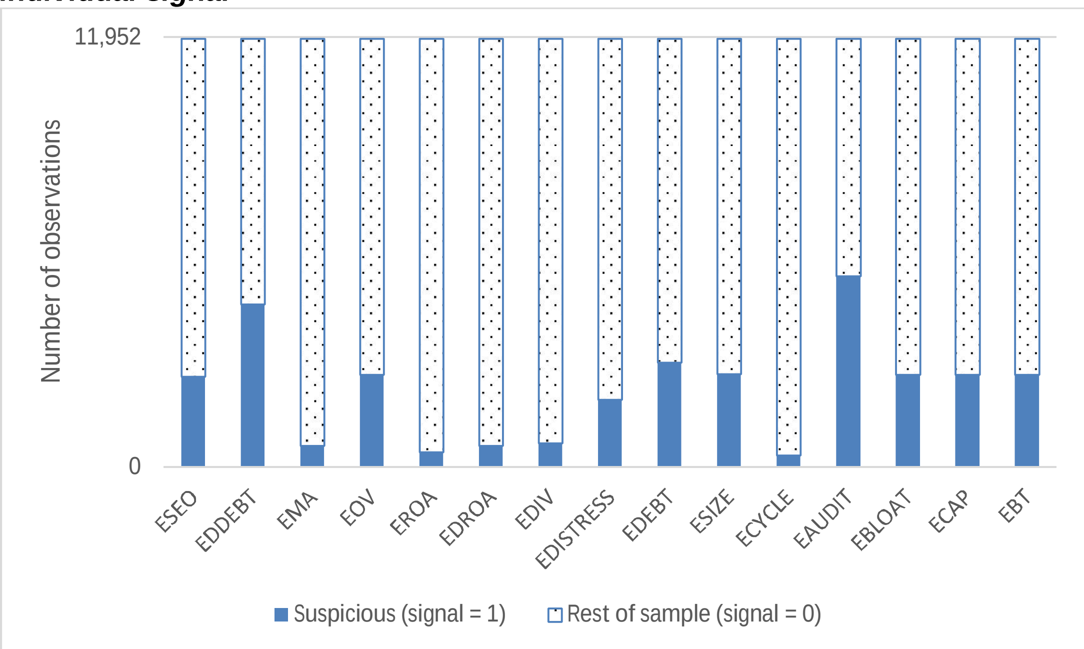
In general, the evidence seems to suggest that the individual signals employed in this study are quite efficient in identifying firms suspicious of earnings management, including the most aggressive earnings manipulators. The next section will then test if aggregating those signals together into a composite index can give a reliable model to detect earnings management.

Table T2.7. Number of suspicious firms versus the rest of the sample as identified by each individual signal

	Number of observations	
	Suspicious (signal = 1)	**Rest of sample (signal = 0)**
ESEO	2,512	9,408
EDDEBT	4,518	7,402
EMA	594	11,326
EOV	2,576	9,344
EROA	410	11,510
EDROA	591	11,329
EDIV	659	11,261
EDISTRESS	1,875	10,045
EDEBT	2,904	9,016
ESIZE	2,578	9,342
ECYCLE	326	11,594
EAUDIT	5,308	6,612
EBLOAT	2,574	9,346
ECAP	2,571	9,349
EBT	2,562	9,358

Notes: The table reports the number of suspicious firms versus the rest of the sample as identified by each individual signal. Definitions of variables are in Section 2.8.

Figure F2.1. Number of suspicious firms versus the rest of the sample by each individual signal



Notes: Definitions of variables are in Section 2.8.

Table T2.8. Measures of accruals earnings management of suspicious firms versus the rest of the sample

	Absolute value				Indicator of aggressiveness			
	Rest of sample	Suspicious	Suspicious - Rest of sample	t-stat	Rest of sample	Suspicious	Suspicious - Rest of sample	t-stat
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Discretionary accruals								
ESEO	0.0732	0.125	0.0518	19.544***	0.2005	0.2763	0.0758	7.71***
EDDEBT	0.0847	0.0832	-0.0015	-0.833	0.1986	0.2457	0.0471	5.955***
EMA	0.0821	0.1233	0.0413	7.838***	0.2141	0.2609	0.0468	2.54**
EOV	0.0815	0.0935	0.012	5.462***	0.2064	0.2527	0.0463	4.854***
EROA	0.0848	0.0651	-0.0197	-6.097***	0.2171	0.1976	-0.0196	-0.945
EDROA	0.0859	0.0506	-0.0352	-16.309***	0.2188	0.1709	-0.0479	-3***
EDIV	0.0857	0.0566	-0.0291	-13.206***	0.2176	0.1973	-0.0203	-1.23
EDISTRESS	0.0733	0.1419	0.0686	21.779***	0.2248	0.1717	-0.0531	-5.494***
EDEBT	0.0804	0.0958	0.0154	7.225***	0.203	0.2583	0.0553	6.035***
ESIZE	0.0776	0.1076	0.03	12.551***	0.1978	0.2839	0.0861	8.795***
ECYCLE	0.0825	0.1412	0.0587	7.97***	0.2117	0.3865	0.1748	6.41***
EAUDIT	0.0739	0.0969	0.023	13.231***	0.1921	0.2468	0.0547	7.155***
EBLOAT	0.0808	0.0962	0.0154	6.867***	0.2019	0.2692	0.0673	6.955***
ECAP	0.0806	0.0969	0.0162	7.192***	0.2087	0.2447	0.036	3.8***
EBT	0.0718	0.1291	0.0573	21.696***	0.2128	0.2299	0.0171	1.867*
Panel B: Discretionary working capital accruals								
ESEO	0.055	0.0938	0.0388	20.452***	0.2007	0.2747	0.074	7.505***
EDDEBT	0.0605	0.0675	0.007	5.332***	0.1863	0.2654	0.0791	9.88***
EMA	0.0611	0.1031	0.042	10.358***	0.2147	0.2466	0.032	1.841*
EOV	0.0604	0.0731	0.0127	7.677***	0.2048	0.2578	0.053	5.521***
EROA	0.0635	0.0526	-0.0109	-4.065***	0.2159	0.2266	0.0107	0.515
EDROA	0.0642	0.043	-0.0212	-10.596***	0.2189	0.1658	-0.0531	-3.343***
EDIV	0.0638	0.0521	-0.0117	-5.899***	0.2151	0.2363	0.0212	1.282
EDISTRESS	0.06	0.0802	0.0202	10.425***	0.2114	0.2421	0.0307	2.866***
EDEBT	0.0607	0.0707	0.01	6.571***	0.2087	0.2399	0.0312	3.453***
ESIZE	0.0585	0.0802	0.0217	12.365***	0.2062	0.2531	0.047	4.899***
ECYCLE	0.0625	0.0885	0.026	5.203***	0.2142	0.2906	0.0764	2.973***
EAUDIT	0.0572	0.0706	0.0134	10.508***	0.2018	0.2342	0.0324	4.235***
EBLOAT	0.0593	0.077	0.0177	10.343***	0.2009	0.2718	0.0709	7.296***
ECAP	0.0612	0.0703	0.0091	5.728***	0.211	0.2355	0.0246	2.608***
EBT	0.0598	0.0757	0.0159	9.183***	0.2164	0.2156	-0.0008	-0.087

Notes: Column 2 to 5 (6 to 9) of Panel A report the mean of ADAC (HDAC) of the suspicious firms identified by each individual score, together with the mean of the rest of the sample and the t-statistics under the null that the difference is zero. Panel B reports the same for ADWAC and HDWAC. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.9. Measures of real earnings management of the suspicious firms versus the rest of the sample

	Absolute value				Indicator of aggressiveness			
	Rest of sample	Suspicious	Suspicious - Rest of sample	t-stat	Rest of sample	Suspicious	Suspicious - Rest of sample	t-stat
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Abnormal cash flows								
ESEO	0.1108	0.1959	0.0851	16.417***	0.1778	0.345	0.1672	15.482***
EDDEBT	0.1363	0.1174	-0.0188	-5.584***	0.1886	0.2554	0.0668	7.941***
EMA	0.1258	0.1912	0.0654	6.413***	0.2109	0.2682	0.0573	2.928***
EOV	0.119	0.1665	0.0475	10.136***	0.2112	0.2232	0.0121	1.243
EROA	0.1306	0.0865	-0.0441	-8.372***	0.2135	0.2207	0.0071	0.324
EDROA	0.1317	0.08	-0.0517	-9.693***	0.2168	0.1544	-0.0624	-3.8***
EDIV	0.1316	0.0852	-0.0464	-8.705***	0.2147	0.1968	-0.0179	-1.013
EDISTRESS	0.1154	0.2036	0.0881	14.454***	0.1683	0.4606	0.2923	22.669***
EDEBT	0.119	0.1607	0.0417	9.609***	0.2124	0.218	0.0055	0.597
ESIZE	0.1191	0.1661	0.047	9.812***	0.1949	0.2828	0.0879	8.464***
ECYCLE	0.1265	0.2204	0.0939	6.718***	0.2036	0.5671	0.3636	12.527***
EAUDIT	0.1154	0.146	0.0306	8.804***	0.1967	0.2348	0.0381	4.73***
EBLOAT	0.1189	0.1669	0.048	9.871***	0.1931	0.2894	0.0962	9.209***
ECAP	0.1263	0.1397	0.0135	3.138***	0.196	0.2791	0.0831	8.01***
EBT	0.1165	0.1757	0.0592	11.764***	0.1697	0.3765	0.2069	18.822***
Panel B: Abnormal production costs								
ESEO	0.1758	0.2065	0.0306	5.864***	0.2068	0.2498	0.0429	4.083***
EDDEBT	0.1806	0.1848	0.0042	1.071	0.2029	0.2366	0.0338	3.946***
EMA	0.1793	0.2365	0.0572	5.207***	0.215	0.2285	0.0134	0.71
EOV	0.1717	0.2219	0.0501	9.508***	0.2215	0.1936	-0.0279	-2.845***
EROA	0.1829	0.1625	-0.0204	-2.374**	0.2143	0.255	0.0407	1.825*
EDROA	0.1845	0.1374	-0.0471	-7.99***	0.2171	0.1889	-0.0283	-1.501
EDIV	0.1838	0.1544	-0.0294	-4.423***	0.2154	0.2214	0.0061	0.339
EDISTRESS	0.1769	0.2125	0.0355	5.969***	0.2	0.3062	0.1062	8.349***
EDEBT	0.1779	0.1961	0.0182	3.811***	0.2189	0.2052	-0.0137	-1.418
ESIZE	0.1775	0.1997	0.0222	4.486***	0.2031	0.2631	0.06	5.673***
ECYCLE	0.1822	0.1796	-0.0026	-0.219	0.2135	0.2977	0.0842	2.944***
EAUDIT	0.1709	0.1966	0.0257	6.626***	0.2062	0.2279	0.0217	2.617***
EBLOAT	0.1742	0.2123	0.0381	7.549***	0.2048	0.2569	0.0521	4.935***
ECAP	0.1835	0.1771	-0.0064	-1.406	0.2054	0.2556	0.0502	4.724***
EBT	0.1811	0.1864	0.0052	1.055	0.2055	0.2566	0.0511	4.756***

Table T2.9. (continued)

	Absolute value				Indicator of aggressiveness			
	Rest of sample	**Suspicious**	**Suspicious - Rest of sample**	**t-stat**	**Rest of sample**	**Suspicious**	**Suspicious - Rest of sample**	**t-stat**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel C: Abnormal discretionary expenses								
ESEO	0.1866	0.282	0.0953	12.785***	0.2168	0.2184	0.0015	0.148
EDDEBT	0.2168	0.1934	-0.0234	-4.553***	0.217	0.2175	0.0005	0.055
EMA	0.2018	0.318	0.1162	7.372***	0.2181	0.2009	-0.0172	-0.879
EOV	0.1937	0.2594	0.0657	9.265***	0.2238	0.1935	-0.0303	-2.946***
EROA	0.2102	0.1417	-0.0686	-8.854***	0.2168	0.2274	0.0106	0.437
EDROA	0.2104	0.1556	-0.0548	-5.719***	0.2183	0.1926	-0.0257	-1.228
EDIV	0.2114	0.1458	-0.0656	-8.335***	0.2185	0.1936	-0.0249	-1.272
EDISTRESS	0.1905	0.2963	0.1058	12.011***	0.2159	0.2237	0.0078	0.66
EDEBT	0.196	0.2444	0.0485	7.366***	0.2104	0.2376	0.0272	2.63***
ESIZE	0.196	0.2494	0.0534	7.666***	0.1963	0.2896	0.0933	8.315***
ECYCLE	0.2054	0.2902	0.0848	3.942***	0.2174	0.2097	-0.0077	-0.299
EAUDIT	0.1889	0.2305	0.0417	7.965***	0.1909	0.2483	0.0575	6.521***
EBLOAT	0.1952	0.2537	0.0585	8.318***	0.2109	0.2397	0.0287	2.646***
ECAP	0.2077	0.2087	0.001	0.167	0.2029	0.2667	0.0638	5.787***
EBT	0.1991	0.2392	0.0402	5.657***	0.2194	0.2093	-0.0101	-0.962
Panel D: Total real earnings management								
ESEO	0.4686	0.5035	0.0349	2.761***	0.2026	0.2753	0.0728	6.278***
EDDEBT	0.4717	0.4832	0.0115	1.185	0.1965	0.2535	0.057	6.042***
EMA	0.4731	0.5308	0.0577	2.07**	0.2178	0.2271	0.0093	0.458
EOV	0.4426	0.6022	0.1596	11.996***	0.2275	0.1834	-0.0441	-4.185***
EROA	0.4786	0.4084	-0.0702	-3.426***	0.2166	0.2644	0.0478	1.955*
EDROA	0.4791	0.4166	-0.0624	-3.306***	0.219	0.202	-0.017	-0.8
EDIV	0.4795	0.4182	-0.0613	-3.735***	0.2172	0.2354	0.0182	0.921
EDISTRESS	0.4698	0.5102	0.0404	2.999***	0.1942	0.3477	0.1535	11.023***
EDEBT	0.4606	0.526	0.0654	5.253***	0.2217	0.207	-0.0147	-1.392
ESIZE	0.4649	0.5158	0.0509	4.034***	0.204	0.2688	0.0647	5.661***
ECYCLE	0.4753	0.5065	0.0312	0.949	0.214	0.366	0.152	4.777***
EAUDIT	0.4602	0.4957	0.0356	3.693***	0.2062	0.233	0.0268	2.955***
EBLOAT	0.4508	0.5706	0.1198	9.067***	0.2059	0.2643	0.0584	5.051***
ECAP	0.4789	0.466	-0.0129	-1.119	0.2019	0.2776	0.0757	6.525***
EBT	0.4748	0.4813	0.0066	0.56	0.2036	0.2748	0.0712	6.033***

Notes: Column 2 to 5 (6 to 9) of Panel A report the mean of ADCF (HDCF) of the suspicious firms identified by each individual score, together with the mean of the rest of the sample and the t-statistics under the null that the difference is zero. Panel B (C; D) reports the same for ADPROD and HDPROD (ADDISEXP and HDDISEXP; ATOTALRM and HTOTALRM, respectively). Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

2.5.5. How well does ESCORE capture the context of earnings management?

ESCORE is designed to capture the 'context' in which earnings management is more likely. This section provides evidence about the effectiveness of ESCORE by looking at how other traditional measures of earnings management (e.g. discretionary accruals and real earnings management proxies) vary as the context (captured by ESCORE) changes. Before presenting the tests in the next sub-sections, Table T2.10 shows the distribution of the firm-year observations across ESCORE portfolios. Subsequent analyses focus on the portfolios of low and high ESCORE stocks. For this purpose, stocks with ESCORE of zero are arbitrarily grouped into the low ESCORE group, those with ESCORE of six and above into the high ESCORE group and the rest to the medium ESCORE group. Since there are fewer stocks having larger ESCORE as graphically illustrated by Figure F2.2, the high ESCORE group includes all stocks with ESCORE of 6 and above (865 observations). The purpose is to ensure that the high ESCORE portfolio has a comparable number of observations to the low ESCORE counterpart (which comprises 862 stocks with ESCORE of zero). Intuitively, the adopted grouping scheme is equivalent to considering that the context surrounding a stock which has accumulated six or more signals is highly susceptible to earnings management[17]. Using this grouping scheme, the next sub-sections present the tests conducted to examine the efficacy of ESCORE to capture earnings management.

[17] The choice of the cut-off at zero and six is quite arbitrary since it is hard to say, for example, a stock with ESCORE of five is qualitatively less 'susceptible' than another one with ESCORE of six. While the study cannot proceed without a arbitrarily-determined cut-off point, unreported results show that all of the main conclusions of the thesis do not change qualitatively if stocks with ESCORE of zero and one are grouped into the low ESCORE portfolio (3,080 observations) and those with ESCORE of four and above into the high ESCORE portfolio (3,534 observations).

2.5.5.1. Univariate analysis

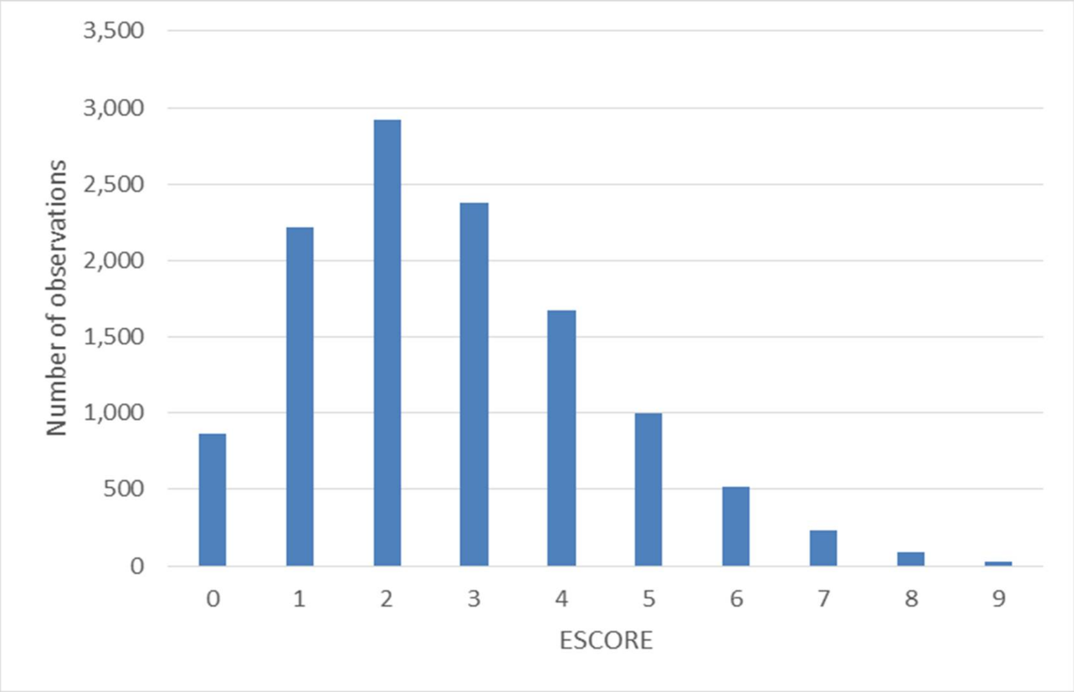
The first test examines how the twelve measures of earnings management (as presented in Section 2.5.1) would vary as the context of earnings management captured by ESCORE changes. Table T2.11 and T2.12 present the mean of ADAC, ADWAC, ADCF, ADPROD, ADDISEXP, ATOTALRM (the absolute values) and HDAC, HDWAC, HDCF, HDPROD, HDDISEXP, HTOTALRM across ESCORE groups, together with the t-test comparing the means of the high ESCORE group (ESCORE of six and above) with those of the low ESCORE group (ESCORE of zero). As graphically illustrated by Figure F2.3 to F2.14, as ESCORE increases, all of the 12 measures of earnings management also increase quite monotonically and consistently. The differences of all measures between the high ESCORE and low ESCORE group are positive, economically large and statistically significant (see Table T2.11 and T2.12). The results, therefore, strongly suggest ESCORE is highly effective in capturing the context of earnings management as when the context is more susceptible (higher ESCORE), firms indeed manage earnings in larger magnitudes and are more likely to be an aggressor.

Table T2.10. Distribution of observations across ESCORE groups

ESCORE	N	ESCORE GROUP	N
0	862	Low (0)	862
1	2,218		
2	2,925		
3	2,381		
4	1,675		
5	994	Medium (1-5)	10,193
6	519		
7	232		
8	88		
9	26	High (6-9)	865

Notes: The table reports the distribution of observations across groups sorted by ESCORE. Definitions of variables are in Section 2.8.

Figure F2.2. Distribution of observations across ESCORE groups



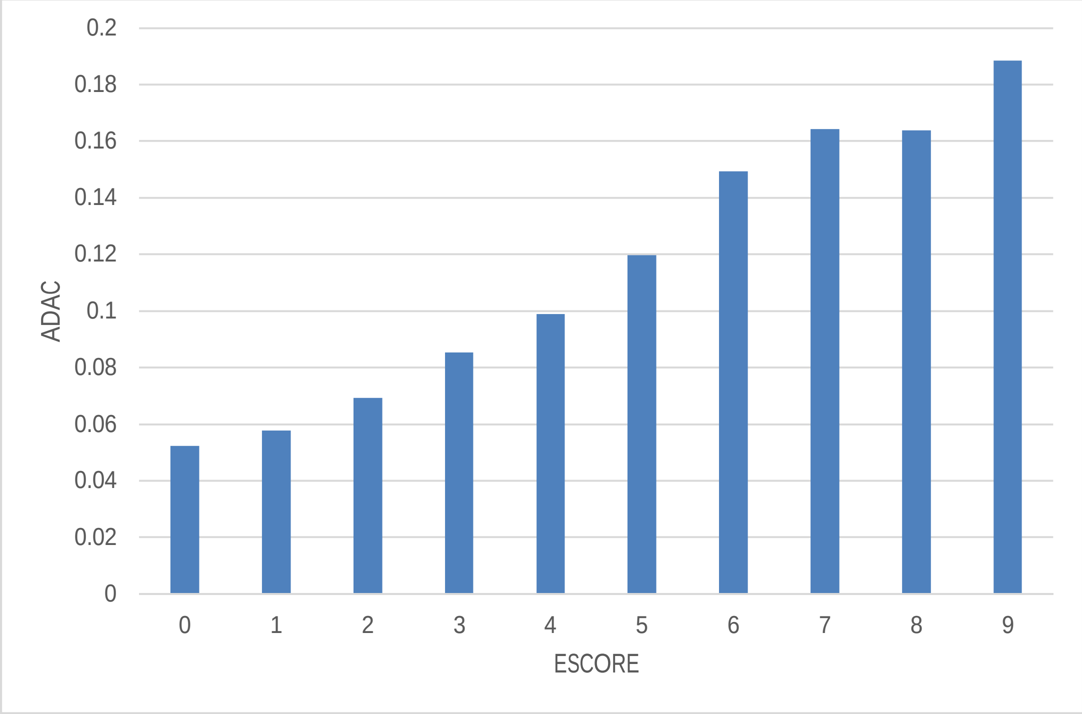
Notes: Definitions of variables are in Section 2.8.

Table T2.11. Measures of accruals earnings management across ESCORE groups

ESCORE	ADAC	HDAC	ADWAC	HDWAC
0	0.0525	0.1323	0.0389	0.1083
1	0.0579	0.1486	0.0463	0.17
2	0.0693	0.2049	0.0548	0.1991
3	0.0855	0.2359	0.0657	0.2294
4	0.099	0.2598	0.0736	0.2596
5	0.1198	0.2808	0.0868	0.2969
6	0.1494	0.2814	0.0968	0.2808
7	0.1644	0.3025	0.1103	0.308
8	0.1639	0.3636	0.1153	0.3256
9	0.1887	0.4074	0.1136	0.2692
Low (0)	0.0525	0.1323	0.0389	0.1083
High (6-9)	0.1561	0.2992	0.1028	0.2923
High - Low	0.1036	0.1669	0.0639	0.184
t-stat	20.064***	8.662***	17.896***	9.839***

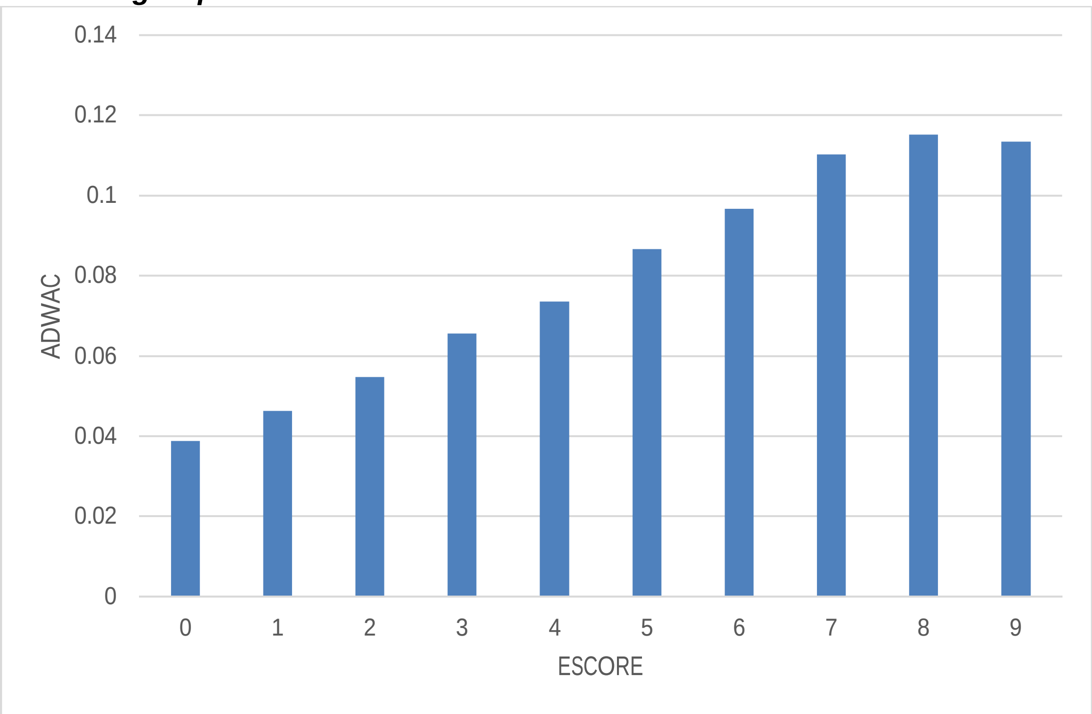
Notes: The table reports the mean of ADAC, HDAC, ADWAC, HDWAC in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Figure F2.3. Absolute value of discretionary accruals across ESCORE groups



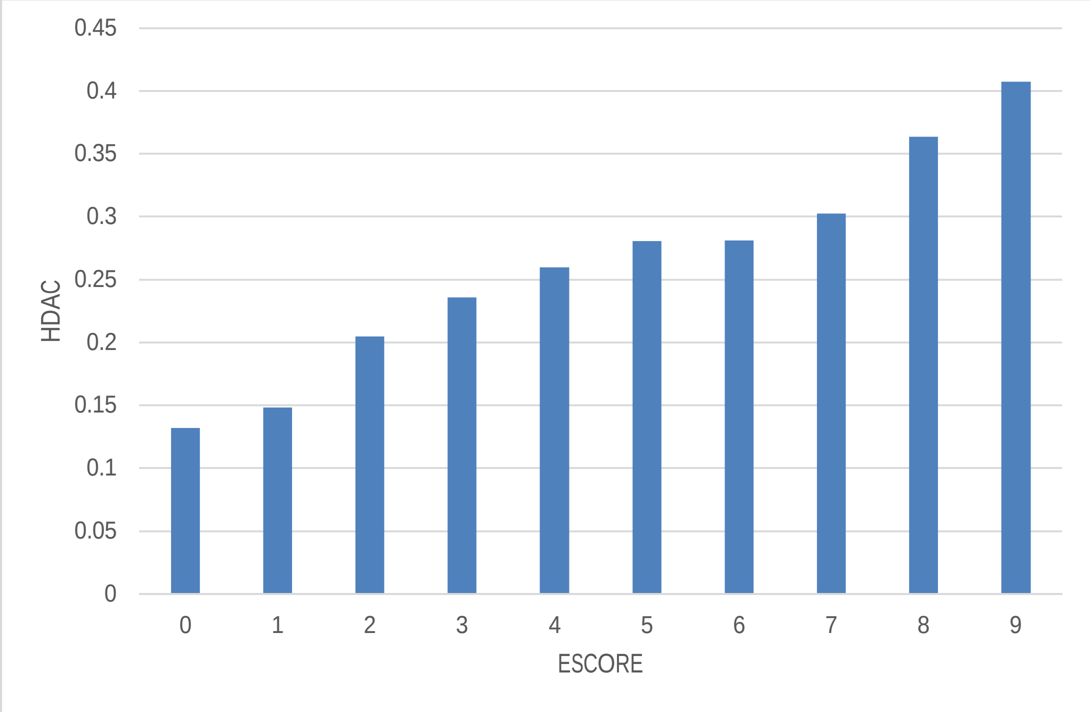
Notes: Definitions of variables are in Section 2.8.

Figure F2.4. Absolute value of discretionary working capital accruals across ESCORE groups



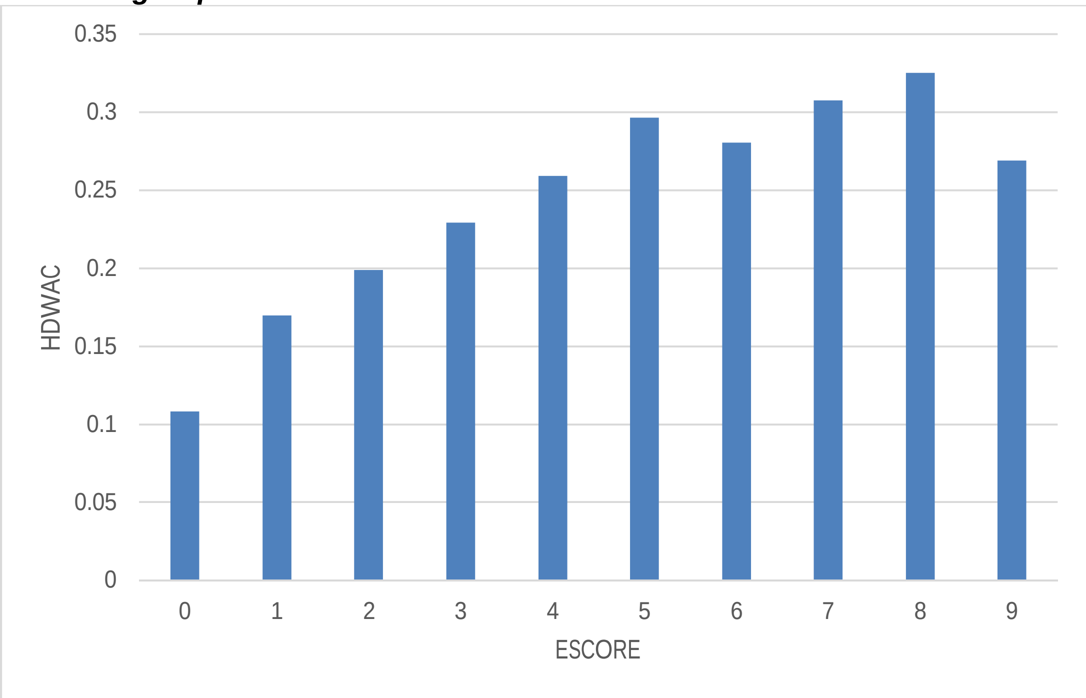
Notes: Definitions of variables are in Section 2.8.

Figure F2.5. Indicators of high discretionary accruals across ESCORE groups



Notes: Definitions of variables are in Section 2.8.

Figure F2.6. Indicators of high discretionary working capital accruals across ESCORE groups



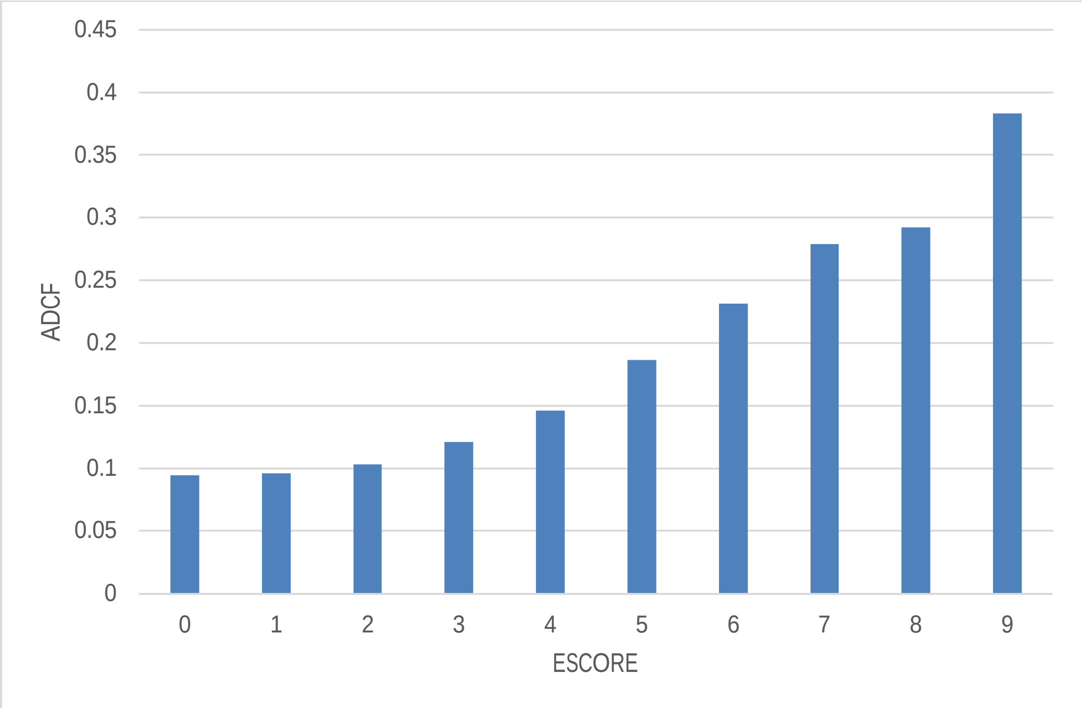
Notes: Definitions of variables are in Section 2.8.

Table T2.12. Measures of real earnings management across ESCORE groups

ESCORE	ADCF	HDCF	ADPROD	HDPROD	ADDISEXP	HDDISEXP	ATOTALRM	HTOTALRM
0	0.0946	0.0833	0.1423	0.1617	0.1533	0.1754	0.3673	0.1256
1	0.096	0.1072	0.1606	0.1776	0.1676	0.1919	0.4419	0.1721
2	0.1031	0.1647	0.1769	0.1963	0.1802	0.2102	0.4668	0.1949
3	0.1211	0.2217	0.188	0.2322	0.2027	0.2121	0.49	0.2238
4	0.1461	0.2789	0.198	0.237	0.2332	0.2289	0.484	0.233
5	0.1868	0.3711	0.2088	0.2759	0.2711	0.285	0.5425	0.33
6	0.2316	0.4351	0.2247	0.2895	0.3079	0.2433	0.5515	0.3373
7	0.279	0.4836	0.2278	0.3125	0.3691	0.2438	0.6438	0.3473
8	0.2925	0.575	0.2379	0.2958	0.328	0.3286	0.6461	0.3279
9	0.3833	0.6522	0.2853	0.3684	0.4215	0.1429	0.8847	0.3889
Low (0)	0.0946	0.0833	0.1423	0.1617	0.1533	0.1754	0.3673	0.1256
High (6-9)	0.2553	0.4692	0.2288	0.2988	0.3308	0.2489	0.5981	0.3408
High - Low	0.1607	0.3858	0.0865	0.1371	0.1775	0.0736	0.2308	0.2152
t-stat	14.637***	18.858***	7.851***	6.127***	11.503***	3.307***	8.272***	9.090***

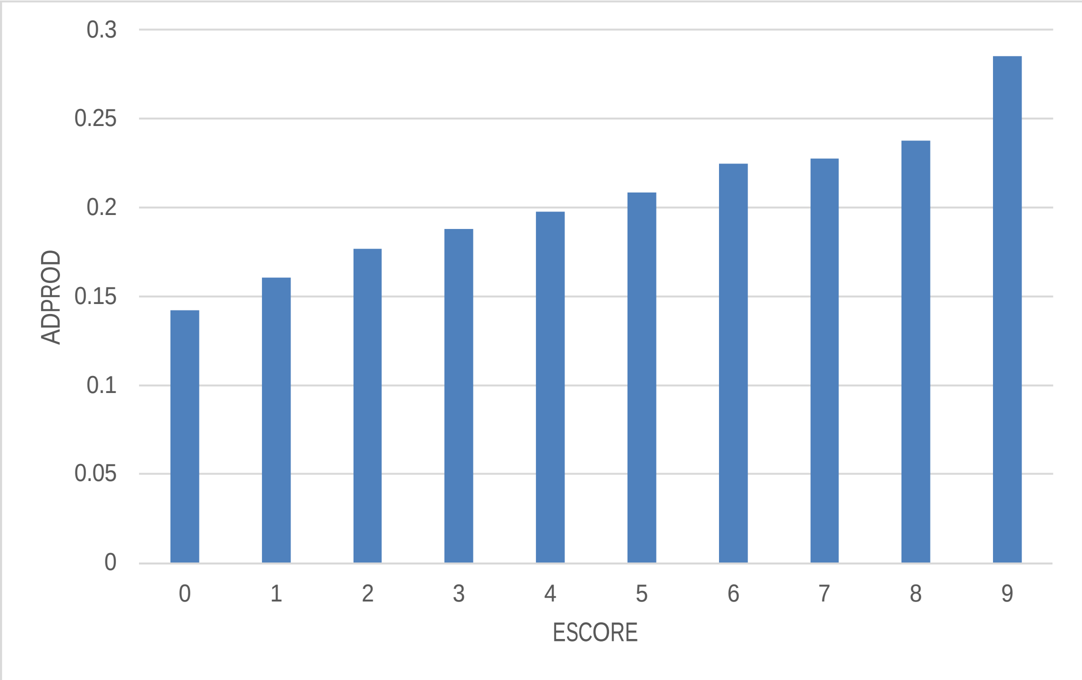
Notes: The table reports the mean of ADCF, HDCF, ADPROD, HDPROD, ADDISEXP, HDDISEXP, ATOTALRM, HTOTALRM in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Figure F2.7. Absolute value of abnormal cash flows across ESCORE groups



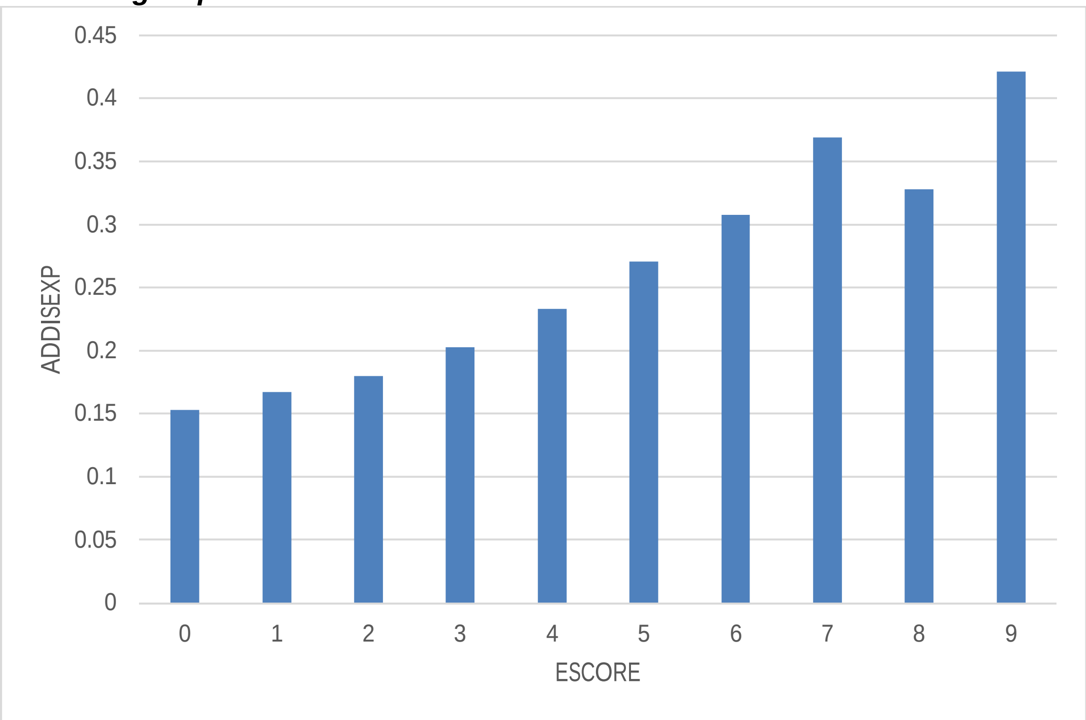
Notes: Definitions of variables are in Section 2.8.

Figure F2.8. Absolute value of abnormal production costs across ESCORE groups



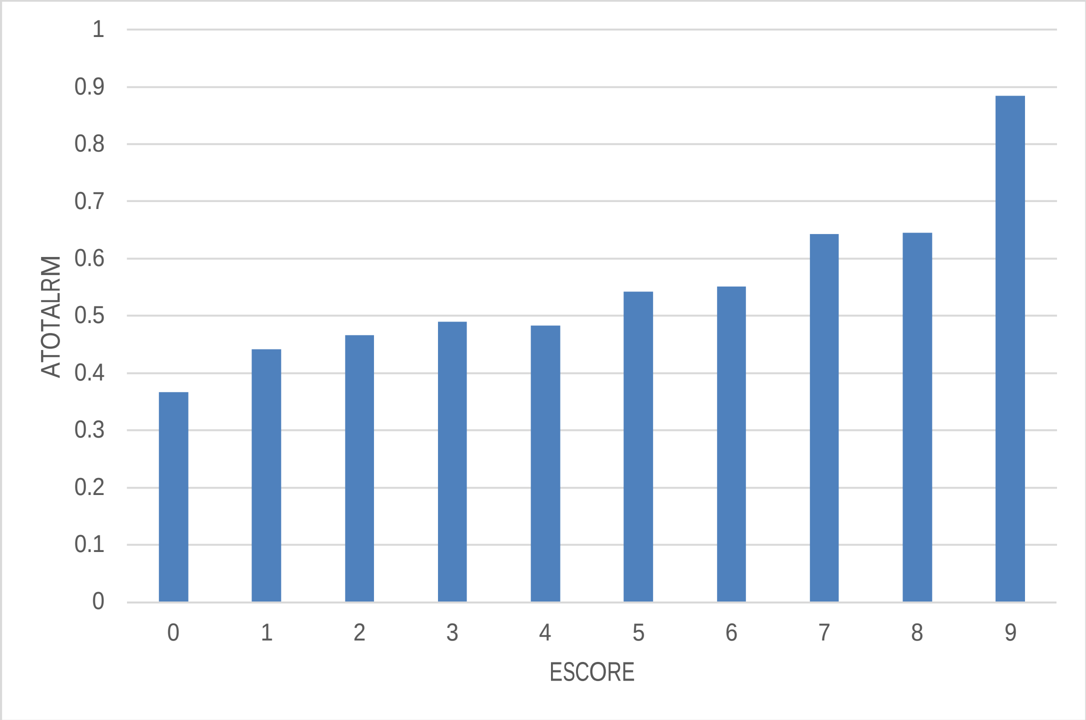
Notes: Definitions of variables are in Section 2.8.

Figure F2.9. Absolute value of abnormal discretionary expenses across ESCORE groups



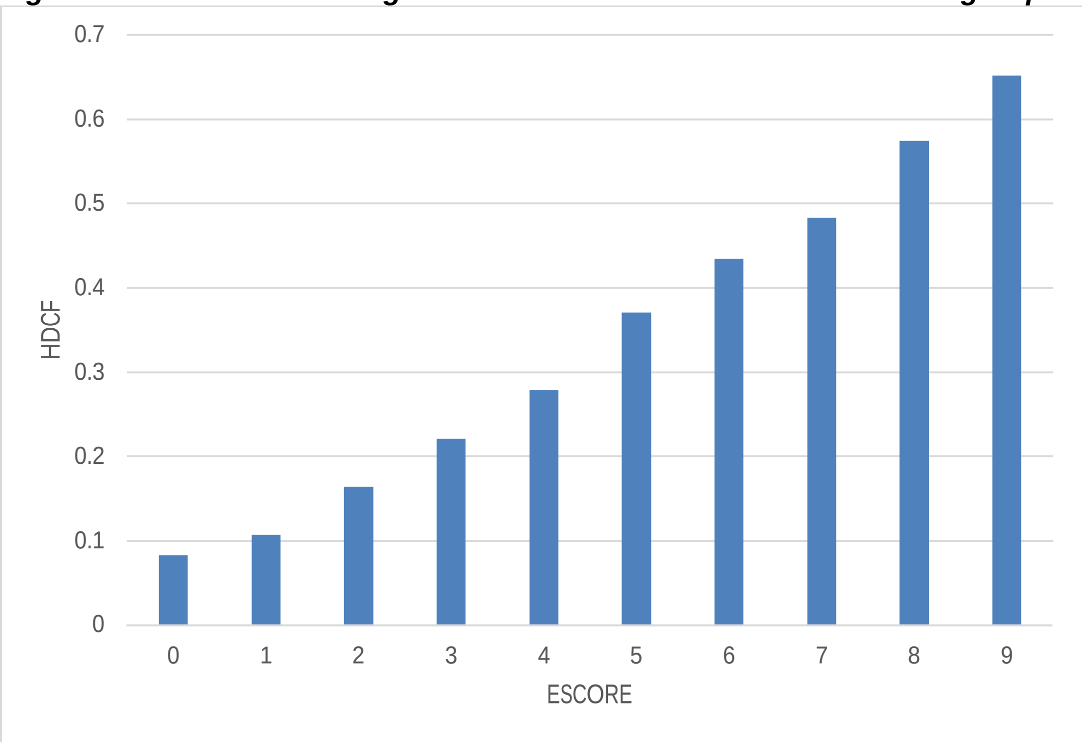
Notes: Definitions of variables are in Section 2.8.

Figure F2.10. Absolute value of total real earnings management across ESCORE groups



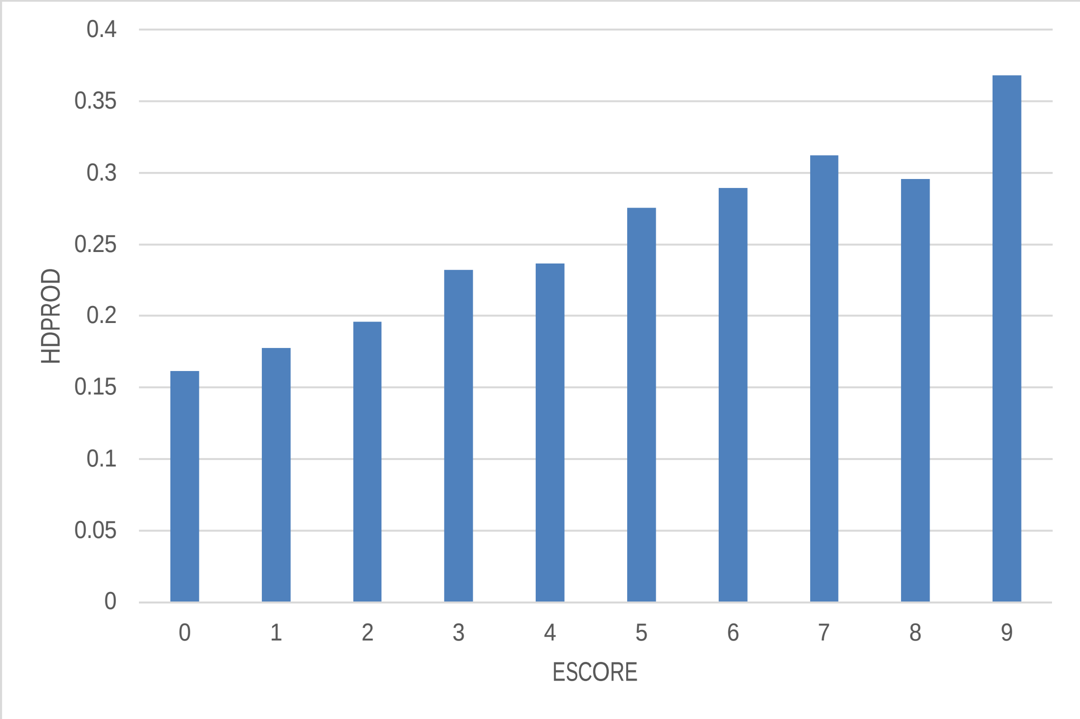
Notes: Definitions of variables are in Section 2.8.

Figure F2.11. Indicator of high abnormal cash flows across ESCORE groups



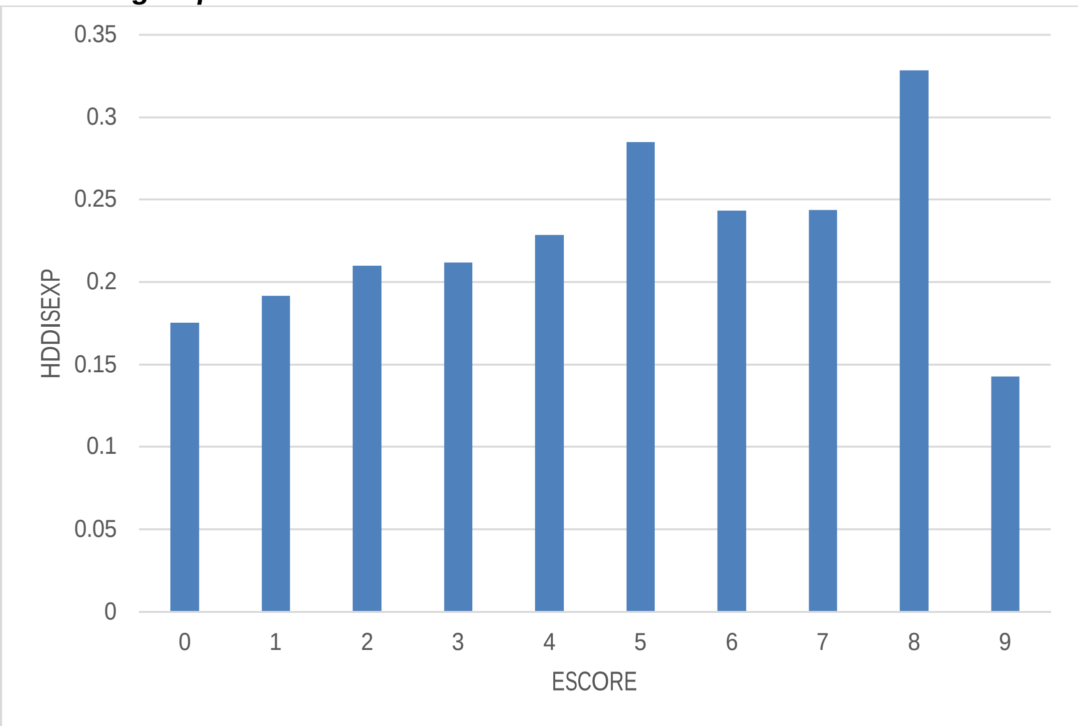
Notes: Definitions of variables are in Section 2.8.

Figure F2.12. Indicator of high abnormal production costs across ESCORE groups



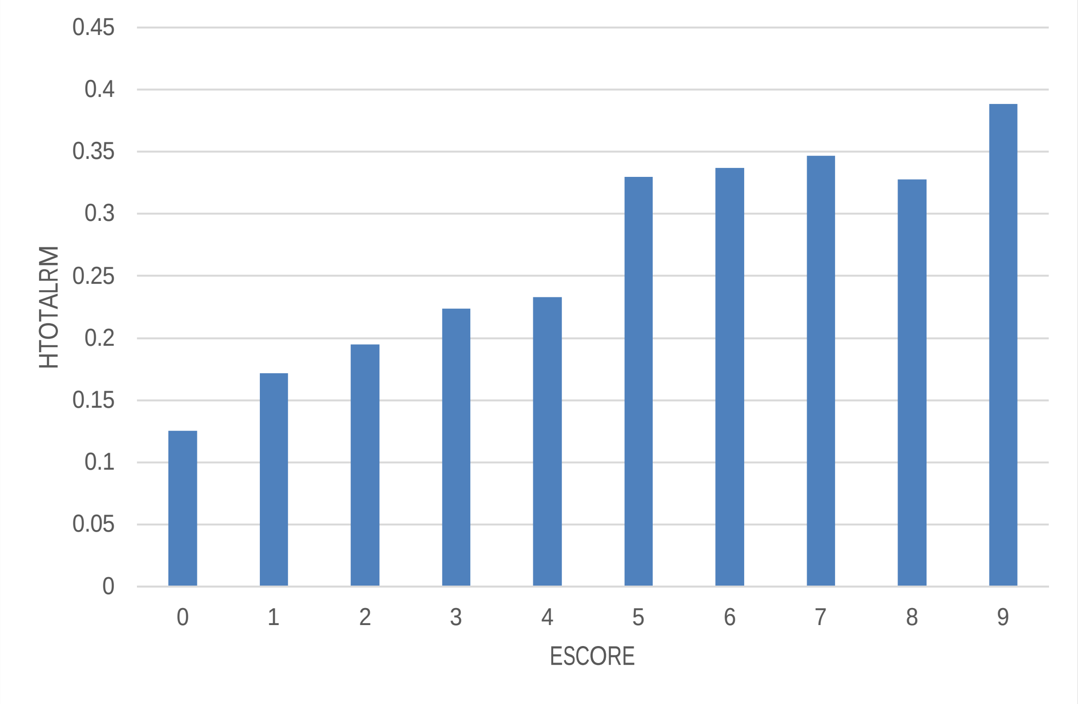
Notes: Definitions of variables are in Section 2.8.

Figure F2.13. Indicator of high abnormal discretionary expenses across ESCORE groups



Notes: Definitions of variables are in Section 2.8.

Figure F2.14. Indicator of high total real earnings management across ESCORE groups



Notes: Definitions of variables are in Section 2.8.

2.5.5.2. Multivariate regression

The univariate analysis as presented above suffers from possible problems of omitted variables. Particularly, the selection of individual signals to include in the ESCORE model deliberately focuses only on those which could be easily constructed using financial statement information. Hence, some dimensions of the context of earnings management have been omitted, most notably corporate governance and compensation[18].

Corporate governance, especially the monitoring role of the board of directors, has been shown to be an important factor affecting earnings management behaviour.

[18] The chapter does not control for institutional and managerial holdings due to lack of access to a high quality source of data. While it is fully acknowledged as a limitation of the thesis (see the conclusion), there is no strong reason which suggests the main conclusions of the thesis would fundamentally change should institutional and managerial holdings be controlled for.

Beasley (1996) finds that firms engaged in financial reporting fraudulent activities often have less outside directors on board compared to those without discovered frauds. Similar results are reported by Uzun et al. (2004). The results suggest that board independence is an important feature which enhance the monitoring role of the boards of directors. On the same line of argument, Dechow et al. (1996) provide evidence that violations of GAAP enforced by the SEC are significantly associated with less independent boards, for example those where the chief executive officer is also the chairman of the board or the company's founder or those without an audit committee. Huang et al. (2012a) find that when the chief executive officer is also the board chairman, firms often release more conservative management earnings forecasts. Klein (2002) documents the negative relationship between discretionary accruals and the independence of the boards and audit committees. Bédard et al. (2004) find that more independent audit committees would significantly mitigate earnings management. Using UK data, Peasnell et al. (2005) find that boards with more outside directors would be more effective in constraining earnings management. Beekes et al. (2004) also report that the proportion of outside directors on board would significantly improve earnings quality.

With regards to compensation, the existing evidence generally suggests that where managers' compensation package is linked to performance, they would have stronger incentive to inflate earnings. In fact, firms increasingly pay their executive based on performance rather than fixed salary (Perry and Zenner, 2001). Bergstresser and Philippon (2006) find that earnings management using discretionary accruals is more pronounced in firms where the chief executive officer's total compensation is more tied to the value of stocks and options he or she is holding. Cheng and Warfield (2005) report that firms which provide managers with more equity incentives, such as stock-based rewards, are more likely to have earnings inflated. On the same vein, Beneish (1999b) find that GAAP violations are companioned with large stock selling and exercises of stock options by executives. Dechow and Sloan (1991), Burns and Kedia (2006) and Efendi et al. (2007) are among the studies which find that the stock option component of managers' compensation packages is significantly related to earnings management. Healy (1985), Holthausen et al. (1995) and Guidry et al. (1999), among others, provide evidence that executive bonuses which are set based on accounting earnings are associated with earnings management. Jenkins and Seiler (1990) find that executive compensation schemes also drive managers' real earnings management through the manipulation of discretionary expenditures. Narayanan (1996) provides evidence that executive compensation packages would also lead to suboptimal real investment decisions.

To respond to the rich literature as reviewed as above regarding the effects of corporate governance and executive compensation on earnings management, it is important to determine if ESCORE is still related to the measures of earnings management after controlling for the characteristics of corporate governance and executive compensation as well as the incremental magnitude of such relationship. This section controls for these omitted variables by considering the size of the board, audit committees (measured by the number of board directors and audit committee members, respectively), the independence of the boards (measured by the percentage of non-executive directors on board and a dummy which turns on if a firm's chief executive officer is also the chairman), and the performance-linked components of executives' compensation packages. In particular, the following ordinary least square (OLS hereafter) regressions are first estimated:

$$AEM_{i,t} = \alpha + \beta_1 BOSIZE_{i,t} + \beta_2 BOIND_{i,t} + \beta_3 AUSIZE_{i,t} + \beta_4 DUALITY_{i,t} + \beta_5 TOTCOMPEN_{i,t} + \beta_6 ESCORE_{i,t} + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon \quad \text{(E2.16)}$$

where: AEM is replaced in each regression by ADAC, ADWAC, ADCF, ADPROD, ADDISEXP, ATOTALRM; BOSIZE is the number of board directors; BOIND is the percentage of non-executive directors on board; AUCOMSIZE is the number of directors on the audit committee (set to zero if a firm does not have an audit committee); DUALITY is a dummy which is one if a firm's chief executive officer is also the chairman of the board, zero otherwise; TOTCOMPEN is the average performance-linked compensation of all executive directors scaled by sales, where performance-linked compensation is defined as the total of bonus, shares, options and other long-term incentive pay awarded during the year, all times by 1,000 to avoid too small ratios because performance-linked executive compensation is typically quite small compared to total sales.

In a similar fashion, the following logistic regressions are also estimated to examine the incremental relationship between ESCORE and the indicators of aggressive earnings management after controlling for the above-mentioned control variables:

$$Logit(HEM_{i,t}) = \alpha + \beta_1 BOSIZE_{i,t} + \beta_2 BOIND_{i,t} + \beta_3 AUCOMSIZE_{i,t} + \beta_4 DUALITY_{i,t} + \beta_5 PLCOM_{i,t} + \beta_6 ESCORE_{i,t} + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon \qquad \text{(E2.17)}$$

where: HEM is replaced in each regression by HDAC, HDWAC, HDCF, HDPROD, HDDISEXP, and HTOTALRM.

The following procedure is followed to prepare the sample for the above multivariate regressions, which is a subsample of the main sample used in this chapter as described in Section 2.3. First, the sample is restricted to the period from 2005 to 2011 only because going further backwards would make the manual collection of data on compensation and corporate governance very difficult as firm's annual reports are no longer available online. Second, for all firm-years which remain in the main sample, data on corporate governance and compensation (as described above) are manually collected from Bloomberg. Third, those firm years which do not have the additional data from Bloomberg, their annual reports are retrieved from Key Note platform and the relevant data is manually collected. Finally, those which still have missing data after the above steps are excluded from the subsample for multivariate regression. This procedure yields an unbalanced panel of 2,059 observations, remarkably smaller than the main sample due to the availability of corporate governance and compensation data, but it is still large enough for statistical inferences. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

Table T2.13 presents the results of the multivariate regression test. The control variables generally have the predicted signs, i.e. measures of earnings management are negatively (positively) related to BOSIZE, BOIND and AUSIZE (DUALITY and PLCOM, respectively). The main focus is on ESCORE, which is shown to be significantly positively related to all measures of earnings management. The results of estimating equation (E2.16) (Panel A of Table T2.13) show that after controlling for compensation and corporate governance, one unit increase in ESCORE results in an increase of 1.24% (2.54%) in ADAC (ATOTALRM), which is statistically significant at 1% level. Looking at the results of estimating equation (E2.17) (Panel B of Table T2.13), ESCORE is also significantly positively related with both HDAC and HTOTALRM after the control variables are added (coefficient of 0.1839 and 0.1381, respectively, both are statistically significant at 1% level). The evidence reinforces the chapter’s earlier conclusion that ESCORE is consistent with other traditional measures of earnings management.

Table T2.13. Measures of accruals and real earnings management regressed on ESCORE and control variables (n = 2,059 observations)

Panel A: OLS regressions of absolute values of earnings management proxies on ESCORE and control variables

Variables	ADAC		ADWAC		ADCF		ADPROD		ADDISEXP		ATOTALRM	
	Coef.	t-statistic	Coef.	t- statistic	Coef.	t- statistic	Coef.	t- statistic	Coef.	t- statistic	Coef.	t- statistic
INTERCEPT	0.0957	6.051***	0.077	6.718***	0.1966	4.889***	0.0695	2.088**	0.2566	6.522***	0.4424	6.296***
$BOSIZE_{i,t}$	-0.0038	-3.471***	-0.0002	-0.296	-0.0011	-0.401	0.0021	0.9	0.001	0.361	0.0076	1.571
$BOIND_{i,t}$	-0.0203	-1.418	-0.0286	-2.765***	-0.0262	-0.72	-0.0294	-0.975	-0.0818	-2.303**	-0.1321	-2.081**
$AUCOMSIZE_{i,t}$	0.0002	0.097	-0.0013	-1.078	0.0009	0.215	0.0016	0.451	-0.0054	-1.283	0.0013	0.168
$DUALITY_{i,t}$	0.0175	2.246**	0.0081	1.433	-0.0014	-0.071	0.004	0.242	-0.0022	-0.114	-0.0336	-0.972
$TOTCOMPEN_{i,t}$	0.0536	2.261**	0.0065	0.38	0.032	0.53	-0.0579	-1.158	0.0457	0.775	-0.0545	-0.517
$ESCORE_{i,t}$	0.0124	10.432***	0.0083	9.663***	0.0129	4.266***	0.0131	5.217***	0.0188	6.357***	0.0254	4.818***

Panel B: Logistic regressions of indicators of aggressive earnings management on ESCORE and control variables

Variables	HDAC		HDWAC		HDCF		HDPROD		HDDISEXP		HTOTALRM	
	Coef.	Chi-square	Coef.	Chi-square	Coef.	Chi-square	Coef.	Chi-square	Coef.	Chi-square	Coef.	Chi-square
INTERCEPT	-0.8654	3.355*	-1.4544	9.57***	-1.9348	14.909***	-0.0892	0.042	0.3289	0.578	-0.5196	1.42
$BOSIZE_{i,t}$	-0.053	2.405	-0.0273	0.707	-0.1	6.976***	-0.0613	2.975*	-0.0803	5.552**	-0.0887	6.686***
$BOIND_{i,t}$	-0.7611	3.334*	-0.4054	0.996	0.2024	0.21	-0.9002	4.285**	-0.9664	5.566**	-0.3435	0.684
$AUCOMSIZE_{i,t}$	-0.0729	1.906	-0.0338	0.461	-0.0209	0.147	-0.0086	0.027	-0.0802	2.399	0.0053	0.011
$DUALITY_{i,t}$	0.2992	2.031	0.1681	0.632	0.1355	0.332	-0.0834	0.117	0.1957	0.857	-0.1719	0.533
$TOTCOMPEN_{i,t}$	-0.9954	1.851	0.1426	0.052	-0.1104	0.031	0.4305	0.491	0.0298	0.002	0.3981	0.433
$ESCORE_{i,t}$	0.1839	30.19***	0.1578	22.991***	0.3696	104.954***	0.1177	11.321***	0.0259	0.59	0.1318	15.638***

Notes: Panel A (B) reports the results of OLS (logistic) regressions of ADAC, ADWAC, ADCF, ADPROD, ADDISEXP, ATOTALRM (HDAC, HDWAC, HDCF, HDPROD, HDDISEXP, HTOTALRM) on ESCORE and control variables. Year and industry fixed effects are included in all regressions. 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

2.5.5.3. Ex-post measure of earnings management

ESCORE has so far been shown to be consistent with other traditional measures of earnings management, including discretionary accruals and real earnings management proxies. Although these measures are the most popular ones in the earnings management literature, they are increasingly subject to criticism (see Section 2.2.4). Given these criticisms, a valid concern would be that the presented evidence on the relationship between ESCORE and discretionary accruals and real earnings management proxies might be attributable to the mis-specification and measurement errors of the established models rather than a reflection of the association of ESCORE with actual earnings management. This section addresses the concern by looking at how ESCORE is associated with an external *ex-post* measure of earnings management.

In the UK, the FRRP is responsible for ensuring financial statements of public companies, which contain the main data inputs to the ESCORE model, comply with applicable laws and financial reporting standards. The FRRP selects firms for review based on some published criteria, including firms from specific sectors in the economy which are under particular stress, firms involved with special accounting issues which give rise to judgement, subjectivity and risk of misstatements as well as from complaints from the public, press or the accounting and financial community. As such, similar to the AAER and GAO samples of restatements in the US, the FRRP sample too is not free from selection bias. However, because each institution has a different sampling scheme, the evidence could reinforce each other and the limitations of each source could be mitigated.

If a firm is selected by the FRRP for review, several steps are taken, including an initial review, formal and informal discussions before a Review Group being set up if necessary, then a thorough investigation followed by a recommendation to the

FRRP chairman. A review may investigate into one or more annual reports of the selected firm. At the end of the process, the FRRP might decide it is suitable for a press notice. It is most likely that a press notice is issued in case the directors have agreed that the financial statements are defective and proposed corrective actions have been taken and that the FRRP is satisfied with those actions.

From the above description, firm-years which are investigated by the FRRP followed by a press notice are defined as instances of earnings management. As shown in Table T2.14, there are 70 annual reports with fiscal year ending between 1/1/1995 and 31/12/2012 which are subjected to FRRP press notices[19]. 37 firm-years which are in the financial and utility industries and do not have enough data to calculate ESCORE are removed. The 33 remaining cases spread across 22 Datastream level-six industries.

If ESCORE could capture the context of earnings management, the 33 firms being investigated by the FRRP and subsequently having a press notice (FRRP firms henceforth) are expected to have ESCORE being significantly larger in the year subjected to the investigation compared to other years. To test this conjecture, ESCORE of 33 FRRP firms for the period from 1995 to 2012 is extracted to create a subsample of 576 firm-year observations. As shown in Table T2.15, the size of FRRP firms is generally larger compared to average firms in the main sample (see Table T2.3), e.g. mean MVE of FRRP firms is £2,708 million compared to £390 million in the main sample (the difference is statistically significant at 1% level). It suggests the FRRP's sampling method is quite biased towards larger firms, which typically play an important role in the economy and if a misstatement exists, it would have more pronounced effects on investors. The mean (standard deviation) of ESCORE in this subsample is 2.1667 (1.4685).

[19] Only in this sub-test the sample period is extended to cover 2012 to maximize the number of observations.

Table T2.14. The FRRP sample selection

FRRP press notices related to annual reports with fiscal year ended between 1/1/1995 and 31/12/2012	70
Less: Financial and utility firms and those with insufficient data to calculate ESCORE	37
Selected firms being investigated by FRRP	33

Notes: Definition of ESCORE is in Section 2.8.

Table T2.15. Descriptive statistics of the FRRP sample (n = 576 firm-year observations)

	Mean	**25th percentile**	**Median**	**75th percentile**	**Standard deviation**
TA (£ million)	2,230	39	118	508	8,895
SALE (£ million)	1,404	36	133	702	4,298
IB (£ million)	152	0	4	29	706
BVE (£ million)	899	17	56	162	3,748
MVE (£ million)	2,708	20	105	419	9,846
ESCORE	2.1667	1	2	3	1.4685

Notes: The table reports descriptive statistics of the FRRP sample, including 33 FRRP firms across 1995 to 2012 where data is sufficient to calculate ESCORE. Definitions of variables are in Section 2.8.

The year for which the annual reports are investigated by the FRRP is defined as the investigation year. Panel A of Table T2.16 shows that the mean ESCORE of FRRP firms in investigation years (3.2424) is significantly larger than that of the rest of the sample (2.1013) at 1% level. The magnitude of the difference (1.1411) is also large, considering that the standard deviation of ESCORE in the subsample is only 1.4685 (see Table T2.15) and that of the main sample (see Table T2.3) is only 1.7346.

The 33 selected investigations might eventually result in different effects on financial statements. For each case, the FRRP press notice is read through to determine the nature of the cases and the effects on the firm's financial statements. Of the 33 FRRP cases, only 12 cases (36%) where the FRRP requires restatements involving items on the income statement. As shown in Panel B of Table T2.16, the mean ESCORE of those 12 cases is 3.20, which is 1.0536 unit higher than that of the rest of the sample (significant at 5% level).

Table T2.16. Mean ESCORE in FRRP firm-years versus the rest of the sample

Panel A: FRRP firm-years				
	FRRP firm-years	**Rest of sample**	**Difference**	**t-statistic**
Number of observations	33	543		
ESCORE	3.2424	2.1013	1.1411	4.4***
Panel B: FRRP firm-years with income statement restatements				
	FRRP firm-years with income statement restatements	**Rest of sample**	**Difference**	**t-statistic**
Number of observations	12	564		
ESCORE	3.2	2.1464	1.0536	2.26**

Notes: Panel A (B) compares the mean ESCORE of FRRP firm-years (FFRP firm-years with income statement restatements) with that of the rest of the sample using the t-test under the null that the difference is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Ideally ESCORE should then be added together with some control variables, such as corporate governance and compensation variables, to the right hand side of a logistic regression where the indicator of FRRP investigations is on the left hand side. However, further constraining the sample for the availability of these additional data would result in a sample which is too small for any reliable statistical inferences. Instead, a logistic regression of the indicator of FRRP investigations (which is equal to one for firm-years which are investigated by the FRRP, zero otherwise) on a constant and ESCORE (year and industry fixed effects included) is estimated. The coefficient on ESCORE, as shown in Table T2.17, is 0.532 (significant at 1% level). In terms of economic significance, one unit increase of ESCORE raises the probability of being investigated by FRRP by 2.02%, which is economically large compared to the unconditional probability of 5.73% (33/576).

Overall, the evidence suggests that firms investigated by FRRP, especially those which are required to restate the income statements, generally have higher ESCORE. It further supports that ESCORE could capture the context of earnings management.

Table T2.17. Logistic regression of the indicator of FRRP investigations on ESCORE

	Specification 1	**Specification 2**
Coefficient on ESCORE	0.4521	0.532
z-statistic	4.1***	3.85***
Marginal effect	0.0232	0.0202
Pseudo R^2	6.57%	13.37%
Year fixed effects	Not included	Included
Industry fixed effects	Not included	Included

Notes: The table reports the results of the logistic regression of the indicator of FRRP investigations (equals to one if a firm-year is investigated by FRRP, zero otherwise) on a constant and ESCORE. In Specification 1, year and industry fixed effects are excluded. In Specification 2, year and industry fixed effects are included. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

2.6. ROBUSTNESS CHECKS

2.6.1. Is the efficiency of ESCORE time-specific?

The sample in this study spans across some remarkable ups and downs of the UK market and important changes in the accounting regulation framework. In particular, the 1995-2011 sample period covers the IT bubble burst in 2000, the global financial crisis in 2008-2009 and the Eurozone sovereign debt crisis thereafter. The sample also spans across two accounting regimes in the UK with the adoption of the IFRS in the UK in 2005. To mitigate concerns if those events may potentially affect the efficacy of ESCORE, Table T2.18 and T2.19 show that in each year over the sample period, high ESCORE stocks consistently have higher ADAC and DAC than the low ESCORE counterpart. Although there are a few exceptions where the mean differences are positive but insignificant, it should be noted that the statistical inference should be interpreted with care because the number of observations in each year is quite small. Generally, it can be concluded that the efficacy of ESCORE is robust over time.

Table T2.18. Measures of accruals earnings management of the low ESCORE group versus the high ESCORE group in each year

Panel A: Discretionary accruals

	ADAC				HDAC			
Year	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**
1995	0.0373	0.1359	0.0985	1.866*	0.1915	0.3333	0.1418	0.941
1996	0.0556	0.05	-0.0056	-0.364	0.1837	0.0833	-0.1003	-0.832
1997	0.052	0.1582	0.1062	2.545**	0.082	0.4286	0.3466	2.445**
1998	0.0472	0.1306	0.0834	2.834**	0.1389	0.3125	0.1736	1.468
1999	0.0447	0.1621	0.1174	4.243***	0.087	0.4444	0.3575	3.369***
2000	0.053	0.2186	0.1657	6.257***	0.0889	0.3256	0.2367	2.815***
2001	0.0558	0.1803	0.1246	6.042***	0.1628	0.254	0.0912	1.114
2002	0.0566	0.1511	0.0945	4.844***	0.1918	0.2632	0.0714	0.966
2003	0.0445	0.1665	0.1221	6.14***	0.1566	0.3	0.1434	1.979**
2004	0.0503	0.174	0.1237	5.416***	0.0779	0.2833	0.2054	3.101***
2005	0.0709	0.1617	0.0908	5.421***	0.1091	0.2976	0.1885	2.869***
2006	0.0653	0.1615	0.0963	5.311***	0.0889	0.3043	0.2155	3.338***
2007	0.0529	0.1671	0.1142	7.488***	0.1111	0.3043	0.1932	2.693***
2008	0.0599	0.1868	0.1269	6.409***	0.0741	0.2778	0.2037	2.912***
2009	0.0547	0.1333	0.0786	4.305***	0.2143	0.3548	0.1406	1.69*
2010	0.0471	0.1617	0.1146	6.085***	0.1	0.2982	0.1982	2.839***
2011	0.046	0.115	0.069	4.506***	0.125	0.2885	0.1635	2.108**

Table T2.18 (continued)

Panel B: Discretionary working capital accruals

	ADWAC				HDWAC			
Year	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**
1995	0.0385	0.0846	0.0461	1.213	0.1277	0.25	0.1223	0.897
1996	0.0356	0.0425	0.0069	0.635	0.1429	0.1667	0.0238	0.205
1997	0.0389	0.1092	0.0703	2.515**	0.1148	0.2143	0.0995	0.981
1998	0.0448	0.1223	0.0775	3.889***	0.1111	0.4	0.2889	2.045*
1999	0.0443	0.1337	0.0894	4.487***	0.1087	0.5	0.3913	3.55***
2000	0.0414	0.1403	0.099	5.623***	0.1364	0.2619	0.1255	1.462
2001	0.0384	0.0981	0.0597	4.687***	0.1163	0.2258	0.1095	1.434
2002	0.0401	0.0982	0.0581	4.056***	0.1781	0.3684	0.1903	2.49**
2003	0.0338	0.0859	0.052	3.716***	0.0602	0.2653	0.2051	2.975***
2004	0.0399	0.101	0.0611	4.084***	0.039	0.1833	0.1444	2.623**
2005	0.0371	0.1025	0.0654	5.698***	0.0727	0.3214	0.2487	3.994***
2006	0.0431	0.1028	0.0597	5.049***	0.1111	0.2778	0.1667	2.485**
2007	0.0406	0.1205	0.0799	6.31***	0.0833	0.3187	0.2353	3.472***
2008	0.0502	0.1021	0.0519	3.902***	0.1111	0.2247	0.1136	1.295
2009	0.0315	0.0807	0.0492	4.707***	0.0536	0.371	0.3174	4.607***
2010	0.0319	0.1303	0.0984	6.509***	0.1	0.4211	0.3211	4.332***
2011	0.0266	0.0887	0.0621	4.814***	0.1071	0.3269	0.2198	2.825***

Notes: Panel A (B) reports the mean of ADAC, HDAC (ADWAC, HDWAC) in each year for the low and high ESCORE groups, together with the t-statistic under the null that the difference is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.19. Measures of real earnings management of the low ESCORE group versus the high ESCORE group in each year

Panel A: Abnormal cash flows

	ADCF				HDCF			
YEAR	Low ESCORE	High ESCORE	High - Low	t-statistic	Low ESCORE	High ESCORE	High - Low	t-statistic
1995	0.0508	0.17	0.1192	1.223	0.1707	0.25	0.0793	0.52
1996	0.0461	0.0854	0.0392	2.052*	0.075	0.2	0.125	0.894
1997	0.0686	0.2718	0.2032	2.022*	0.12	0.4167	0.2967	1.905*
1998	0.0476	0.1217	0.074	2.469**	0.0968	0.4667	0.3699	2.571**
1999	0.0699	0.3547	0.2848	4.257***	0.1463	0.5652	0.4189	3.857***
2000	0.0786	0.2832	0.2046	3.82***	0.075	0.3333	0.2583	2.865***
2001	0.0805	0.2245	0.144	4.353***	0.1905	0.4138	0.2233	2.407**
2002	0.0941	0.2571	0.1631	3.801***	0.1286	0.5192	0.3907	4.839***
2003	0.087	0.2209	0.1339	3.235***	0.0597	0.4444	0.3847	4.786***
2004	0.104	0.2726	0.1686	3.813***	0.0882	0.4737	0.3854	5.127***
2005	0.0937	0.2882	0.1945	5.477***	0.08	0.5195	0.4395	6.352***
2006	0.1371	0.2865	0.1494	3.792***	0.0769	0.5	0.4231	6.1***
2007	0.0795	0.2317	0.1522	5.715***	0.0571	0.4706	0.4134	6.129***
2008	0.0886	0.2292	0.1407	3.532***	0.0769	0.5244	0.4475	5.816***
2009	0.0947	0.1762	0.0815	3.013***	0.0638	0.4561	0.3923	5.183***
2010	0.1867	0.3753	0.1886	3.004***	0.0746	0.5	0.4254	5.515***
2011	0.1603	0.2579	0.0976	2.176**	0.102	0.4894	0.3873	4.52***

Table T2.19 (continued)

Panel B: Abnormal production costs

	ADPROD				HDPROD			
YEAR	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**
1995	0.1262	0.2747	0.1485	1.108	0.15	0.2857	0.1357	0.87
1996	0.1611	0.2406	0.0795	1.106	0.2308	0.2	-0.0308	-0.204
1997	0.1352	0.2915	0.1563	3.047***	0.1224	0.2222	0.0998	0.788
1998	0.1692	0.241	0.0718	1.083	0.2581	0.2667	0.0086	0.061
1999	0.0998	0.3451	0.2453	3.674***	0.175	0.4	0.225	1.924*
2000	0.1254	0.2559	0.1305	2.532**	0.075	0.2333	0.1583	1.776*
2001	0.1451	0.1621	0.017	0.53	0.2439	0.2609	0.017	0.18
2002	0.1257	0.1961	0.0705	1.996*	0.1714	0.381	0.2095	2.527**
2003	0.1269	0.2071	0.0802	2.38**	0.1194	0.3333	0.2139	2.48**
2004	0.1585	0.2808	0.1222	2.485**	0.2388	0.3	0.0612	0.737
2005	0.2537	0.2433	-0.0104	-0.197	0.2	0.2698	0.0698	0.86
2006	0.1848	0.2128	0.028	0.76	0.1316	0.3188	0.1873	2.363**
2007	0.1598	0.2108	0.0511	1.368	0.2857	0.2985	0.0128	0.133
2008	0.1088	0.228	0.1191	2.93***	0.08	0.3857	0.3057	3.792***
2009	0.1281	0.1583	0.0302	0.905	0.1304	0.2245	0.0941	1.192
2010	0.1605	0.2282	0.0677	1.507	0.209	0.2553	0.0464	0.576
2011	0.1363	0.2194	0.083	2.143**	0.0408	0.3571	0.3163	3.949***

Table T2.19 (continued)

Panel C: Abnormal discretionary expenses

	ADDISEXP				HDDISEXP			
YEAR	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**
1995	0.115	0.117	0.002	0.05	0.1176	0.3333	0.2157	1.362
1996	0.0839	0.121	0.0371	0.755	0.2414	0.25	0.0086	0.049
1997	0.0933	0.3306	0.2373	1.768	0.1538	0.3	0.1462	1.055
1998	0.1272	0.1788	0.0516	0.942	0.12	0.1333	0.0133	0.12
1999	0.0973	0.5129	0.4156	3.805***	0.2069	0.25	0.0431	0.349
2000	0.1721	0.4433	0.2712	3.267***	0.1429	0.2941	0.1513	1.527
2001	0.1034	0.2735	0.1701	3.953***	0.1935	0.1887	-0.0049	-0.054
2002	0.1607	0.2959	0.1352	2.279**	0.1964	0.3333	0.1369	1.568
2003	0.1694	0.3141	0.1447	2.32**	0.1607	0.325	0.1643	1.904*
2004	0.1482	0.3814	0.2332	4.472***	0.1864	0.3889	0.2024	2.427**
2005	0.1962	0.3556	0.1594	2.962***	0.25	0.2778	0.0278	0.315
2006	0.1789	0.3462	0.1672	3.519***	0.125	0.1923	0.0673	0.843
2007	0.1329	0.2873	0.1544	3.846***	0.2143	0.1974	-0.0169	-0.189
2008	0.1408	0.2989	0.1581	3.249***	0.1	0.1739	0.0739	0.793
2009	0.1116	0.2442	0.1326	2.84***	0.125	0.25	0.125	1.5
2010	0.253	0.3788	0.1258	1.733*	0.1964	0.24	0.0436	0.539
2011	0.1642	0.313	0.1488	2.556**	0.125	0.2857	0.1607	1.808*

Table T2.19 (continued)

Panel D: Total real earnings management

	ATOTALRM				HTOTALRM			
YEAR	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**	**Low ESCORE**	**High ESCORE**	**High - Low**	**t-statistic**
1995	0.3002	0.62	0.3199	0.827	0.1515	0.2	0.0485	0.27
1996	0.3768	0.6822	0.3054	2.495**	0.1786	0.125	-0.0536	-0.349
1997	0.3967	0.8771	0.4803	3.159***	0.1316	0.375	0.2434	1.665
1998	0.4295	0.7289	0.2994	1.575	0.16	0.2	0.04	0.315
1999	0.2598	0.9532	0.6934	3.755***	0.0714	0.3529	0.2815	2.176**
2000	0.3135	0.7646	0.4511	1.911*	0	0.25	0.25	3***
2001	0.3124	0.4344	0.122	1.541	0.1	0.2558	0.1558	1.783*
2002	0.3946	0.6473	0.2527	2.557**	0.1429	0.4571	0.3143	3.22***
2003	0.3813	0.5202	0.1389	1.807*	0.1071	0.4286	0.3214	3.399***
2004	0.4219	0.7262	0.3043	2.72***	0.1552	0.383	0.2278	2.642***
2005	0.4187	0.6391	0.2204	2.303**	0.15	0.35	0.2	2.24**
2006	0.413	0.5194	0.1064	1.049	0.1613	0.2951	0.1338	1.401
2007	0.4374	0.5293	0.092	1.003	0.3214	0.35	0.0286	0.26
2008	0.3758	0.4512	0.0754	0.742	0.1	0.3793	0.2793	2.966***
2009	0.3871	0.447	0.0599	0.767	0.15	0.2609	0.1109	1.258
2010	0.4372	0.4961	0.0588	0.589	0.125	0.3556	0.2306	2.718***
2011	0.3359	0.6087	0.2728	3.235***	0.05	0.4211	0.3711	4.2***

Notes: Panel A (B; C; D) reports the mean of ADCF, HDCF (ADPROD, HDPROD; ADDISEXP, HDDISEXP; ATOTALRM, HTOTALRM, respectively) in each year for the low and high ESCORE groups, together with the t-statistic under the null that the difference is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

2.6.2. Alternative models to estimate discretionary accruals

In the main test, the cross-sectional version of the modified-Jones model is used to estimate DAC. Despite there are competing models to estimate discretionary accruals (Dechow et al., 1995; Guay et al., 1996; Bernard and Skinner, 1996; Young, 1999; Thomas and Zhang, 2000; Peasnell et al., 2000; Fields et al., 2001), the existing literature generally suggests that there is no other model that outperforms the modified-Jones model, especially in the UK context (Peasnell et al., 2000; Botsari and Meeks, 2008). Nevertheless, to mitigate the concerns over whether the results can be affected by the models employed to estimate discretionary accruals, in this section the main test is replicated with various variants of the modified-Jones model.

In the first robustness check, DAC is estimated using the cross-sectional version of the original-Jones model as follows:

$$DAC_{i,t} = \frac{AC_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right)\right] \quad \text{(E2.18)}$$

where: $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$ are the estimated coefficients from Equation (E2.4) as presented in Section 2.5.1.1 in the main test [i.e. the regression is exactly the same as with the modified-Jones model, the only difference is that in (E2.18) the change in receivables is not taken away from the change in revenues]. Table T2.20 shows that the efficacy of ESCORE in revealing the context of earnings management is qualitatively the same when the original Jones model is employed.

Hribar and Collins (2002) argue that accruals estimated using the cash flows approach can overcome the potential error induced by 'non-articulation' transactions in the balance sheet approach. However, other authors, such as Gore et al. (2007), have argued that the cash flows approach is also problematic because 'non-articulation' transaction may also affect the cash flow approach and the accruals

Table T2.20. Measures of discretionary accruals across ESCORE groups using the original Jones model

ESCORE	ADAC	HDAC
0	0.0531	0.1334
1	0.0578	0.1537
2	0.0687	0.2045
3	0.0849	0.2338
4	0.0991	0.2621
5	0.1185	0.2857
6	0.1477	0.2678
7	0.1629	0.2845
8	0.1559	0.3295
9	0.1907	0.4231
Low (0)	0.0531	0.1334
High (6-9)	0.1539	0.2832
High - Low	0.1008	0.1498
t-statistic	19.386***	7.797***

Notes: The table reports the mean of ADAC and HDAC, estimated using the original Jones model, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

resulted from the cash flows approach may include items which cannot be classified as either discretionary or non-discretionary. Therefore, both the Jones and modified-Jones models are replicated using the balance sheet approach to account for the ongoing contention surrounding this issue.

Following Dechow et al. (1995), AC (total accruals) is estimated under the balance sheet approach as follows:

$$AC = (\Delta CA - \Delta CHE) - (\Delta CL - \Delta STD) - DP \quad \text{(E2.19)}$$

where: DP is depreciation and amortization expenses.

Table T2.21 reports summary statistics of estimating discretionary accruals using the balance sheet approach. No significant change to the parameters compared to the ones reported in Table T2.1 (Section 2.5.1.1) in the main test is noted. Table T2.22 and T2.23 confirm the robustness of the ESCORE model when the balance sheet approach is used.

Table T2.21. Average parameters across industry-years in models to estimate discretionary accruals using modified Jones model where total accruals is calculated using balance sheet approach

	AC_t/ TA_{tm1} (E2.4)	
	Coefficient	**t-statistic**
Intercept	-0.0246	-7.969***
$1/TA_{tm1}$	0.0155	0.544
$\triangle REV_t / TA_{tm1}$	0.0349	4.826***
PPE_t / TA_{tm1}	-0.0333	-3.621***
R^2	0.3317	

Notes: Within each industry-year with at least 15 observations of available data, the following model is estimated:

$$\frac{AC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \qquad \text{(E2.4)}$$

in which total accruals is estimated using balance sheet approach:

$$AC = (\Delta CA - \Delta CHE) - (\Delta CL - \Delta STD) - DP \qquad \text{(E2.19)}$$

The table reports the average across industry-years of the parameters estimated from the above model, together with the t-statistics estimated from using the standard errors of the mean across industry-years. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.22. Measures of discretionary accruals across ESCORE groups using modified Jones model where total accruals is calculated using balance sheet approach

ESCORE	**ADAC**	**HDAC**
0	0.0480	0.1000
1	0.0555	0.1594
2	0.0637	0.2084
3	0.0766	0.2295
4	0.0866	0.2653
5	0.1033	0.3030
6	0.1137	0.2680
7	0.1258	0.3219
8	0.1309	0.2727
9	0.1391	0.3600
Low (0)	0.0480	0.1000
High (6-9)	0.1194	0.2857
High - Low	0.0714	0.1857
t-statistic	17.093***	10.023***

Notes: The table reports the mean of ADAC, HDAC, estimated using the modified Jones model where total accruals is estimated using balance sheet approach, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.23. Measures of discretionary accruals across ESCORE groups using original Jones model where total accruals is calculated using balance sheet approach

ESCORE	ADAC	HDAC
0	0.0478	0.1047
1	0.0550	0.1630
2	0.0630	0.2090
3	0.0755	0.2278
4	0.0858	0.2677
5	0.1015	0.2989
6	0.1127	0.2583
7	0.1251	0.3047
8	0.1263	0.2614
9	0.1280	0.3600
Low (0)	0.0478	0.1047
High (6-9)	0.1179	0.2741
High - Low	0.0701	0.1694
t-statistic	17.013***	9.163***

Notes: The table reports the mean of ADAC, HDAC, estimated using the original Jones model where total accruals is estimated using balance sheet approach, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

The last robustness check related to the discretionary accruals model involves the removal of the intercept. The modified-Jones model as specified in the main test is actually slightly different from the original model because an intercept has been added to avoid forcing the regression line through the origin (Gore et al., 2007). In this section, both the original and modified Jones models, each uses both the cash flow and balance sheet approach to calculate total accruals, are re-estimated without an intercept. In particular, Equation (E2.4) is modified as below:

$$\frac{AC_{i,t}}{TA_{i,t-1}} = \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \qquad \text{(E2.20)}$$

All the rest of the estimation of DAC using the modified-Jones and original Jones models where total accruals is estimated using the cash flow and balance sheet approaches are unchanged.

Table T2.24 reports the summary statistics of estimating the model without the intercept where total accruals is calculated using the cash flow approach. Table T2.25 and T2.26 show that the main results are qualitatively unchanged for both cases when the original and modified Jones models are used. Similar results using the model without the intercept where total accruals is calculated using the balance sheet approach are reported in Table T2.27, T2.28 and T2.29. Again, the main conclusions are qualitatively similar to the main test.

Table T2.24. Average parameters across industry-years in models to estimate discretionary accruals using modified Jones model without an intercept

	AC_t/ TA_{tm1} (E2.20)	
	Coef.	**t-statistic**
$1/TA_{tm1}$	-40.4850	-1.069
$\triangle REV_t / TA_{tm1}$	0.0345	4.263***
PPE_t/TA_{tm1}	-0.0808	-14.99***
R^2	0.3673	

Notes: Within each industry-year with at least 15 observations of available data, the following model is estimated:

$$\frac{AC_{i,t}}{TA_{i,t-1}} = \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.20)}$$

The table reports the average across industry-years of the parameters estimated from the above model, together with the t-statistics estimated from using the standard errors of the mean across industry-years. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.25. Measures of discretionary accruals across ESCORE groups using modified Jones model without an intercept

ESCORE	ADAC	HDAC
0	0.0522	0.1299
1	0.0581	0.1560
2	0.0697	0.2055
3	0.0852	0.2297
4	0.1008	0.2579
5	0.1223	0.2827
6	0.1555	0.2967
7	0.1685	0.2888
8	0.1677	0.3636
9	0.1898	0.3846
Low (0)	0.0522	0.1299
High (6-9)	0.1613	0.3040
High - Low	0.1090	0.1741
t-statistic	19.668***	8.977***

Notes: The table reports the mean of ADAC, HDAC, estimated using the modified Jones model without an intercept, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.26. Measures of discretionary accruals across ESCORE groups using original Jones model without an intercept

ESCORE	ADAC	HDAC
0	0.0526	0.1323
1	0.0578	0.1600
2	0.0692	0.2045
3	0.0847	0.2301
4	0.1010	0.2567
5	0.1207	0.2837
6	0.1531	0.2967
7	0.1661	0.2716
8	0.1597	0.3182
9	0.1870	0.3462
Low (0)	0.0526	0.1323
High (6-9)	0.1583	0.2936
High - Low	0.1057	0.1614
t-statistic	19.098***	8.353***

Notes: The table reports the mean of ADAC, HDAC, estimated using the original Jones model without an intercept, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.27. Average parameters across industry-years in models to estimate discretionary accruals using modified Jones model without an intercept where total accruals is calculated using balance sheet approach

	AC_t/ TA_{tm1} (E2.20)	
	Coefficient	**t-statistic**
$1/TA_{tm1}$	5.0031	0.17
$\triangle REV_t / TA_{tm1}$	0.0354	4.879***
PPE_t/TA_{tm1}	-0.0676	-10.064***
R^2	0.3928	

Notes: Within each industry-year with at least 15 observations of available data, the following model is estimated:

$$\frac{AC_{i,t}}{TA_{i,t-1}} = \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(E2.20)}$$

in which total accruals is estimated using balance sheet approach:

$$AC = (\Delta CA - \Delta CHE) - (\Delta CL - \Delta STD) - DP \quad \text{(E2.19)}$$

The table reports the average across industry-years of the parameters estimated from the above model, together with the t-statistics estimated from using the standard errors of the mean across industry-years. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.28. Measures of discretionary accruals across ESCORE groups using modified Jones model without an intercept where total accruals is calculated using balance sheet approach

ESCORE	ADAC	HDAC
0	0.0497	0.1176
1	0.0572	0.1726
2	0.0648	0.2066
3	0.0786	0.2240
4	0.0881	0.2575
5	0.1054	0.2968
6	0.1169	0.2796
7	0.1297	0.2833
8	0.1370	0.2614
9	0.1559	0.3200
Low (0)	0.0497	0.1176
High (6-9)	0.1236	0.2799
High - Low	0.0739	0.1623
t-statistic	16.671***	8.592***

Notes: The table reports the mean of ADAC, HDAC, estimated using the modified Jones model without an intercept where total accruals is estimated using the balance sheet approach, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.29. Measures of discretionary accruals across ESCORE groups using original Jones model without an intercept where total accruals is calculated using balance sheet approach

ESCORE	ADAC	HDAC
0	0.0494	0.1235
1	0.0566	0.1744
2	0.0642	0.2069
3	0.0777	0.2240
4	0.0874	0.2581
5	0.1038	0.2927
6	0.1156	0.2699
7	0.1297	0.2747
8	0.1337	0.2386
9	0.1432	0.3200
Low (0)	0.0494	0.1235
High (6-9)	0.1220	0.2695
High - Low	0.0726	0.1459
t-statistic	16.695***	7.729***

Notes: The table reports the mean of ADAC, HDAC, estimated using the original Jones model without an intercept where total accruals is estimated using the balance sheet approach, in each group sorted by ESCORE. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

2.6.3. Alternative versions of ESCORE

ESCORE, as constructed in the main test, requires rolling benchmarks to calculate six signals, i.e. the signals used to capture overvalued firms (EOV), firms with low debt (EDEBT), firms with small size (ESIZE), firms with high net operating assets (EBLOAT), firms with low tangible asset intensity (ECAP) and firms with high book-tax difference (EBT). In particular, to determine EOV of firm *i* in year *t*, for example, the 80th percentile of MTB (market-to-book ratio) for the corresponding industry in year *t* needs to be calculated to compare against firm *i*'s actual MTB. In the next year, the benchmark for year *t+1* is needed, and so on. This rolling-benchmark approach is arguably more appropriate to make sure the benchmarks are updated over time and thus are closest to reality. Nevertheless, from a practitioner's viewpoint, it might be difficult to calculate the rolling benchmarks (or at least it is time-consuming) because the use of rolling benchmarks requires an update of the benchmarks every year, including the collection of industry-wide data. Therefore, this section creates another version of ESCORE, namely ESCORE_FIXED, which uses time-fixed benchmarks. The time-fixed benchmarks do not change over time, so ESCORE_FIXED is a simplified and more practice-oriented version of ESCORE. For each industry, the time-fixed benchmarks are calculated as the averages of the benchmarks across 17 sample years:

$$\overline{\gamma_k^{20}} = \frac{\sum_{t=1995}^{2011}(\gamma_{k,t}^{20})}{17} \tag{E2.21}$$

$$\overline{\gamma_k^{80}} = \frac{\sum_{t=1995}^{2011}(\gamma_{k,t}^{80})}{17} \tag{E2.22}$$

where: *k* = 1... 43 are the unique Datastream level-six industries remained in the sample, and *t* = 1995... 2011 represent the 17 sample years.

$\overline{\gamma_k^{20}}$ and $\overline{\gamma_k^{80}}$ are used as the upper and lower benchmarks, respectively. If a signal is lower (higher) than $\overline{\gamma_k^{20}}$ ($\overline{\gamma_k^{80}}$), it would be considered as too low (high). As constructed, the benchmarks are constant over the time but are different across industries. The pitfall of the approach is, however, that the benchmarks remain unchanged over time, which may make them outdated as time goes. Table T2.30 reports the time-fixed benchmarks for each (Datastream level-six) industry across the years. The time-fixed benchmarks as reported in Table T2.30 could serve as a quick reference point to simplify the calculation of ESCORE in practice, i.e. one could simply compare a firm's market value of equity, for example, to the $\overline{MVE_k^{20}}$ of the corresponding industry to decide if the signal ESIZE is one or zero, rather than having to collect MVE of the whole industry in that year, then calculate MVE_k^{20} to use as the benchmark. Table T2.31 reports the distribution of observations across groups sorted by ESCORE_FIXED while Table T2.32 and T2.33 report the result of a replication of the main test using ESCORE_FIXED calculated under the time-fixed benchmarks. The main conclusions from the main tests do not change qualitatively.

ESCORE as constructed using either the time-fixed or rolling benchmarks could arguably still be difficult for an average investor to construct because of the need to collect industry-wide data to construct the benchmarks. This section further tests the efficacy of a suppressed version of ESCORE, namely ESCORE_9, which excludes all signals which require a benchmark to construct (i.e. ESIZE, EOV, EBT, EBLOAT, ECAP and EDEBT). In particular, ESCORE_9 is calculated as follows:

$$ESCORE\_9 = ESEO + EDDEBT + EMA + EROA + EDROA + EDIV + EDISTRESS + ECYCLE + EAUDIT \quad \text{(E2.23)}$$

As designed, ESCORE_9 is an integer ranging from 0 to 9. Table T2.34 shows the number of observations in each group sorted by ESCORE_9. To make sure the number of observations in the low and high ESCORE groups are approximately the same, stocks with ESCORE of zero (three and higher) are assigned to the low (high) ESCORE group. Table T2.35 and T2.36 report how the measures of earnings management vary as ESCORE_9 increases. It could be noted that ESCORE_9 is still effective in capturing the context of earnings management, although the power shrinks remarkably compared to the complete ESCORE as used in the main test.

Table T2.30. Average industry benchmarks

Industries	**N**	$\overline{MVE_k^{20}}$	$\overline{MTB_k^{80}}$	$\overline{BOOKTAX_k^{80}}$	$\overline{NOA_k^{20}}$	$\overline{CAP_k^{20}}$	$\overline{DEBT_k^{20}}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Building Materials and Fixtures	410	10,932	2.5853	0.0763	0.4294	0.4395	0.0344
Industrial Suppliers	276	18,902	3.3094	0.0362	0.4441	0.2082	0.0305
Specialty Chemicals	318	19,608	4.0362	0.3146	0.4549	0.3670	0.0421
Home Construction	258	35,980	1.5436	0.0188	0.5473	0.0238	0.0740
Electrical Equipment	371	5,513	3.4570	0.3935	0.3941	0.2042	0.0201
Heavy Construction	290	14,510	2.9180	0.0350	0.1079	0.1291	0.0232
Media Agencies	383	9,208	8.0574	0.1898	0.1249	0.1097	0.0290
Industrial Machinery	779	8,336	2.9728	0.0492	0.3813	0.3436	0.0315
Healthcare Providers	23	4,306	4.3513	0.0664	0.6398	0.0398	0.1294
Financial Administration	13	21,687	7.0500	0.0218	0.2797	0.2131	0.0552
Exploration & Production	395	26,807	3.2060	3.1903	0.4571	0.2040	0.0074
Oil Equipment and Services	73	24,051	4.2967	0.1684	0.1369	0.1302	0.0317
Recreational Services	320	8,622	3.1160	0.2569	0.3706	0.4810	0.0592
Electronic Equipment	299	8,257	4.4093	0.2077	0.4070	0.2317	0.0236
Software	957	7,355	7.0822	0.4854	0.0854	0.1056	0.0003
Durable Household Production	36	3,842	2.5772	0.0969	0.4870	0.5158	0.0000
Furnishings	87	7,552	2.9622	0.0432	0.4151	0.4919	0.0326
Transport Services	197	18,238	2.5858	0.1246	0.3755	0.3212	0.0735
Apparel Retailers	259	27,892	4.2323	0.0341	0.3796	0.3621	0.0116
Clothing and Accessory	318	5,025	2.7832	0.0914	0.4411	0.2317	0.0265
Food Products	384	26,806	3.5921	0.0494	0.4398	0.3716	0.1082
Restaurants and Bars	470	22,479	3.1987	0.0894	0.5689	0.6894	0.0677

Table T2.30 (continued)

Industries	N	$\overline{MVE_k^{20}}$	$\overline{MTB_k^{80}}$	$\overline{BOOKTAX_k^{80}}$	$\overline{NOA_k^{20}}$	$\overline{CAP_k^{20}}$	$\overline{DEBT_k^{20}}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Consumer Electronics	28	27,490	3.4635	0.0373	0.4746	0.4823	0.0204
Publishing	405	20,541	5.6911	0.1624	0.3103	0.0745	0.0288
Business Support Services	1398	9,503	4.3210	0.0610	0.2607	0.1707	0.0361
Broadline Retailers	88	34,512	3.1222	0.0564	0.3830	0.5066	0.0093
Food Retail, Wholesale	63	60,515	3.0112	0.0198	0.4670	0.7491	0.0703
Specialty Retailers	458	16,742	3.4254	0.0323	0.3241	0.2590	0.0450
Pharmaceuticals	282	14,821	8.6519	4.2351	0.1321	0.0556	0.0007
Gambling	99	12,884	7.9496	0.2054	0.1682	0.0670	0.0274
Medical Supplies	20	13,220	6.2058	0.5928	0.1704	0.0756	0.0092
Broadcast and Entertainment	340	6,907	6.7370	0.5503	0.2331	0.1221	0.0201
Gold Mining	71	24,323	3.5633	1.4136	0.4817	0.4019	0.0124
General Mining	159	20,861	3.5954	4.7763	0.3582	0.1448	0.0041
Telecommunication Equipment	84	12,398	3.4032	0.5757	0.2526	0.1235	0.0038
Semiconductors	27	16,404	6.6568	1.7243	0.0556	0.0549	0.0000
Medical Equipment	266	7,043	5.4608	0.8935	0.3200	0.1701	0.0059
Business Training & Employment	344	7,524	6.6713	0.0857	0.2240	0.0813	0.0103
Fixed Line Telecommunication	36	34,611	7.0520	0.5431	0.0882	0.3036	0.0752
Mobile Telecommunication	20	11,793	5.8036	0.3703	0.1900	0.0231	0.0000
Computer Services	531	13,501	7.5568	0.1861	0.1505	0.1381	0.0054
Internet	12	3,904	4.4347	0.3279	0.0792	0.3561	0.0001
Biotechnology	273	21,113	7.0276	17.6279	-0.0033	0.0751	0.0002

Notes: Column (2) reports the distribution of observations across Datastream level-six industries. Columns (3), (6), (7) and (8) report the average across the years of the 20^{th} percentile of MVE, NOA, CAP and DEBT in each industry. Columns (4) and (5) report the average of across the years of the 80^{th} percentile of MTB and BOOKTAX in each industry. Definitions of variables are in Section 2.8.

Table T2.31. Distribution of observations across ESCORE_FIXED groups

ESCORE_FIXED	N	ESCORE_FIXED GROUP	N
0	915	Low (0)	915
1	2,269		
2	2,890		
3	2,392		
4	1,578		
5	996	Medium (1-5)	10,125
6	504		
7	257		
8	89		
9	30	High (6-9)	880

Notes: The table reports the distribution of observations across groups sorted by ESCORE_FIXED. Definitions of variables are in Section 2.8.

Table T2.32. Measures of accruals management across ESCORE_FIXED groups

ESCORE_FIXED	ADAC	HDAC	ADWAC	HDWAC
0	0.0521	0.1301	0.0377	0.1018
1	0.058	0.1556	0.0472	0.1768
2	0.069	0.2024	0.0546	0.2031
3	0.0836	0.2404	0.0656	0.233
4	0.0998	0.2681	0.0741	0.2529
5	0.1245	0.262	0.0887	0.2791
6	0.1565	0.2619	0.0994	0.2797
7	0.1679	0.3658	0.1098	0.3191
8	0.1703	0.2921	0.1119	0.3488
9	0.1859	0.4	0.1202	0.3333
Low (0)	0.0521	0.1301	0.0377	0.1018
High (6-9)	0.1622	0.3	0.1044	0.3
High - Low	0.1101	0.1699	0.0667	0.1982
t-statistic	21.417***	8.924***	18.917***	10.724***

Notes: The table reports the mean of ADAC, HDAC, ADWAC, HDWAC in each group sorted by ESCORE_FIXED. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE_FIXED group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.33. Measures of real earnings management across ESCORE_FIXED groups

ESCORE_FIXED	ADCF	HDCF	ADPROD	HDPROD	ADDISEXP	HDDISEXP	ATOTALRM	HTOTALRM
0	0.0967	0.0984	0.1479	0.1688	0.1506	0.171	0.3809	0.1308
1	0.0935	0.1212	0.157	0.1761	0.1669	0.196	0.4491	0.1768
2	0.1013	0.1615	0.1725	0.1974	0.1756	0.2127	0.4748	0.2017
3	0.1244	0.2009	0.1918	0.2315	0.2065	0.2168	0.484	0.2169
4	0.1402	0.2818	0.2047	0.2398	0.2315	0.2323	0.486	0.2329
5	0.1993	0.3654	0.2121	0.2625	0.2878	0.2567	0.5051	0.3155
6	0.2195	0.423	0.21	0.2772	0.2938	0.2404	0.5381	0.3112
7	0.2827	0.5212	0.234	0.3641	0.3401	0.2986	0.579	0.3886
8	0.3399	0.55	0.2513	0.2535	0.4037	0.2	0.6691	0.3636
9	0.3769	0.72	0.2711	0.3913	0.4343	0.1818	0.9309	0.3333
Low (0)	0.0967	0.0984	0.1479	0.1688	0.1506	0.171	0.3809	0.1308
High (6-9)	0.255	0.4738	0.2233	0.3037	0.3229	0.2514	0.5776	0.3399
High - Low	0.1583	0.3754	0.0754	0.1349	0.1723	0.0803	0.1967	0.2091
t-statistic	14.629***	18.279***	6.981***	6.092***	11.663***	3.671***	7.278***	8.943***

Notes: The table reports the mean of ADCF, HDCF, ADPROD, HDPROD, ADDISEXP, HDDISEXP, ATOTALRM, HTOTALRM in each group sorted by ESCORE_FIXED. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE_FIXED group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.34. Distribution of observations across ESCORE_9 groups

ESCORE_9	N	ESCORE_9 GROUP	N
0	2,487	Low (0)	2,487
1	4,438		
2	3,170	Medium (1-2)	7,608
3	1,359		
4	403		
5	53		
6	9		
7	1	High (3-7)	1,825

Notes: The table reports the distribution of observations across groups sorted by ESCORE_9. Definitions of variables are in Section 2.8.

Table T2.35. Measures of accruals management across ESCORE_9 groups

ESCORE_9	ADAC	HDAC	ADWAC	HDWAC
0	0.0615	0.1709	0.048	0.1516
1	0.0727	0.2037	0.0561	0.2069
2	0.0943	0.2473	0.0699	0.2382
3	0.1187	0.2494	0.0851	0.2835
4	0.1418	0.2605	0.1002	0.3083
5	0.1603	0.3396	0.1066	0.283
6	0.1389	0.5556	0.1107	0.3333
7	0.1052	0	0.3088	0
Low (0)	0.0615	0.1709	0.048	0.1516
High (3-7)	0.1251	0.2559	0.0893	0.289
High - Low	0.0636	0.085	0.0413	0.1374
t-statistic	19.605***	6.691***	18.132***	10.681***

Notes: The table reports the mean of ADAC, HDAC, ADWAC, HDWAC in each group sorted by ESCORE_9. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE_9 group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T2.36. Measures of real earnings management across ESCORE_9 groups

ESCORE_9	ADCF	HDCF	ADPROD	HDPROD	ADDISEXP	HDDISEXP	ATOTALRM	HTOTALRM
0	0.1079	0.1034	0.1626	0.1627	0.1738	0.1851	0.451	0.1292
1	0.1112	0.1648	0.1795	0.2093	0.1907	0.2225	0.4816	0.2097
2	0.1381	0.2709	0.1888	0.2345	0.2181	0.2315	0.4702	0.2508
3	0.1737	0.3684	0.1988	0.2745	0.2552	0.2176	0.4883	0.2904
4	0.2137	0.4055	0.2188	0.2749	0.3211	0.2377	0.5452	0.3368
5	0.2435	0.5106	0.2711	0.3	0.3202	0.2093	0.6944	0.3243
6	0.1914	0.625	0.2424	0.25	0.3584	0.25	0.6191	0.375
7	0.8197	0	0.1253	0	0.3188	0	0.308	0
Low (0)	0.1079	0.1034	0.1626	0.1627	0.1738	0.1851	0.451	0.1292
High (3-7)	0.1849	0.3816	0.2053	0.275	0.2725	0.2218	0.5072	0.3018
High – Low	0.077	0.2782	0.0427	0.1123	0.0986	0.0367	0.0562	0.1727
t-statistic	12.167***	20.506***	6.505***	8.05***	10.549***	2.584***	3.391***	11.562***

Notes: The table reports the mean of ADCF, HDCF, ADPROD, HDPROD, ADDISEXP, HDDISEXP, ATOTALRM, HTOTALRM in each group sorted by ESCORE_9. The t-statistic is calculated under the null that the difference between mean values of the low and high ESCORE_9 group is zero. Definitions of variables are in Section 2.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

2.7. CONCLUSIONS

This chapter demonstrates that a simple and easy-to-construct model, namely ESCORE, which accumulates fifteen individual financial-statement-based signals, could capture the context in which earnings management is more likely to happen. Using UK listed stocks during the period 1995 to 2011, stocks with ESCORE of six and above are shown to have managed earnings, both in accruals and real earnings management, by larger magnitudes and are more likely to be an accounting aggressor. Firms which are selected by the FRRP for investigation also have higher ESCORE. The results are robust across various modifications to the methodologies and across time.

The new approach promises to be a useful tool for practitioners as well as an original contribution to the literature on earnings management detection models. One of the appeals of the ESCORE model is that it does not require industry-wide data collection and complicated econometric procedures to calculate. The model allows financial statement users to quickly access the reliability of reported earnings. This feature of ESCORE makes it a promising tool to be used in practice as well as in subsequent research in which data constraint is a major problem preventing the researchers to use other traditional measures of earnings management. For example, the use of the Jones-type models in emerging markets is quite problematic because of the issue of small sample size which could reduce the reliability of econometric regressions. Using ESCORE in such settings is clearly advantageous. Moreover, ESCORE only implies the likelihood of earnings management without directly measure the magnitude of such manipulation. Hence ESCORE does not suffer from the major weakness of the existing earnings management models which try to measure the magnitude of earnings management via modelling in the absence of a general theory. Last but not least, ESCORE captures both accruals and real earnings management as well as financial reporting violations which require restatements. ESCORE is, hence, particularly advantageous to use in subsequent studies as it only focuses on earnings management and makes no prediction regarding which methods have been used to manage earnings.

ESCORE has a unique characteristic that makes it stand out from the other proxies of earnings management. ESCORE accumulates individual signals of susceptible earnings management into an index. Such index is, therefore, capable of revealing the general context of in which earnings management is more likely to happen. There is no existing measure of earnings management which could do the same. This feature of ESCORE opens up many interesting research questions, one of which will be investigated in the next chapter: would the market take full account of the information contained in the general context of earnings management in setting share price?

2.8. DEFINITIONS OF VARIABLES USED IN CHAPTER 2

$\boldsymbol{\gamma_{k,t}^{20}}$ and $\boldsymbol{\gamma_{k,t}^{80}}$ are, respectively, the lower and upper benchmarks of industry *k* in year *t*, determined as the 20th and 80th percentiles of γ in each industry-year. γ is substituted by DEBT, MTB, MVE, NOA, CAP, BOOKTAX (definitions of these variables are below); *k* = 1... 43 are 43 unique Datastream level-six industries; *t* = 1995... 2011 represent the sample years.

$\boldsymbol{\overline{\gamma_{k}^{20}}}$ and $\boldsymbol{\overline{\gamma_{k}^{20}}}$ are, respectively, the average of $\gamma_{k,t}^{20}$ and $\gamma_{k,t}^{80}$ across 17 years from 1995 to 2011.

EDDEBT is defined as a dummy that takes the value of one if DDEBT is 5% or higher, zero otherwise. DDEBT is the percentage change of total of short- and long-term debts compared to last year, and zero otherwise.

ESEO is one if CSHO increases by 5% compared to last year and PROISSUE is positive, zero otherwise. CSHO is number of outstanding shares. PROISSUE is the proceeds from issuing ordinary/preferred stocks.

EMA is one if a firm announces a share-financed M&A deal in the financial year, zero otherwise.

EOV is one if beginning MTB is higher than the corresponding $MTB_{k,t}^{80}$, zero otherwise. MTB is calculated as market value of equity at the end of fiscal year divided by ordinary shareholders' equity.

EROA is one if ROA is equal to or larger than zero but smaller than 0.01, zero otherwise. ROA is calculated as earnings before extraordinary items scaled by beginning total assets.

EDROA is one if DROA is equal to or larger than zero but smaller than 0.005, zero otherwise. DROA is calculated as the change of earnings before extraordinary items compared to last year scaled by beginning total assets.

EDIV is one if DIVDEF is equal to or larger than zero but smaller than 0.01, zero otherwise. DIVDEF is calculated as the difference between net income and total cash dividends scaled by beginning total assets.

EDISTRESS is one if ZSCORE is negative, zero otherwise. $ZSCORE = 3.2 + 12.8x_1 + 2.5x_2 – 10.68x_3 + 0.029x_4$, where: x_1 is pre-tax income divided by current liabilities; x_2 is current assets divided by total liabilities; x_3 is current liabilities divided by total assets; x_4 is quick assets minus current liabilities divided by daily operating expense, where daily operating expense is sales minus pre-tax income minus depreciation expense divided by 365.

EDEBT is one if beginning DEBT is lower than the corresponding $DEBT_{k,t}^{20}$, zero otherwise. DEBT is the total of short- and long-term debts scaled by total assets.

ESIZE is one if beginning MVE is smaller than the corresponding $MVE_{k,t}^{20}$, zero otherwise. MVE is market value of equity at fiscal year-end.

ECYCLE is one if (i) CFO is negative, CFF is positive, CFI is negative, or (ii) CFO is positive, CFF is positive, CFI is negative, zero otherwise, where CFO is operating cash flows, CFF is financing cash flows, CFI is investing cash flows.

EAUDIT is one if the financial statements are not audited by one of the Big 5 audit firms, zero otherwise.

EBLOAT is one if beginning NOA is smaller than the corresponding $NOA_{k,t}^{20}$, zero otherwise. NOA = (BVE + DEBT – CHE) / TA, where BVE is book value of equity, CHE is cash and cash equivalents, TA is total assets.

ECAP is one if beginning CAP is smaller than the corresponding $CAP_{k,t}^{20}$, zero otherwise. CAP is plants, properties and equipment divided by total assets.

EBT is one if BOOKTAX is higher than the corresponding $BOOKTAX_{k,t}^{80}$, zero otherwise. BOOKTAX is the absolute value of the difference between pre-tax income and TTP scaled by sales. The total taxable profit, TTP, is estimated as follows:

- If TXT ≤ 0, then TTP = 0
- If 0 < TXT ≤ LL x SR, then TTP = $\frac{TXT}{SR}$
- If LL x SR ≤ TXT ≤ (UL – LL) x AR, then TTP = $\frac{TXT-(LL\times SR)}{AR}$ + LL
- If TXT ≥ (UL – LL) x AR, then TTP = $\frac{TXT-(LL\times SR)-[(UL-LL)\times AR]}{MR}$ + UL

where: TXT is the reported income tax expense, LL is the lower limit for marginal tax relief, UL is the upper limit for marginal tax relief, SR is the small profit tax rate, MR is the main tax rate, AR = (SR + MR) / 2.

ESCORE = ESEO + EDDEBT + EMA + EOV + EROA + EDROA + EDIV + EDISTRESS + EDEBT + ESIZE + ECYCLE + EAUDIT + EBLOAT + ECAP + EBT.

ESCORE_FIXED = ESEO + EDDEBT + EMA + EOV + EROA + EDROA + EDIV + EDISTRESS + EDEBT + ESIZE + ECYCLE + EAUDIT + EBLOAT + ECAP + EBT, where EOV, EDEBT, ESIZE, EBLOAT, ECAP and EBT are calculated using $\overline{\gamma_k^{20}}$ and $\overline{\gamma_k^{20}}$.

ESCORE_9 = ESEO + EDDEBT + EMA + EROA + EDROA + EDIV + EDISTRESS + ECYCLE + EAUDIT.

$\mathbf{DAC_{i,t}} = \frac{AC_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right)\right]$, is discretionary accruals of stock *i* in year *t*. $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$ are the estimated coefficients from the following regression, which is run in each industry-year with at least 15 observations: $\frac{AC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t}$, where $AC_{i,t}$ is total accruals of firm *i* in year *t*, which is calculated as the difference between income before extraordinary items and net operating cash flows; $\Delta REV_{i,t}$ and $\Delta REC_{i,t}$ are the change in sales and receivables from year *t – 1* to year *t* of firm *i*, respectively; and $PPE_{i,t}$ is gross plant, property and equipment of firm *i* at the end of year *t*.

ADAC is the absolute value of DAC.

HDAC is one if DAC is equal to or higher than the 80th percentile of the corresponding industry-year ranked by DAC, zero otherwise.

$\mathbf{DWAC_{i,t}} = \frac{WAC_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t}-\Delta REC}{TA_{i,t-1}}\right)\right]$, is discretionary working capital accruals of stock *i* in year *t*. $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$ are the estimated coefficients from the following regression, which is run in each industry-year with at least 15 observations: $\frac{WAC_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}-\Delta REC}{TA_{i,t-1}}\right) + \varepsilon_{i,t}$, where: $WAC_{i,t}$ is working capital accruals of stock *i* in year *t*, which is calculated as WAC = (ΔCA – ΔCHE) – (ΔCL – ΔSTD) [ΔCA is change in current assets; ΔCHE is change in cash and cash equivalents; ΔCL is change in current liabilities; ΔSTD is change in short-term debts].

ADWAC is the absolute value of DWAC.

HDWAC is one if DWAC is equal to or higher than the 80^{th} percentile of the corresponding industry-year ranked by DWAC, zero otherwise.

$\mathbf{DCF_{i,t}} = -1 \times \left\{\frac{CFO_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right)\right]\right\}$, is abnormal cash flows of stock *i* in year *t*. $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$ are the estimated coefficients from the following regression, which is run in each industry-year with at least 15 observations: $\frac{CFO_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t}$.

ADCF is the absolute value of DCF.

HDCF is one if DCF is equal to or higher than the 80^{th} percentile of the corresponding industry-year ranked by DCF, zero otherwise.

$\mathbf{DPROD_{i,t}} = \frac{PROD_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_4\left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}}\right)\right]$, is abnormal production costs of stock *i* in year *t*. $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$, $\hat{\beta}_4$ are the estimated coefficients from the following regression, which is run in each industry-year with at least 15 observations: $\frac{PROD_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1\left(\frac{1}{TA_{i,t-1}}\right) + \beta_2\left(\frac{REV_{i,t}}{TA_{i,t-1}}\right) + \beta_3\left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) +$

$\beta_4 \left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}}\right) + \varepsilon_{i,t}$, where: $PROD_{i,t}$ is production cost, calculated as the sum of cost of goods sold and change in inventory, of firm *i* in year *t.*

ADPROD is the absolute value of DPROD.

HDPROD is one if DPROD is equal to or higher than the 80th percentile of the corresponding industry-year ranked by DPROD, zero otherwise.

$\mathbf{DDISEXP_{i,t}} = -1 \times \left\{\frac{DISEXP_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha} + \hat{\beta}_1 \left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_2 \left(\frac{REV_{i,t-1}}{TA_{i,t-1}}\right)\right]\right\}$, is abnormal discretionary expenses of stock *i* in year *t.* $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$ are the estimated coefficients from the following regression, which is run in each industry-year with at least 15 observations: $\frac{DISEXP_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1 \left(\frac{1}{TA_{i,t-1}}\right) + \beta_2 \left(\frac{REV_{i,t-1}}{TA_{i,t-1}}\right) + \varepsilon_{i,t}$, where: $DISEXP_{i,t}$ is discretionary expenses, calculated as selling and general administrative expenses plus research and development expenses, of firm *i* in year *t.*

ADDISEXP is the absolute value of DDISEXP.

HDDISEXP is one if DDISEXP is equal to or higher than the 80th percentile of the corresponding industry-year ranked by DDISEXP, zero otherwise.

$\mathbf{TOTALRM_{i,t}} = \left[\frac{DCF_{i,t} - \overline{DCF_{t,k}}}{\sigma(DCF)_{t,k}} + \frac{DPROD_{i,t} - \overline{DPROD_{t,k}}}{\sigma(DPROD)_{t,k}} + \frac{DDISEXP_{i,t} - \overline{DDISEXP_{t,k}}}{\sigma(DISEXP)_{t,k}}\right] / 3$ (i ∈ k) is total real earnings management, where: $\overline{DCF_{t,k}}$, $\overline{DPROD_{t,k}}$, $\overline{DDISEXP_{t,k}}$ [$\sigma(DCF)_{t,k}$, $\sigma(DPROD)_{t,k}$, $\sigma(DISEXP)_{t,k}$] is, respectively, the mean [standard deviation] of DCF, DPROD, DDISEXP of all firms in industry *k* in year *t*; k=1…43 are 43 unique Datastream level-six industries.

BOSIZE is the number of board directors.

BOIND is the percentage of non-executive directors on board.

AUCOMSIZE is the number of directors on the audit committee (set to zero if a firm does not have an audit committee).

DUALITY is a dummy which is one if a firm's chief executive officer is also the chairman of the board, zero otherwise.

TOTCOMPEN is the average performance-linked compensation of all executive directors scaled by sales, where performance-linked compensation is defined as the total of bonus, shares, options and other long-term incentive pay awarded during the year.

CHAPTER 3

THERE'S NO SMOKE WITHOUT FIRE: DOES THE CONTEXT OF EARNINGS MANAGEMENT CONTAIN INFORMATION ABOUT FUTURE STOCK RETURNS?[20]

3.1. INTRODUCTION

Sloan (1996) shows that the market overprices the total accruals component of earnings. Xie (2001) further shows that it is the discretionary component of accruals that investors misprice. Since discretionary accruals, often estimated using the Jones (1991) model or one of its variants, is widely used in the literature to proxy for earnings management (see Section 2.2.1), the evidence seems consistent with the story suggesting the market fails to fully appreciate manager's exercising discretion to influence reported earnings. Subsequent to Sloan's (1996) seminal contribution,

[20] The chapter has been greatly benefited from the comments and advices of Mark Clatworthy, Elisabeth Dedman, Daniel Coulombe, Karin Thorburn, Soo Hee Lee, Warwick Funnell as well as three anonymous reviewers, the reviewers and participants at the 2014 British Accounting and Finance Association Annual Conference and Doctoral Colloquium, 2014 European Accounting Association Annual Congress and Doctoral Colloquium, 2015 European Accounting Association Annual Congress, 2015 Financial Management Association European Doctoral Student Consortium, 2015 European Financial Management Association Annual Conference, 2015 American Accounting Association Annual Meeting.

research into how the market reacts to earnings management has emerged into a large strand in the literature. Evidence in support of the negative association of discretionary accruals and future stock returns is reported in various studies employing different methodologies, across different time period and in different markets (Desai et al., 2004; Iqbal et al., 2009; Iqbal and Strong, 2010).

While it is well established that discretionary accruals is not fully priced, one aspect of the existing literature is still subject to considerable criticism which is rooted mainly from the weaknesses of the accruals model to capture earnings management. Discretionary accruals is typically calculated as the difference of reported accruals from a measure of 'non-discretionary' accruals estimated using some firm characteristics. As such, it represents the component of earnings that is subject to manager's discretion. This methodology, however, fails to reflect the *context* in which earnings is managed. Suppose earnings management indeed occurs, discretionary accruals could arguably capture the magnitude of it but it is silent about how and why the incident happens. Assuming a semi-strong efficient market, the mispricing of discretionary accruals could be attributable to investors failing to fully reflect on the 'true' earnings that a manager knows but does not truthfully releases to the market. One can arguably question the intuition of such story. Earnings management, of course, does not happen for no reason. There should be a 'context' which leads to the manager cooking the book, be it a personal motivation, a benefit to shareholders, a pressure or suitable room for managing earnings. While the manager can assumingly hide the 'true' earnings through earnings management, he or she cannot hide the surrounding context. Let us take a fictitious firm A for example. A is growth firm which is currently in financial distress. Struggling to finance its expanding strategy, mostly through acquisitions of companies which provide it needed supplementary resources, A decides to resort to raising more equity since it believes the current stock price is good for a seasoned equity offer. A is audited by a local less reputable auditor (compared to the Big 4). What we can observe is a very susceptible context in which A is more likely to manage earnings, without having to observe the (arguably unobservable) actual earnings management behaviour. If A indeed manages earnings and the market is 'fooled', we can reasonably extrapolate that the market has mispriced both the distorted earnings *and* the context leading to A manipulating earnings. To date, while there is mounting evidence confirming the former hypothesis, the latter is not yet investigated in the extant literature.

This chapter is the first to empirically test if the context of earnings management is mispriced. The chapter employs ESCORE as designed in Chapter 2 as an empirical proxy for the context of earnings management. Using the same sample of UK listed firms during the period from 1995 to 2011 as used in Chapter 2, this chapter tests if ESCORE could predict one-year-ahead stock returns. It is found that a zero-investment hedge portfolio that takes long position in low ESCORE stocks (i.e. those with less susceptible context of earnings management) and short position in high ESCORE stocks (i.e. those with more susceptible context of earnings management) would earn an average abnormal return of 1.37% per month after adjusting for the risk loadings on the market, size, book-to-market and momentum factors in up to one year after portfolio formation. In multivariate regressions, ESCORE is found to be negatively and significantly related to one-year-ahead buy-and-hold returns after controlling for other existing market 'anomalies', including the mispricing of discretionary accruals. The result is robust across different ways to construct ESCORE, portfolio weighting schemes and models to estimate abnormal returns. Overall, the chapter concludes that the context of earnings management does help predict future stock returns.

The chapter contributes significantly to the literature by presenting new evidence that not only the market misprices earnings management, it also does not fully appreciate the information contained in the context surrounding such manipulation. The evidence is in line with the behavioural-based explanation that investors, as human beings, are systematically biased in processing financial statement information. In particular, under the influence of the base rate fallacy (Tversky and Kahneman, 1982), investors seem to focus too much on details and under-react to the general context which is captured by ESCORE. The evidence presented in this chapter is an original and important contribution to the 'market anomalies' literature. For practitioners, the chapter could potentially lead to the design of trading strategies which could exploit the sub-optimal behaviour of the market to achieve abnormal returns.

The rest of the chapter is organized as follows. Section 3.2 reviews the related literature and Section 3.3 states the testable hypothesis. Section 3.4 explains the data and methodologies employed in this chapter. Section 3.5 presents and discusses the main results. Some robustness checks with modifications to the methodologies are performed and presented in Section 3.6. Section 3.7 provides some concluding remarks. Section 3.8 provides the definitions of all variables used in this chapter.

3.2. LITERATURE REVIEW

This chapter examines whether the market misprices the context of earnings management. Hence, the chapter contributes directly to the literature of earnings management and the literature on test of market efficiency. Previous chapters have reviewed the literature on earnings management which serves as a foundation for this chapter. In this section, the literature on market efficiency and behavioural finance will be reviewed to set the background for the main contributions of this chapter.

3.2.1. The efficient market hypothesis

One of the key building blocks in modern corporate finance is the idea that the market is efficient (Fama, 1970; Fama, 1991; Fama, 1998). The central idea is simple, yet very powerful, that market price is always correct as it has already reflected all available information. News in an efficient market spreads very fast and hence is instantly reflected in stock prices leaving no chance for any investor to take advantage. Depending on what ‘news’ is concerned, Fama (1970) formulates three levels of market efficiency, namely weak, semi-strong and strong forms. The weak form states that stock price already reflects all historical information leaving no chance for technical analysts, i.e. those investors who analyse patterns in stock prices, to earn abnormal returns. In the semi-strong form, all publicly available information is reflected instantly in stock price which means even fundamental analysts, i.e. those which analyse public information such as financial statements etc., could not have a better idea about what stock price should be rather than the price already prevails on the market. The strong form efficiency goes even further stating even private information would be instantly reflected in stock price, hence even trading which is based on insider’s information would not yield abnormal returns. Many early studies have provided evidence suggesting the market is very efficient (Fama, 1965; Ball and Brown, 1968; Fama et al., 1969) and the idea of market efficiency is so influential to the finance profession that Professor Fama is finally awarded the Nobel Prize in 2013.

3.2.2. The ‘market anomalies’

The traditional paradigm of market efficiency would have been very convenient for us to think about how capital markets operate, but only if the theory is consistently confirmed with empirical evidence. However, evidence against market efficiency, known as the ‘anomaly’ literature, seems to be prevalent. Abnormal returns, defined as returns which could not be explained by risk, are found in many trading strategies which exploit one or more piece of information which is readily available to the market. For example, De Bondt and Thaler (1985) find that buying stocks with lower prior returns and short selling those with higher prior returns could be abnormally profitable. Lakonishok et al. (1994) construct portfolios based on some simple ratios, such as book-to-market, cash-flow-to price, earnings-to-price ratios, and find that stocks with those ratios being high outperform those with low ratios. Banz (1981) finds that smaller firms earn abnormally higher returns than larger firms. Ritter (1991), Loughran et al. (1994), Loughran and Ritter (1995) provide evidence that firms tend to deliver abnormally poor returns following stock issues. Piotroski (2000) and Mohanram (2005) find that the market under-react to firm's financial strength, hence buy financially strong and selling short financially weak firms would be a profitable trading strategy. Sloan (1996) makes an influential contribution by showing that the accruals component of earnings is negatively related to future returns. Xie (2001) go further showing that it is the discretionary accruals component which mainly drives Sloan's result.

The 'abnormal' returns earned by the above-mentioned strategies which are designed based on some observable and available information would be the end of the market efficient hypothesis. However, one reason which makes it difficult to completely reject the null that the market is efficient based on the above evidence lies with the problems associated with how to define 'abnormal' returns. In other words, the 'abnormal' returns documented could very well be the errors of the models used to adjust returns for risk. In fact, any test of market efficient hypothesis is a joint test with the validity of the employed risk-adjusting model. The finance literature has gone a long way to develop models to derive at expected returns given a level of risk, such as the Capital Asset Pricing Model (CAPM hereafter) (Sharpe, 1964; Lintner, 1965; Black, 1972) and its extended three-factor (Fama and French, 1992) and four-factor models (Carhart, 1997). However, saying we have got 'the model' to perfectly quantify the risk-return relationship is by far an overstatement. Hence, it is not uncommon that advocates of market efficiency cite the failure of the risk-adjusting model to explain a documented 'anomaly'. Moreover, it has also been shown that the existence and magnitude of many of the 'anomalies' are highly sensitive to the methodologies employed with many disappearing or significantly shrinking after some changes to the methodologies (Fama, 1998).

Overall, although there is still criticism, the ‘market anomalies’ literature has grown very fast and really challenge the traditional paradigm. It would be meaningless if evidence is obtained but no plausible explanation could be presented. The next section will look into a possible answer to the ‘anomaly’ literature: behavioural finance.

3.2.3. Heuristics and biases: The emergence of behavioural finance

For the market to be efficient, a number of assumptions need to be maintained. One of the key assumptions is that market participants are all rational, have perfect access to unlimited information and could make unbiased decisions based only on the relevant information. This is where one of the most powerful criticisms of the market efficient hypothesis comes from. Tversky and Kahneman (1974) provide very strong foundation from the psychology literature to support that human beings are systematically biased. They outline three forms of heuristics which affect human’s judgement of probability and prediction of value under uncertainty. The first one is ‘representativeness’. When tasked to judge the probability that an event originates from a process, people often rely on the representativeness heuristic and assign irrationally high probability if the event is highly representative of the process while in fact the similarity, or ‘representativeness’, should not affect the judgement of probability at all. On the other hand, representativeness heuristic also prevents people from taking into account relevant factors which would affect the judgement of probability. For example, when asked to judge if a person is a librarian or farmer, people tends to rely too much on information which could be representative of ‘typical’ librarians and farmers, and they tend to ignore the relevant prior probability that there are more farmers than librarians in the population. The second heuristic Tversky and Kahneman (1974) mention is ‘availability’. Under the influence of availability, one tends to rely too much on information which is easily retrievable or readily available. Third, the 'adjustment and anchoring' heuristic leads people to making error in estimation as a result of making adjustments from an initial value.

People are also shown to be overconfident (Fischhoff et al., 1977; Tversky and Kahneman, 1982). Overconfidence is particularly pronounced among experts and biases estimations of probability (De Bondt and Thaler, 1990; Oskamp, 1965). Weinstein (1980) shows that people are also unrealistically optimistic. Optimism is shown to bias planning decision in that people tend to allow insufficient time for tasks (Buehler et al., 1994). In addition, Edwards (1968) shows that on average people seem to be too conservative in the sense that they tend to over rely on prior experience in making judgement. People are also shown to preserve their existing belief in an irrational way (Lord et al., 1979). In particular, once one forms an opinion, he or she tends to be too reluctant to search for information which contradicts their opinion, or even if such information is presented to them, he or she tends to disregard the information.

In general, that people, including all market participants, are systematically biased in making judgements and estimations is firmly evidenced. Hence, expecting everyone on the market to be rational as in the traditional paradigm is not a very plausible assumption. Behavioural finance has emerged over the last few decades as the alternative explanation for the numerous 'market anomalies' which have been found. Behavioural finance allows for irrationality as a results of heuristics and cognitive biases to exist, hence it seems to produce models which are closer to the real world.

However, it is difficult to say behavioural finance is replacing the traditional paradigm of market efficiency at the moment. Fama (1998) observes that behavioural finance models seem to be developed for particular cases rather than a universal model which could explain all ‘market anomalies’. For examples, while many studies show evidence of market over-reaction, evidence of market under-reaction is no less prevalent. The literature, therefore, at the moment stands at a point where market efficiency is still helpful to help shape our thinking about how capital market functions, behavioural finance is an expanding field with a lot of potential to respond to the difficulties faced by the traditional paradigm (Barberis and Thaler, 2003).

3.3. HYPOTHESIS DEVELOPMENT

The literature reviewed in Section 3.2 establishes that the market misprices earnings management as captured by accruals, especially its discretionary component. Nevertheless, one issue remains unexplored. While a manager can assumingly hide the ‘true’ earnings through earnings management, he or she cannot hide the surrounding context (for example, manager’s motivations, benefits to shareholders, pressures or opportunities for managing earnings etc.). As the old saying goes, “there’s no smoke without fire”, if a firm engages in earnings management (there is a ‘fire’), there should be a ‘context’ surrounding it (the ‘smoke’) which is difficult to hide. Hence investors should be able to ‘sense’ the existence of earnings management by observing the surrounding context. If investors are still ‘fooled’ by earnings management, it implies that they must have mispriced both the magnitude and the context in which such manipulation occurs. In other words, if the market also misprices the context of earnings management incrementally beyond the mispricing of discretionary accruals, it would offer more convincing evidence that the market could not see through earnings management, which is a crucial knowledge to understand how the market processes publicly available financial statement information.

There is good reason to expect that the market would misprice the context of earnings management which has a deep root in human heuristics and biases. Tversky and Kahneman (1982) outline a cognitive bias, namely 'base rate' fallacy, which humans could systematically suffer from. In particular, it is found that when presented with generic information about the probability of an event (the base rate) together with specific information about the event, one tends to make judgements based too much on the specific information and ignore the base rate. In the case of using financial statements to invest on the stock market, investors are tasked with assessing whether the financial statements they are using have been manipulated. To make this judgement, investors could observe the general context surrounding a firm which would suggest the probability of earnings management together with a range of specific information about the firm, which is plenty for a listed company in a well-developed market such as the UK. In this scenario, if investors are subjected to the base rate fallacy, it is expected that they would over-rely on specific information and fail to process the base rate information (i.e. the general context suggesting the existence of earnings management) rationally. Hence, the context of earnings management could contain information which has not been fully reflected in stock prices, leaving space for a context-based trading strategy to earn abnormal profits. Following this intuition, the testable hypothesis is stated as follows:

> ***Ceteris paribus, firms with more (less) susceptible context of earnings management earn lower (higher) abnormal returns.***

To empirically test this hypothesis, this chapter uses ESCORE as designed in Chapter 2 to capture the context of earnings management and investigates if such model can predict future stock returns. The next section (Section 3.4) will describe the data and methodologies employed in the main tests before the results are discussed in Section 3.5.

3.4. DATA AND METHODOLOGIES

3.4.1. Sample and time convention

The sample used in this chapter is similar to the one used in Chapter 2, i.e. the sample has 11,920 observations covering all UK listed dead and alive stocks during the period from 1995 to 2011[21]. To avoid look ahead bias, the chapter measures stock returns from June year *t+1* to May year *t+2* for stocks with fiscal year ending in any calendar month in year *t* to ensure at the portfolio forming date, all financial statements of sampled firms are already published[22]. Hence, in terms of data on stock returns, the time period covered in this chapter spans from June 1996 to May 2013.

3.4.2. Raw returns

For each month, buy-and-hold raw returns, assuming dividend reinvestment, for each stock are calculated as follows:

$$BHRR_{i,j}^{m} = \left(\frac{RI_{i,j}}{RI_{i,j-1}}\right) - 1 \qquad \text{(E3.1)}$$

where: $BHRR_{i,j}^{m}$ is buy-and-hold returns of stock *i* in month *j*; $RI_{i,j}$ is Datastream's Return Index at the end of month *j*; $RI_{i,j-1}$ is Datastream's Return Index at the end of month *j–1*.

If a stock delists during the holding period, the delisting returns are treated as follows. First of all, a delisting is identified as the first instance of a stock having a trailing zero returns or if the stock has an inactive date (WC07012). For each delisting instance, a screen through the footnotes to company status (Datastream's code WC00000F) is conducted to identify the delisting reasons. The identified delisting

[21] Please see Section 2.3 for full explanation of the sample selection process.

[22] Please see Section 3.4.2 for further discussion on portfolio formation.

reasons are grouped into either non-performance-related (M&A) and performance-related (all other reasons, including where a delisting reason cannot be determined from the company status footnote). If a stock does not have a monthly return for June (the first month after portfolio formation), the firm-year observation is excluded from the sample (equivalent to assuming that investors cannot consider the stock for trading due to non-existence). If a stock has a return for June, but then delisted before the end of the holding period due to non-performance-related reasons, it is assumed that the investors earn the returns from portfolio forming date to delisting date, and then reinvest the proceeds in the size-matched portfolio which assumingly bears similar risk compared to the delisted firm. This approach has been used by other authors (e.g. Soares and Stark, 2009; Desai et al., 2004) to reflect the reality that the returns in most M&A-related delisting cases are positive. In effect, returns in the months following non-performance-related delisting are replaced by the returns on the size-matched portfolio[23]. If the delisting is performance-related, it is assumed that the whole initial investment is lost, hence a delisting return of –100% is used.

Before proceeding, it is important to check if the returns calculated using the procedures explained above are reliable, especially given the concerns about using Datastream's returns data (Ince and Porter, 2006). To check this, the returns on the Financial Times Stock Exchange (FTSE hereafter) All Shares Index are used as the benchmark. Each year, all sample stocks with available returns data are grouped into a portfolio. The value-weighted returns on the market portfolio are then compared year-by-year with the corresponding returns on the FTSE All Shares Index. As reported in Table T3.1, the two time-series are highly correlated (the correlation coefficient is 0.8718, significant at 1% level). It therefore provides reasonable assurance that returns have been properly handled.

[23] Returns on the size-matched portfolio are estimated using similar procedure to calculate size-adjusted returns described in the next section (Section 3.4.3).

Table T3.1. Correlation between returns on the value-weighted market portfolio and returns on the FTSE All Shares Index

Year	N	Returns on the value-weighted market portfolio	Returns on the FTSE All Shares Index
1995	598	0.0197	0.2158
1996	593	0.2354	0.3069
1997	620	-0.0847	0.0580
1998	649	0.0868	0.0681
1999	726	0.0991	-0.0457
2000	705	-0.0931	-0.0958
2001	773	-0.1903	-0.1759
2002	753	0.2390	0.1555
2003	755	0.1636	0.1654
2004	740	0.2405	0.2130
2005	754	0.2747	0.2167
2006	822	-0.1068	-0.0712
2007	831	-0.1906	-0.2366
2008	757	0.3808	0.2294
2009	695	0.2266	0.2036
2010	604	-0.0810	-0.0800
2011	545	0.2355	0.3011
Correlation coefficient		0.8718***	

Notes: The table reports the returns on the value-weighted market portfolio and returns on the FTSE All Shares Index together with the Pearson correlation coefficient between the two time-series. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Each year, stocks are sorted by ESCORE. ESCORE for year *t* (*t*= 1995… 2011) is calculated for all stocks with fiscal year ended in any month of the calendar year *t*. Based on ESCORE of year *t*, portfolios are formed at the end of May year *t+1* and hold until the end of May year *t+2*. From the above firm-specific returns, the raw returns of portfolio *p*, denoted $BHRR^{m}_{p,j}$ are the equally-weighted $BHRR^{m}_{i,j}$ of all stocks in portfolio *p*.

3.4.3. Abnormal returns

To test the profitability of the ESCORE-based trading strategies, the chapter uses various measures of buy-and-hold abnormal returns. First of all, firm-specific monthly buy-and-hold size-adjusted returns are calculated as follows. Each year all stocks with available data are sorted into ten deciles based on market capitalization at the end of the last fiscal year. The returns on the size decile portfolio *d* (*d* = 1…

10), $SDR_{d,j}^{m}$, is calculated as the average $BHRR_{i,j}^{m}$ of all stocks which belong to decile *d*[24]. For each stock, its corresponding size decile and size decile return are identified. The buy-and-hold size-adjusted return of stock *i* in month *j* is then calculated as:

$$BHSAR_{i,j}^{m} = BHRR_{i,j}^{m} - SDR_{d,j}^{m} \ (i \in d) \quad \text{(E3.2)}$$

Firm-specific monthly buy-and-hold market-adjusted returns are then calculated using returns on the FTSE All Shares Index as the benchmark as follows:

$$BHMAR_{i,j}^{m} = BHRR_{i,j}^{m} - FTSEALLR_{j}^{m} \quad \text{(E3.3)}$$

Similar to calculating raw returns of portfolios, the size-adjusted and market-adjusted returns of portfolio *p*, $BHSAR_{p,j}^{m}$ and $BHMAR_{p,j}^{m}$, are respectively the equally-weighted $BHSAR_{i,j}^{m}$ and $BHMAR_{i,j}^{m}$ of all stocks in portfolio *p*.

$BHSAR_{p,j}^{m}$ and $BHMAR_{p,j}^{m}$ are calculated using reference portfolios, an approach which could bias the test statistics (Barber and Lyon, 1997; Kothari and Warner, 1997). Moreover, both measures are not capable of capturing some other known dimensions of risk, including the book-to-market and momentum factors. To strengthen the results, therefore, three additional measures of abnormal portfolio returns are used including the CAPM which has the market as the only risk factor (Sharpe, 1964; Lintner, 1965; Black, 1972), the three-factor model which adds size and book-to-market as the additional risk factors (Fama and French, 1992) and the four-factor models which extend the three-factor model to also include momentum as the fourth risk factor (Carhart, 1997). Those three measures of abnormal returns are estimated by running the following time-series regressions:

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[24] Unreported results show that using the value-weighted scheme to calculate returns on the size decile portfolios does not qualitatively change any of the main conclusions of the chapter.

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \varepsilon \quad \text{(E3.4)}$$

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \varepsilon \quad \text{(E3.5)}$$

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \beta_4 UMD_j + \varepsilon \quad \text{(E3.6)}$$

where: $BHRR^{m}_{p,j}$ is the equally-weighted portfolio raw returns of portfolio *p* of month *j* (*j* is from June 1996 to May 2013 with portfolios being formed at the end of May each year based on ESCORE calculated from the previous fiscal year); Rf_j, Rm_j, SMB_j, HML_j, UMD_j are, respectively, the monthly risk-free rate, returns on the market portfolio, size, book-to-market and momentum factors, all as described and downloaded from the database which is made publicly available by Gregory et al. (2013).

Table T3.2, T3.3 and T3.4 present the summary statistics of estimating Equation (E3.4), (E3.5) and (E3.6), respectively. In general, all the coefficients have the expected sign and are significant in most cases.

Table T3.2. Summary statistics of estimating the CAPM for equally-weighted ESCORE portfolios

ESCORE	Intercept		Rm - Rf		R^2
	Coef.	t-statistic	Coef.	t-statistic	
0	0.0050	2.109**	0.8493	15.137***	0.5314
1	0.0029	1.299	0.8910	16.593***	0.5768
2	0.0020	0.918	0.8193	15.735***	0.5507
3	-0.0004	-0.185	0.7959	14.685***	0.5163
4	-0.0042	-1.604	0.9069	14.461***	0.5087
5	-0.0077	-2.604***	0.7900	11.137***	0.3804
6	-0.0097	-2.683***	0.8881	10.349***	0.3465
7	-0.0076	-1.863*	0.9929	10.194***	0.3397
8	-0.0259	-3.543***	0.9257	5.462***	0.1435
9	-0.0131	-1.279	0.7441	3.33***	0.0859
Low ESCORE (0)	0.0050	2.109**	0.8493	15.137***	0.5314
Medium ESCORE (1-5)	-0.0005	-0.221	0.8415	15.916***	0.5563
High ESCORE (6-9)	-0.0094	-2.873***	0.9084	11.677***	0.4030

Notes: The table reports the estimated coefficients and the associated t-statistics obtained from running the following regression:

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \varepsilon \quad \text{(E3.4)}$$

'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.3. Summary statistics of estimating the Fama-French three-factor model for equally-weighted ESCORE portfolios

ESCORE	**Intercept**		**Rm - Rf**		**SMB**		**HML**		**R^2**
	Coef.	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	
0	0.0036	2.391**	0.7433	20.167***	0.7433	16.8***	0.1956	4.852***	0.8074
1	0.0014	1.26	0.7709	28.847***	0.8005	24.952***	0.2658	9.092***	0.9002
2	0.0008	0.614	0.7179	23.891***	0.7474	20.718***	0.1487	4.525***	0.8575
3	-0.0017	-1.326	0.6934	22.938***	0.7908	21.792***	0.1129	3.415***	0.8567
4	-0.0056	-3.399***	0.7937	19.885***	0.8548	17.839***	0.1446	3.312***	0.8104
5	-0.0089	-4.036***	0.6873	12.775***	0.8277	12.816***	0.0752	1.278	0.6605
6	-0.0111	-3.791***	0.7722	10.916***	0.8866	10.441***	0.1361	1.759*	0.5771
7	-0.0080	-2.156**	0.9459	10.545***	0.6398	5.941***	-0.2420	-2.466**	0.4666
8	-0.0267	-3.998***	0.7680	4.84***	1.2639	6.296***	-0.2033	-0.941	0.3018
9	-0.0155	-1.561	0.6813	3.099***	0.8539	3.057***	-0.0946	-0.411	0.1634
Low ESCORE (0)	0.0036	2.391**	0.7433	20.167***	0.7433	16.8***	0.1956	4.852***	0.8074
Medium ESCORE (1-5)	-0.0018	-1.614	0.7339	26.954***	0.7941	24.296***	0.1573	5.281***	0.8879
High ESCORE (6-9)	-0.0105	-4.129***	0.8079	13.059***	0.8472	11.407***	0.0353	0.522	0.6404

Notes: The table reports the estimated coefficients and the associated t-statistics obtained from running the following regression:

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \varepsilon \quad \text{(E3.5)}$$

'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.4. Summary statistics of estimating the augmented Fama-French four-factor model for equally-weighted ESCORE portfolios

ESCORE	Intercept		Rm - Rf		SMB		HML		UMD		R^2
	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	
0	0.0033	2.086**	0.7491	19.968***	0.7524	16.514***	0.2191	4.471***	0.0307	0.844	0.8081
1	0.0018	1.553	0.7646	28.174***	0.7906	23.987***	0.2400	6.77***	-0.0338	-1.283	0.9010
2	0.0008	0.636	0.7170	23.401***	0.7458	20.045***	0.1448	3.618***	-0.0051	-0.173	0.8575
3	-0.0016	-1.243	0.6927	22.473***	0.7897	21.095***	0.1099	2.73***	-0.0039	-0.132	0.8567
4	-0.0046	-2.752***	0.7780	19.334***	0.8302	16.987***	0.0808	1.538	-0.0835	-2.139**	0.8147
5	-0.0080	-3.483***	0.6709	12.313***	0.8020	12.12***	0.0087	0.122	-0.0871	-1.648	0.6651
6	-0.0109	-3.586***	0.7689	10.662***	0.8815	10.064***	0.1228	1.303	-0.0175	-0.25	0.5772
7	-0.0080	-2.075**	0.9458	10.341***	0.6397	5.759***	-0.2423	-2.028**	-0.0004	-0.005	0.4666
8	-0.0249	-3.565***	0.7366	4.527***	1.2004	5.626***	-0.2902	-1.222	-0.1466	-0.882	0.3049
9	-0.0156	-1.534	0.6832	3.043***	0.8569	2.972***	-0.0866	-0.296	0.0098	0.045	0.1634
Low ESCORE (0)	0.0033	2.086**	0.7491	19.968***	0.7524	16.514***	0.2191	4.471***	0.0307	0.844	0.8081
Medium ESCORE (1-5)	-0.0014	-1.239	0.7277	26.31***	0.7844	23.352***	0.1320	3.654***	-0.0331	-1.233	0.8888
High ESCORE (6-9)	-0.0104	-3.923***	0.8055	12.77***	0.8434	11.01***	0.0256	0.311	-0.0127	-0.208	0.6405

Notes: The table reports the estimated coefficients and the associated t-statistics obtained from running the following regression:

$$BHRR_{p,j}^{m} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \beta_4 UMD_j + \varepsilon \quad \text{(E3.6)}$$

'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

The estimated coefficients obtained from Equation (E3.4) [(E3.5); and (E3.6)] are respectively denoted $\hat{\beta}_{1,p}^{1F}$ [$\hat{\beta}_{1,p}^{3F}$, $\hat{\beta}_{2,p}^{3F}$, $\hat{\beta}_{3,p}^{3F}$; and $\hat{\beta}_{1,p}^{4F}$, $\hat{\beta}_{2,p}^{4F}$, $\hat{\beta}_{3,p}^{4F}$, $\hat{\beta}_{4,p}^{4F}$]. The monthly buy-and-hold portfolio abnormal returns are then calculated using these estimated coefficients as follows:

$$BHAR1F_{p,j}^{m} = BHRR_{p,j}^{m} - [Rf_j + \hat{\beta}_{1,p}^{1F}(Rm_j - Rf_j)] \quad \text{(E3.7)}$$

$$BHAR3F_{p,j}^{m} = BHRR_{p,j}^{m} - [Rf_j + \hat{\beta}_{1,p}^{3F}(Rm_j - Rf_j) + \hat{\beta}_{2,p}^{3F}SMB_j + \hat{\beta}_{3,p}^{3F}HML_j] \quad \text{(E3.8)}$$

$$BHAR4F_{p,j}^{m} = BHRR_{p,j}^{m} - [Rf_j + \hat{\beta}_{1,p}^{4F}(Rm_j - Rf_j) + \hat{\beta}_{2,p}^{4F}SMB_j + \hat{\beta}_{3,p}^{4F}HML_j + \hat{\beta}_{4,p}^{4F}UMD_j] \quad \text{(E3.9)}$$

The monthly buy-and-hold abnormal returns of the hedge portfolio ($BHAR1F_{Hedge,j}^{m}$, $BHAR3F_{Hedge,j}^{m}$, $BHAR4F_{Hedge,j}^{m}$) are calculated as the difference between abnormal returns on the low ESCORE portfolio ($BHAR1F_{LoE,j}^{m}$, $BHAR3F_{LoE,j}^{m}$, $BHAR4F_{LoE,j}^{m}$) and that abnormal returns on the high ESCORE portfolio ($BHAR1F_{HiE,j}^{m}$, $BHAR3F_{HiE,j}^{m}$, $BHAR4F_{HiE,j}^{m}$):

$$BHAR1F_{Hedge,j}^{m} = BHAR1F_{LoE,j}^{m} - BHAR1F_{HiE,j}^{m} \quad \text{(E3.10)}$$

$$BHAR3F_{Hedge,j}^{m} = BHAR3F_{LoE,j}^{m} - BHAR3F_{HiE,j}^{m} \quad \text{(E3.11)}$$

$$BHAR4F_{Hedge,j}^{m} = BHAR4F_{LoE,j}^{m} - BHAR4F_{HiE,j}^{m} \quad \text{(E3.12)}$$

The above regression-based approach is also not flawless, especially in the UK context (Michou et al., 2007; Lee et al., 2007; Bauer et al., 2010). Nevertheless, since both the reference and regression-based approaches are used with five different measures of abnormal returns, it would reasonably guard the results against any possible significant biases due to the way abnormal returns are calculated.

3.4.4. Annualized returns

One of the main tests in this chapter employ multivariate regressions (Section 3.5.3). In those regressions, the monthly returns as estimated in Section 3.4.2 and 3.4.3 are converted into annual returns to match with the annual update of the explanatory variables which are all calculated based on information from annual financial statements. In particular, for each firm the annual buy-and-hold raw returns are calculated as follows:

$$BHRR^{a}_{i,t} = \prod_{j=1}^{12}(1 + BHRR^{m}_{i,j}) - 1 \; (j = \text{June year t} \ldots \text{ May year t + 1}) \qquad \text{(E3.13)}$$

The firm-specific annual buy-and-hold size-adjusted and market-adjusted returns are calculated as follows:

$$BHSAR^{a}_{i,t} = \prod_{j=1}^{12}(1 + BHRR^{m}_{i,j}) - \prod_{j=1}^{12}\left(1 + SDR^{m}_{d,j}\right) (i \in d, j = \text{June year t} \ldots \text{ May year t + 1}) \qquad \text{(E3.14)}$$

$$BHMAR^{a}_{i,t} = \prod_{j=1}^{12}(1 + BHRR^{m}_{i,j}) - \prod_{j=1}^{12}\left(1 + FTSEALLR^{m}_{j}\right) (j = \text{June year t} \ldots \text{ May year t + 1}) \qquad \text{(E3.15)}$$

For the firm-specific one-factor, three-factor and four-factor abnormal returns, the following equations are estimated for each stock:

$$BHRR^{m}_{i,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \varepsilon \qquad \text{(E3.16)}$$

$$BHRR^{m}_{i,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \varepsilon \qquad \text{(E3.17)}$$

$$BHRR^{m}_{i,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \beta_4 UMD_j + \varepsilon \qquad \text{(E3.18)}$$

To estimate Equation (E3.16), (E3.17) and (E3.18), the chapter requires at least 36 observations. Therefore, stocks with less than 36 monthly returns are dropped from the main sample. The estimated coefficient[s] of stock *i* obtained from Equation

(E3.16) [(E3.17) and (E3.18)] is [are] denoted $\hat{\beta}_{1,i}^{1F}$ [$\hat{\beta}_{1,i}^{3F}$, $\hat{\beta}_{2,i}^{3F}$, $\hat{\beta}_{3,i}^{3F}$ and $\hat{\beta}_{1,i}^{4F}$, $\hat{\beta}_{2,i}^{4F}$, $\hat{\beta}_{3,i}^{4F}$, $\hat{\beta}_{4,i}^{4F}$, respectively]. The monthly expected returns for each stock are then calculated using these estimated coefficients as follows:

$$E(R1F_{i,j}^{m}) = Rf_j + \hat{\beta}_{1,i}^{1F}(Rm_j - Rf_j) \quad \text{(E3.19)}$$

$$E(R3F_{i,j}^{m}) = Rf_j + \hat{\beta}_{1,i}^{3F}(Rm_j - Rf_j) + \hat{\beta}_{2,i}^{3F}SMB_j + \hat{\beta}_{3,i}^{3F}HML_j \quad \text{(E3.20)}$$

$$E(R4F_{i,j}^{m}) = Rf_j + \hat{\beta}_{1,i}^{4F}(Rm_j - Rf_j) + \hat{\beta}_{2,i}^{4F}SMB_j + \hat{\beta}_{3,i}^{4F}HML_j + \hat{\beta}_{4,i}^{4F}UMD_j \quad \text{(E3.21)}$$

where: $E(R1F_{i,j}^{m})$, $E(R3F_{i,j}^{m})$, $E(R4F_{i,j}^{m})$ are, respectively, the expected returns of stock *i* in month *j* using the one-, three- and four-factor model.

The one-, three- and four-factor abnormal returns are next calculated as follows:

$$BHAR1F_{i,t}^{a} = \prod_{j=1}^{12}(1 + BHRR_{i,j}^{m}) - \prod_{j=1}^{12}\left[1 + E(R1F_{i,j}^{m})\right] (j = \text{June year t} \ldots \text{ May year t + 1}) \quad \text{(E3.22)}$$

$$BHAR1F_{i,t}^{a} = \prod_{j=1}^{12}(1 + BHRR_{i,j}^{m}) - \prod_{j=1}^{12}\left[1 + E(R3F_{i,j}^{m})\right] (j = \text{June year t} \ldots \text{ May year t + 1}) \quad \text{(E3.23)}$$

$$BHAR1F_{i,t}^{a} = \prod_{j=1}^{12}(1 + BHRR_{i,j}^{m}) - \prod_{j=1}^{12}\left[1 + E(R4F_{i,j}^{m})\right] (j = \text{June year t} \ldots \text{ May year t + 1}) \quad \text{(E3.24)}$$

3.5. RESULTS

3.5.1. Descriptive statistics and correlations

Because this chapter employs the same sample as Chapter 2, the descriptive statistics of many variables have been presented in Chapter 2 (Section 2.5.2), except only for stock returns. Table T3.5 presents descriptive statistics of the measures of stock returns. On average, sample stocks earn a raw return of 7.04% per year. The means of all measures of abnormal returns are small but are not zero, mainly because of the winsorization procedures. The statistics are, in general, quite comparable with other studies of stock returns in the UK (e.g. Hung et al., 2004; Duong et al., 2014). Table T3.6 reports the correlation coefficients between stock returns and ESCORE as well as its components. In general, a lot of the coefficients are negative and significant, especially between returns and ESCORE (coefficients ranging from 9% to 11%, all are statistically significant). It provides initial evidence that ESCORE is related to future stock returns.

Table T3.5. Descriptive statistics (n = 11,920)

	Mean	**25th percentile**	**Median**	**75th percentile**	**Standard deviation**
BHRR[a]	0.0704	-0.2843	0.0114	0.3245	0.5467
BHSAR[a]	0.0079	-0.3003	-0.0420	0.2297	0.5047
BHMAR[a]	-0.0045	-0.3298	-0.0608	0.2245	0.5227
BHAR1F[a]	0.0016	-0.3173	-0.0548	0.2276	0.5192
BHAR3F[a]	-0.0105	-0.3057	-0.0599	0.1987	0.5018
BHAR4F[a]	-0.0096	-0.2968	-0.0568	0.2020	0.4976

Notes: The table reports the mean, 25th, 50th (the median), 75th percentiles and standard deviation of selected variables. Definitions of variables are in Section 3.8.

Table T3.6.Correlations

	BHRR[a]	**BHSAR[a]**	**BHMAR[a]**	**BHAR1F[a]**	**BHAR3F[a]**	**BHAR4F[a]**
ESEO	-0.12	-0.10	-0.11	-0.11	-0.10	-0.10
EDDEBT	-0.04	-0.04	-0.03	-0.03	-0.03	-0.03
EMA	-0.07	-0.05	-0.04	-0.05	-0.05	-0.05
EOV	-0.02	-0.02	-0.02	-0.02	*-0.01*	*-0.01*
EROA	*0.02*	*0.01*	*0.01*	*0.01*	*0.00*	*0.00*
EDROA	0.02	0.02	0.02	0.03	0.02	0.02
EDIV	0.03	0.02	0.02	0.02	*0.02*	*0.01*
EDISTRESS	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06
EDEBT	*-0.02*	*0.00*	*-0.02*	*-0.02*	*-0.01*	*-0.01*
ESIZE	*-0.01*	*-0.01*	*-0.01*	*-0.01*	*0.00*	*-0.01*
ECYCLE	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
EAUDIT	-0.06	-0.02	-0.05	-0.04	-0.03	-0.04
EBLOAT	*-0.01*	*-0.01*	*-0.01*	*-0.01*	*-0.01*	*-0.01*
ECAP	-0.03	-0.03	-0.03	-0.03	-0.02	-0.03
EBT	-0.08	-0.07	-0.08	-0.08	-0.08	-0.08
ESCORE	-0.11	-0.09	-0.10	-0.10	-0.09	-0.09

Notes: The table reports Pearson correlation coefficients between selected variables. Definitions of variables are in Section 3.8. Values reported in *italic* indicate the corresponding coefficients are *not significant at 5% level.*

3.5.2. Portfolio analyses

This section uses the t-test to compare monthly abnormal returns (i.e. $BHSAR_{i,j}^{m}$, $BHMAR_{i,j}^{m}$, $BHAR1F_{p,j}^{m}$, $BHAR3F_{p,j}^{m}$, $BHAR4F_{p,j}^{m}$) between various portfolios designed based on ESCORE and its components. Following Desai et al. (2004), to avoid the potential inflation of t-statistics when assessing the abnormal portfolio returns over time, $BHSAR_{i,j}^{m}$, $BHMAR_{i,j}^{m}$, $BHAR1F_{p,j}^{m}$, $BHAR3F_{p,j}^{m}$ and $BHAR4F_{p,j}^{m}$ are calculated for each month (from June 1996 to May 2013 with portfolios being formed at the end of May each year based on ESCORE calculated from the previous fiscal year) and each monthly return is treated as one observation. The employed t-statistics are calculated from 204 time-series monthly observations (across 17 years).

Table T3.7 compares the mean return of the suspicious stocks identified by individual signals and that of the rest of the sample. It could be noted that most individual signals are effective in identifying poorly-performing stocks. As a result, the portfolios taking long position in stocks which are flagged up by the individual signals as suspicious mostly earn negative returns and significantly lower than returns earned by the rest of the sample.

Table T3.8 reports the buy-and-hold returns on each ESCORE portfolio (0-9), the low, medium and high ESCORE portfolios as well as the hedge portfolio which takes long position in low ESCORE and short position in high ESCORE stocks. The t-statistics are reported under the null hypothesis that the corresponding return is zero. The results are easy to summarize. First, as ESCORE increases, all measures of stock returns decrease quite monotonically. This pattern is graphically illustrated by Figure F3.1, F3.2, F3.3, F3.4, F3.5 and F3.6. Secondly, low ESCORE stocks earn abnormally high and high ESCORE stocks earn abnormally low returns. Third, the hedge portfolio earns positive abnormal returns.

Table T3.7.Stock returns of the suspicious firms versus the rest of the sample – Buy-and-hold annual returns

	N		Mean returns			
	Rest of sample	Suspicious	Rest of sample	Suspicious	Suspicious - Rest of sample	t-statistic
Panel A: ESEO						
BHRR[a]	9,408	2,512	0.1052	-0.0596	-0.1648	-12.745***
BHSAR[a]	9,408	2,512	0.0332	-0.0868	-0.1201	-10.085***
BHMAR[a]	9,408	2,512	0.0254	-0.1164	-0.1417	-11.536***
BHAR1F[a]	9,408	2,512	0.0313	-0.1096	-0.1408	-11.512***
BHAR3F[a]	9,408	2,512	0.0153	-0.1075	-0.1228	-10.34***
BHAR4F[a]	9,408	2,512	0.0157	-0.1042	-0.1199	-10.203***
Panel B: EDDEBT						
BHRR[a]	7,402	4,518	0.0889	0.0401	-0.0488	-4.731***
BHSAR[a]	7,402	4,518	0.0248	-0.0196	-0.0444	-4.664***
BHMAR[a]	7,402	4,518	0.0087	-0.0260	-0.0347	-3.515***
BHAR1F[a]	7,402	4,518	0.0136	-0.0182	-0.0318	-3.248***
BHAR3F[a]	7,402	4,518	0.0003	-0.0283	-0.0286	-3.046***
BHAR4F[a]	7,402	4,518	0.0014	-0.0275	-0.0289	-3.108***
Panel C: EMA						
BHRR[a]	11,326	594	0.0791	-0.0948	-0.1739	-7.577***
BHSAR[a]	11,326	594	0.0139	-0.1061	-0.1200	-5.656***
BHMAR[a]	11,326	594	0.0009	-0.1067	-0.1076	-4.895***
BHAR1F[a]	11,326	594	0.0072	-0.1059	-0.1132	-5.183***
BHAR3F[a]	11,326	594	-0.0051	-0.1133	-0.1081	-5.124***
BHAR4F[a]	11,326	594	-0.0043	-0.1105	-0.1062	-5.077***
Panel D: EOV						
BHRR[a]	9,344	2,576	0.0765	0.0485	-0.0280	-2.302**
BHSAR[a]	9,344	2,576	0.0145	-0.0159	-0.0304	-2.707***
BHMAR[a]	9,344	2,576	0.0017	-0.0269	-0.0286	-2.459**
BHAR1F[a]	9,344	2,576	0.0072	-0.0188	-0.0260	-2.248**
BHAR3F[a]	9,344	2,576	-0.0074	-0.0221	-0.0147	-1.317
BHAR4F[a]	9,344	2,576	-0.0066	-0.0202	-0.0135	-1.222
Panel E: EROA						
BHRR[a]	11,510	410	0.0688	0.1161	0.0473	1.72*
BHSAR[a]	11,510	410	0.0072	0.0298	0.0226	0.892
BHMAR[a]	11,510	410	-0.0055	0.0244	0.0299	1.139
BHAR1F[a]	11,510	410	0.0008	0.0224	0.0216	0.826
BHAR3F[a]	11,510	410	-0.0108	-0.0045	0.0062	0.247
BHAR4F[a]	11,510	410	-0.0095	-0.0107	-0.0011	-0.043
Panel F: EDROA						
BHRR[a]	11,329	591	0.0674	0.1288	0.0614	3.074***
BHSAR[a]	11,329	591	0.0057	0.0508	0.0452	2.503**
BHMAR[a]	11,329	591	-0.0073	0.0489	0.0561	2.974***
BHAR1F[a]	11,329	591	-0.0016	0.0627	0.0644	3.475***
BHAR3F[a]	11,329	591	-0.0132	0.0408	0.0540	3.075***
BHAR4F[a]	11,329	591	-0.0122	0.0416	0.0538	3.075***
Panel G: EDIV						
BHRR[a]	11,261	659	0.0670	0.1299	0.0629	3.043***
BHSAR[a]	11,261	659	0.0053	0.0524	0.0471	2.462**
BHMAR[a]	11,261	659	-0.0073	0.0442	0.0515	2.589***
BHAR1F[a]	11,261	659	-0.0011	0.0469	0.0480	2.305**
BHAR3F[a]	11,261	659	-0.0125	0.0223	0.0347	1.819*
BHAR4F[a]	11,261	659	-0.0111	0.0170	0.0281	1.409
Panel H: EDISTRESS						
BHRR[a]	10,045	1,875	0.0835	0.0007	-0.0827	-5.196***
BHSAR[a]	10,045	1,875	0.0214	-0.0640	-0.0854	-5.806***
BHMAR[a]	10,045	1,875	0.0088	-0.0755	-0.0842	-5.48***
BHAR1F[a]	10,045	1,875	0.0152	-0.0715	-0.0867	-5.693***
BHAR3F[a]	10,045	1,875	0.0024	-0.0800	-0.0824	-5.561***
BHAR4F[a]	10,045	1,875	0.0034	-0.0788	-0.0822	-5.594***
Panel I: EDEBT						
BHRR[a]	9,016	2,904	0.0754	0.0550	-0.0205	-1.755*
BHSAR[a]	9,016	2,904	0.0091	0.0041	-0.0050	-0.464
BHMAR[a]	9,016	2,904	0.0003	-0.0193	-0.0196	-1.76*
BHAR1F[a]	9,016	2,904	0.0064	-0.0133	-0.0197	-1.777*
BHAR3F[a]	9,016	2,904	-0.0071	-0.0211	-0.0139	-1.299
BHAR4F[a]	9,016	2,904	-0.0065	-0.0191	-0.0126	-1.185

Table T3.7 (continued)

	N		Mean returns			
	Rest of sample	**Suspicious**	**Rest of sample**	**Suspicious**	**Suspicious - Rest of sample**	**t-statistic**
Panel J: ESIZE						
BHRR[a]	9,342	2,578	0.0744	0.0562	-0.0181	-1.333
BHSAR[a]	9,342	2,578	0.0095	0.0021	-0.0075	-0.585
BHMAR[a]	9,342	2,578	-0.0004	-0.0192	-0.0188	-1.431
BHAR1F[a]	9,342	2,578	0.0043	-0.0081	-0.0124	-0.949
BHAR3F[a]	9,342	2,578	-0.0094	-0.0147	-0.0054	-0.422
BHAR4F[a]	9,342	2,578	-0.0065	-0.0208	-0.0144	-1.138
Panel K: ECYCLE						
BHRR[a]	11,594	326	0.0734	-0.0358	-0.1092	-3.159***
BHSAR[a]	11,594	326	0.0105	-0.0830	-0.0934	-2.83***
BHMAR[a]	11,594	326	-0.0018	-0.0995	-0.0977	-2.921***
BHAR1F[a]	11,594	326	0.0043	-0.0961	-0.1004	-3.004***
BHAR3F[a]	11,594	326	-0.0079	-0.1057	-0.0979	-3.017***
BHAR4F[a]	11,594	326	-0.0072	-0.0946	-0.0875	-2.78***
Panel L: EAUDIT						
BHRR[a]	6,612	5,308	0.0977	0.0364	-0.0613	-6.057***
BHSAR[a]	6,612	5,308	0.0177	-0.0042	-0.0219	-2.342**
BHMAR[a]	6,612	5,308	0.0175	-0.0319	-0.0495	-5.107***
BHAR1F[a]	6,612	5,308	0.0207	-0.0222	-0.0429	-4.465***
BHAR3F[a]	6,612	5,308	0.0045	-0.0293	-0.0337	-3.626***
BHAR4F[a]	6,612	5,308	0.0066	-0.0297	-0.0363	-3.933***
Panel M: EBLOAT						
BHRR[a]	9,346	2,574	0.0733	0.0600	-0.0133	-1.049
BHSAR[a]	9,346	2,574	0.0105	-0.0013	-0.0118	-1.003
BHMAR[a]	9,346	2,574	-0.0013	-0.0162	-0.0149	-1.22
BHAR1F[a]	9,346	2,574	0.0049	-0.0105	-0.0154	-1.266
BHAR3F[a]	9,346	2,574	-0.0082	-0.0191	-0.0109	-0.929
BHAR4F[a]	9,346	2,574	-0.0072	-0.0181	-0.0108	-0.934
Panel N: ECAP						
BHRR[a]	9,349	2,571	0.0793	0.0381	-0.0412	-3.095***
BHSAR[a]	9,349	2,571	0.0155	-0.0195	-0.0349	-2.83***
BHMAR[a]	9,349	2,571	0.0045	-0.0371	-0.0416	-3.242***
BHAR1F[a]	9,349	2,571	0.0096	-0.0276	-0.0372	-2.923***
BHAR3F[a]	9,349	2,571	-0.0047	-0.0319	-0.0273	-2.217**
BHAR4F[a]	9,349	2,571	-0.0030	-0.0333	-0.0303	-2.476**
Panel O: EBT						
BHRR[a]	9,358	2,562	0.0925	-0.0101	-0.1026	-7.695***
BHSAR[a]	9,358	2,562	0.0275	-0.0637	-0.0912	-7.359***
BHMAR[a]	9,358	2,562	0.0177	-0.0854	-0.1031	-8.048***
BHAR1F[a]	9,358	2,562	0.0238	-0.0798	-0.1036	-8.148***
BHAR3F[a]	9,358	2,562	0.0095	-0.0838	-0.0933	-7.531***
BHAR4F[a]	9,358	2,562	0.0103	-0.0823	-0.0926	-7.506***

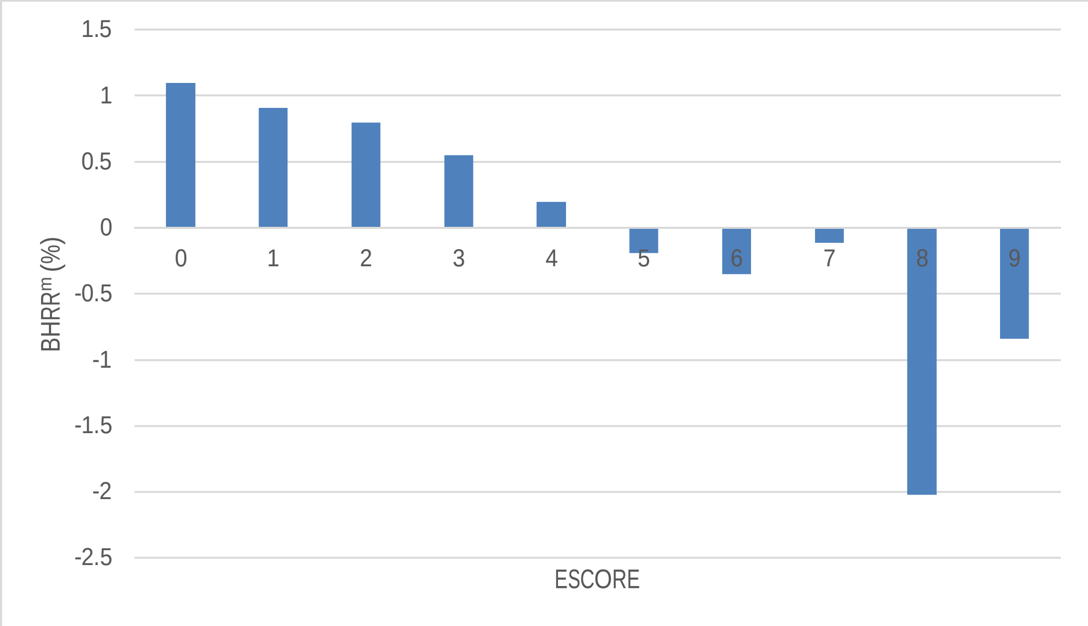
Notes: The table reports the number of observations and returns of the suspicious firms versus the rest of the sample, together with the t-statistic under the null that the difference is zero. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.8. Stock returns across ESCORE groups – Equally-weighted scheme

ESCORE	$BHRR^m$		$BHSAR^m$		$BHMAR^m$		$BHAR1F^m$		$BHAR3F^m$		$BHAR4F^m$	
	Return	**t-statistic**	**Return**	**t-statistic**	**Return**	**t-statistic**	**Return**	**t-statistic**	**Return**	**t-statistic**	**Return**	**t-statistic**
0	1.10	3.252***	0.48	3.694***	0.44	1.866*	0.50	2.109**	0.36	2.391**	0.33	2.086**
1	0.91	2.669***	0.32	4.041***	0.25	1.127	0.29	1.299	0.14	1.26	0.18	1.553
2	0.80	2.474**	0.23	3.678***	0.14	0.618	0.20	0.918	0.08	0.614	0.08	0.636
3	0.55	1.688*	0.01	0.134	-0.11	-0.482	-0.04	-0.185	-0.17	-1.326	-0.16	-1.243
4	0.20	0.549	-0.27	-2.709***	-0.45	-1.727*	-0.42	-1.604	-0.56	-3.399***	-0.46	-2.752***
5	-0.19	-0.503	-0.61	-4.178***	-0.85	-2.805***	-0.77	-2.604***	-0.89	-4.036***	-0.80	-3.483***
6	-0.35	-0.784	-0.72	-3.146***	-1.00	-2.795***	-0.97	-2.683***	-1.11	-3.791***	-1.09	-3.586***
7	-0.11	-0.211	-0.52	-1.512	-0.76	-1.88*	-0.76	-1.863*	-0.80	-2.156**	-0.80	-2.075**
8	-2.02	-2.573**	-2.31	-3.562***	-2.61	-3.591***	-2.59	-3.543***	-2.67	-3.998***	-2.49	-3.565***
9	-0.84	-0.786	-0.83	-0.883	-1.38	-1.348	-1.31	-1.279	-1.55	-1.561	-1.56	-1.534
Low (0)	1.10	3.252***	0.48	3.694***	0.44	1.866*	0.50	2.109**	0.36	2.391**	0.33	2.086**
Medium (1-5)	0.55	1.683*	0.02	1.121	-0.10	-0.461	-0.05	-0.221	-0.18	-1.614	-0.14	-1.239
High (6-9)	-0.31	-0.742	-0.69	-3.662***	-0.97	-2.978***	-0.94	-2.873***	-1.05	-4.129***	-1.04	-3.923***
Low - High	1.41	5.156***	1.17	4.584***	1.41	5.156***	1.43	5.241***	1.42	5.279***	1.37	5.102***

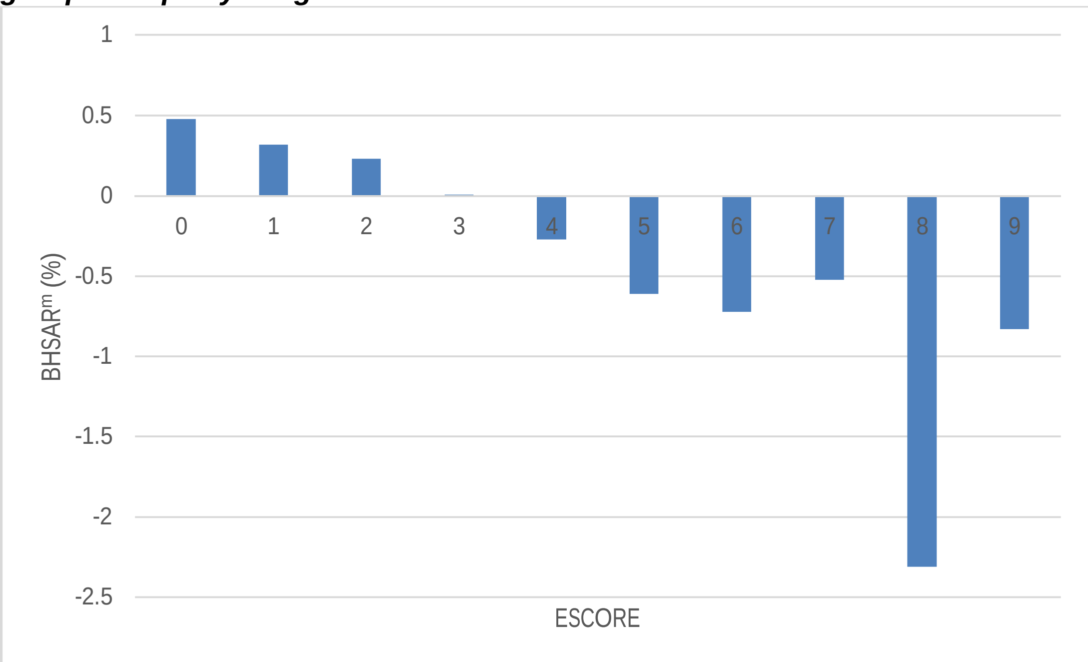
Notes: The table reports the returns on different portfolios formed on the basis of ESCORE. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Figure F3.1. Buy-and-hold monthly raw returns across ESCORE groups – Equally-weighted scheme



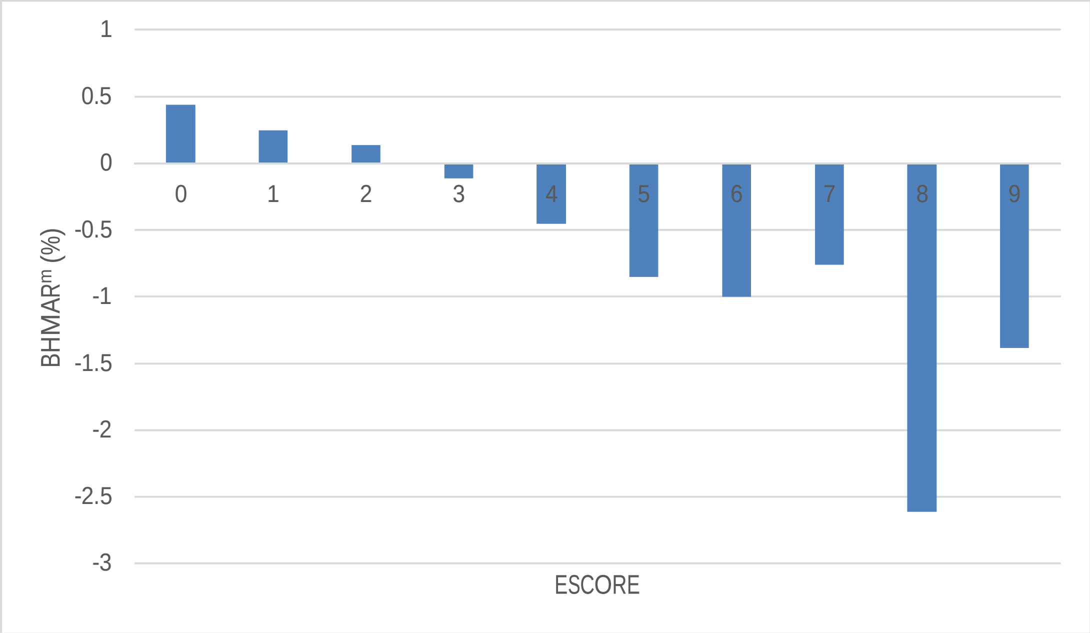
Notes: Definitions of variables are in Section 3.8.

Figure F3.2. Buy-and-hold monthly size-adjusted returns across ESCORE groups – Equally-weighted scheme



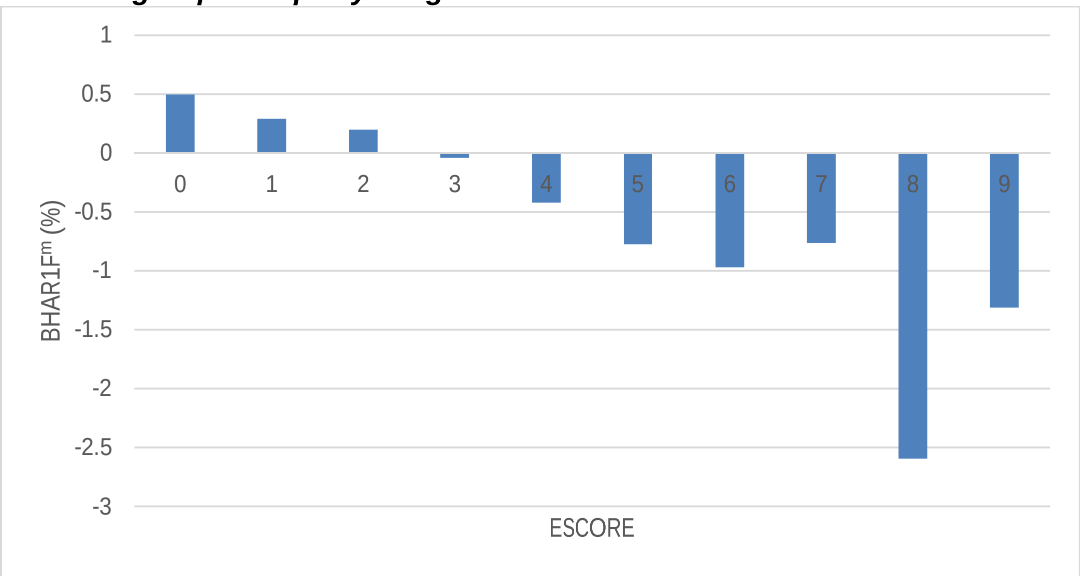
Notes: Definitions of variables are in Section 3.8.

Figure F3.3. Buy-and-hold monthly market-adjusted returns across ESCORE groups – Equally-weighted scheme



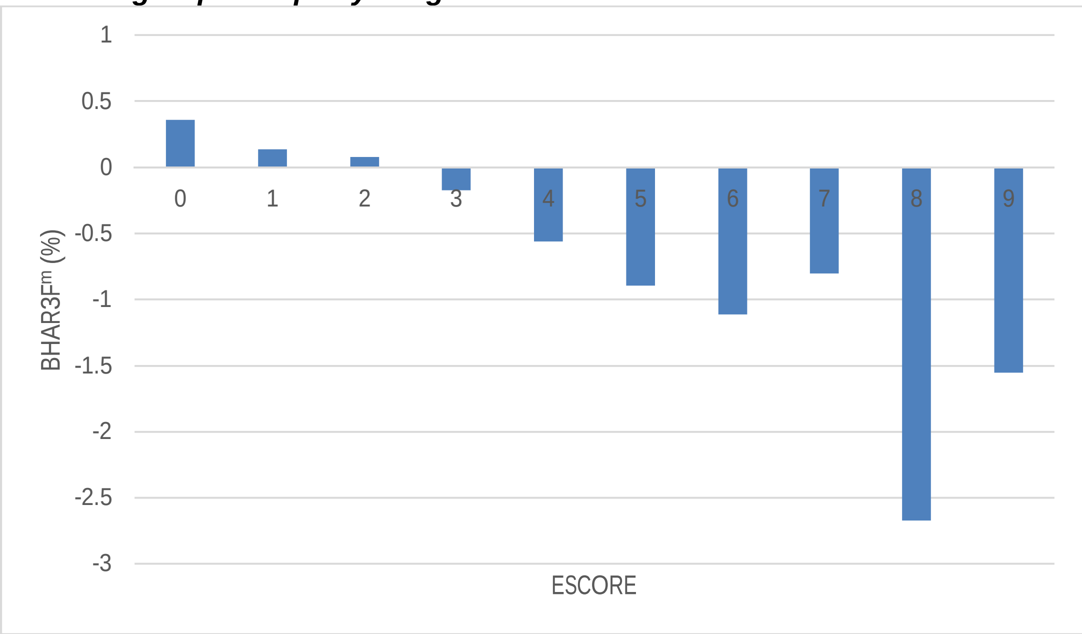
Notes: Definitions of variables are in Section 3.8.

Figure F3.4. Buy-and-hold monthly one-factor abnormal returns across ESCORE groups – Equally-weighted scheme



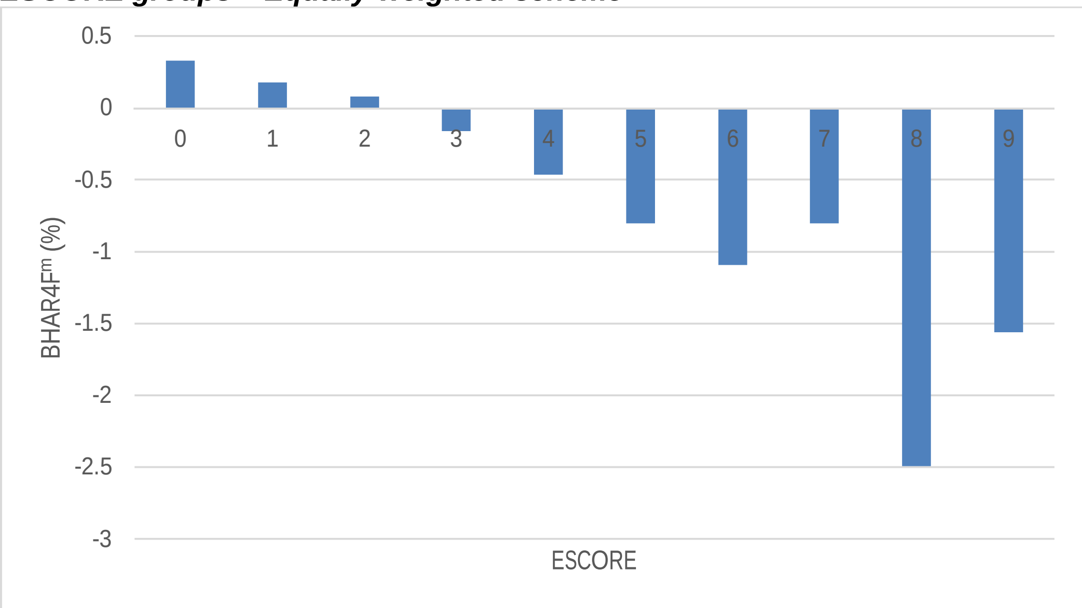
Notes: Definitions of variables are in Section 3.8.

Figure F3.5. Buy-and-hold monthly three-factor abnormal returns across ESCORE groups – Equally-weighted scheme



Notes: Definitions of variables are in Section 3.8.

Figure F3.6. Buy-and-hold monthly four-factor abnormal returns across ESCORE groups – Equally-weighted scheme



Notes: Definitions of variables are in Section 3.8.

Since the results are quite consistent across different return metrics, only the results based on abnormal returns estimated using the four-factor model are discussed. The portfolio of stocks with ESCORE of zero earns an abnormal return of 0.33% per month (significant at 5% level). As ESCORE increases, abnormal returns decrease quite monotonically. The high ESCORE portfolio (includes all stocks with ESCORE of six or higher) earns an abnormal return of –1.04% (significant at 1% level). The hedge portfolio that takes long position in low ESCORE stocks and short position in high ESCORE stocks earns 1.37% abnormal return per month. To put the results in perspective, the findings are compared with other similar return anomalies documented in the literature, especially in the UK. Sloan (1996) documents an annual size-adjusted return of 10.4% on a hedge portfolio which takes long position in stocks with low and short in those with high accruals. Soares and Stark (2009) provide similar results showing that the accruals anomaly exists in the UK with the hedge portfolio earning an abnormal return (adjusted for size and book-to-market factors but without controlling for transaction costs) of 18.7% per year. The annualized return on the hedge portfolio based on ESCORE is 17.74% (1.0137^12 – 1), which is non-trivial in economic terms. Overall, the result strongly suggests that the market misprices the information contained in ESCORE, which is designed to capture the context of earnings management.

3.5.3. Other 'market anomalies' in disguise?

The results from the portfolio analyses strongly suggest that ESCORE is correlated with future returns. However, because of the way ESCORE is constructed, there are some other known 'market anomalies' that are associated with ESCORE, and hence could partly explain the returns predictive power of ESCORE. This section addresses such concern.

To see if ESCORE is indeed related to other known patterns in realized returns, Table T3.9 presents basic financial characteristics of stocks across ESCORE groups. Firm size, measured by either total assets or market capitalization, is negatively related with ESCORE. Firms with higher ESCORE are also more likely to issue seasoned equity and debt as well as have lower NOA. High ESCORE firms are also highly valued by the market evidenced by the monotonic increase of the market-to-book ratio across the ESCORE groups. The decrease of ROA and DROA as ESCORE increases also suggests that high ESCORE stocks are typically less profitable. High ESCORE stocks are also more financially distressed as measured by the ZSCORE.

The above observed patterns impose a concern whether ESCORE could predict future returns beyond the known return effects embedded in it. To start with, it is clear that the components of ESCORE is selected based on the literature of earnings management, and not from the literature of market anomalies. Therefore, the signals embedded in ESCORE do not necessarily include only those which are known stock returns predictors.

Table T3.9. Fundamental characteristics across ESCORE groups

	ESCORE									
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
TA(£ million)	733	615	458	348	264	130	92	41	33	11
SALE (£ million)	703	611	472	362	274	140	97	65	67	9
NI (£ million)	41	32	23	16	10	2	-1	-1	-3	-1
DIV (£ million)	18	15	12	9	6	2	1	1	1	0
MVE (£ million)	689	576	443	349	270	134	94	61	25	17
DSHARE	0.0054	0.0224	0.0445	0.0904	0.1763	0.2677	0.3677	0.4911	0.6565	0.9111
DDEBT	-0.2765	0.1760	0.5336	1.6761	2.3236	3.6770	4.2057	5.4630	7.7978	8.8561
MTB	2.2047	2.3857	2.8669	3.2708	4.1842	4.3591	5.2342	6.4006	6.0342	5.9664
ROA	0.0589	0.0552	0.0476	0.0169	-0.0360	-0.1153	-0.2325	-0.3791	-0.4571	-0.5874
DROA	0.0335	0.0219	0.0185	0.0151	0.0074	-0.0018	-0.0071	-0.0346	-0.0026	-0.1953
DIVDEF	0.0343	0.0286	0.0208	-0.0086	-0.0598	-0.1320	-0.2451	-0.3863	-0.4589	-0.5908
ZSCORE	17.9433	16.6083	15.9328	13.6591	9.5750	7.0799	-1.1646	-4.3763	-8.2776	-12.5474
DEBT	0.1668	0.1755	0.1676	0.1572	0.1439	0.1289	0.1225	0.1038	0.1010	0.0760
NOA	0.5701	0.5603	0.5314	0.4906	0.4458	0.4340	0.3992	0.3501	0.3683	0.3702
CAP	0.5874	0.5562	0.5030	0.4316	0.3667	0.3127	0.2840	0.2453	0.2187	0.1969
BOOKTAX	0.0587	0.0831	0.1952	0.4172	1.0355	2.8103	3.8965	4.3297	4.0088	4.5332
DAC	0.0070	0.0054	0.0127	0.0085	0.0037	0.0079	-0.0101	-0.0239	-0.0059	0.0125
ESEO	0.0000	0.0437	0.1084	0.2230	0.3290	0.4608	0.5934	0.6810	0.7614	0.9615
EDDEBT	0.0000	0.2674	0.4017	0.4746	0.4412	0.4718	0.4721	0.4526	0.5568	0.5000
EMA	0.0000	0.0063	0.0191	0.0470	0.0818	0.1207	0.1503	0.1681	0.2841	0.5000
ECYCLE	0.0000	0.0032	0.0062	0.0189	0.0400	0.0915	0.0886	0.1293	0.1591	0.3077
EAUDIT	0.0000	0.2029	0.3921	0.5254	0.6209	0.6982	0.8054	0.8491	0.9773	0.9615

Notes: The table reports the mean of selected variables across groups sorted by ESCORE. Definitions of variables are in Section 3.8.

The chapter further argues that the predictive power of ESCORE comes from the context of earnings management which is revealed *collectively* by the composite ESCORE, not by the predictive power of the individual signals separately. In fact, some signals, including ESIZE and EBLOAT, even predict future returns, based on the established literature, in the opposite direction because stocks with ESIZE and EBLOAT of one (smaller stocks and those which have smaller NOA) are expected to earn higher (not lower) future returns based on the established evidence of the size effect (e.g. Banz, 1981) and the irrational market reaction to balance sheet bloat (Hirshleifer et al., 2004). Meanwhile, the literature is silent about whether other signals, including EROA, EDROA, EDIV, EMA, EDEBT, EDDEBT, ECYCLE, EAUDIT and EBT, could predict future returns[25]. The concern lies, therefore, mainly with the high market-to-book ratio, high likelihood of issuing seasoned equity, more financial distress and low profitability of high ESCORE stocks. It has been widely documented that abnormally low returns are associated with high market-to-book firms (e.g. Fama and French, 1992; Lakonishok et al., 1994), seasoned equity offers (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995), firms with negative ZSCORE (Agarwal and Taffler, 2008), and firms with lower profitability (Ou and Penman, 1989; Piotroski, 2000; Fama and French, 2006). Those known patterns of returns are embedded in ESCORE through EOV, ESEO and EDISTRESS. In addition, because ESCORE is designed to capture the context of earnings management, it is also important to control for the documented market mispricing of discretionary accruals (Xie, 2001). To demonstrate that ESCORE is still associated with future returns after controlling for the above anomalies, the following regressions are estimated:

[25] The literature (e.g. Agrawal et al., 1992) also suggests that firms would typically suffer negative returns after an M&A. However, the documented negative returns are generally measured following the date the deal is completed. EMA is defined in this thesis as a dummy which turns on if a firm announces a share-for-share deal in a year. In some cases, the completion date could be a long time after the announcement date, hence the existing literature might not indicate that EMA is related to returns.

$$RET^{a}_{i,t+1} = \alpha + \beta_1 Ln(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon \quad \text{(E3.25)}$$

where: $RET^{a}_{i,t+1}$ is annual buy-and-hold return of stock *i* measured from June year *t+1* to May year *t+2* and is replaced by $BHRR^{a}_{i,t+1}$, $BHSAR^{a}_{i,t+1}$, $BHMAR^{a}_{i,t+1}$, $BHAR1F^{a}_{i,t+1}$, $BHAR3F^{a}_{i,t+1}$ and $BHAR4F^{a}_{i,t+1}$; $Log(MVE_{i,t})$ is natural logarithm of MVE of stock *i* at the end of year *t*.[26]

If ESCORE could predict future stock returns beyond the anomalies embedded in it, γ in Equation (E3.25) is predicted to be negative. Table T3.10 presents the results of estimating Equation (E3.25) where BHRR[a] is the dependent variable. Specification 1 of the table reports the full specification of Equation (E3.25). The table also reports four other specifications where ESCORE and DAC are dropped one by one and both together as well as where only ESCORE and DAC are kept as explanatory variables. Panel A reports the results obtained from a pooled regression. To respond to the concern raised recently about the problems associated with regressions using panel data in which the residuals are both serially and cross-sectionally correlated (Petersen, 2009; Gow et al., 2010), Panel B also reports the results of a regression using the methodology pioneered by Fama and MacBeth (1973) with the t-statistics calculated using corrected standard errors following the procedures introduced by Newey and West (1987). In particular, in the Fama-Macbeth regressions, Equation (E3.25) is estimated in each of the sample years and the mean of the annual estimated coefficients are reported. The t-statistics, which are calculated based on the distributions of the annual estimated coefficients, are treated for serial correlations using Newey-West procedures. In a similar fashion, Table T3.11

[26] To mitigate any residual concerns about the potential relation between EMA and returns as discussed above, the chapter adds EMA to Equation (E3.25) and replicates all main analyses. Unreported results show that the main conclusions of the chapter are not qualitatively affected after controlling for EMA.

(T3.12, T3.13, T3.14 and T3.15) presents the results where $BHSAR^a$ ($BHMAR^a$, $BHAR1F^a$, $BHAR3F^a$ and $BHAR4F^a$, respectively) is the dependent variable.

Looking at Specification 4 (i.e. returns regressed on all explanatory variables except ESCORE and DAC) across Table T3.10 to Table T3.15, all control variables have the predicted signs. DAC, added in Specification 3, is always negative and significant, which is in line with the existing literature (e.g. Xie, 2001). The main focus is on the coefficient on ESCORE. Looking at Specification 1 (i.e. the full regression), ESCORE is always negative and significant across the tables. Comparing Specification 1 to Specification 3, adding ESCORE generally increases the adjusted R^2. Chapter 2 has shown that ESCORE, although being constructed using a different methodology, is highly correlated with DAC. Therefore, Specification 2 drops DAC from the regressions. As shown in the tables, ESCORE remains negative and significant after dropping DAC. It could be therefore concluded that ESCORE can predict stock returns beyond the existing anomalies. In Panel B of Table T3.15, Specification 1 shows that one unit increase in ESCORE pulls annual four-factor risk-adjusted returns down by 1.40%. As a comparison with the portfolio analysis where there is no control for other market 'anomalies', the annualized buy-and-hold four-factor risk-adjusted returns of the hedge portfolio reported in Table T3.8 is 17.74% (1.0137^12 – 1). The average ESCORE of the low ESCORE portfolio is 0 and that of the high ESCORE portfolio is 6.56 [(519x6 + 232x7 + 88x8 + 26x9) / 865][27], yielding a difference of –6.56. Therefore, after adjusting for other known market anomalies the four-factor risk-adjusted returns on the hedge portfolio shrink from 17.74% to 9.18% per year (1.40 x 6.56), which is still highly significant in economic terms.

[27] See Table T2.10 for the number of observations in each ESCORE group.

Table T3.10. Buy-and-hold annual raw returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.3137	8.431***	0.3079	8.275***	0.2101	6.385***	0.1961	5.979***	0.1685	18.133***
$Ln(MVE_{i,t})$	(-)	-0.0075	-2.6***	-0.0064	-2.245**	-0.0032	-1.157	-0.0017	-0.629		
$MTB_{i,t}$	(-)	-0.0044	-4.091***	-0.0046	-4.221***	-0.0051	-4.776***	-0.0054	-4.973***		
$ROA_{i,t}$	(+)	0.1881	6.16***	0.1547	5.244***	0.2034	6.677***	0.1666	5.651***		
$ESEO_{i,t}$	(-)	-0.0920	-6.563***	-0.0951	-6.794***	-0.1251	-9.722***	-0.1311	-10.224***		
$EDISTRESS_{i,t}$	(-)	0.0088	0.485	0.0154	0.857	-0.0165	-0.938	-0.0107	-0.61		
$NOA_{i,t}$	(-)	-0.1326	-5.741***	-0.1387	-6.012***	-0.1112	-4.865***	-0.1165	-5.102***		
$DAC_{i,t}$	(-)	-0.1774	-4.189***			-0.1996	-4.727***			-0.1030	-2.59***
$ESCORE_{i,t}$	(-)	-0.0220	-5.936***	-0.0234	-6.328***					-0.0356	-12.425***
Adjusted R^2 (%)		2.73		2.58		2.44		2.26		1.32	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2794	4.14***	0.2756	3.98***	0.1947	2.44**	0.1810	2.21**	0.1587	4.23***
$Ln(MVE_{i,t})$	(-)	-0.0059	-1.05	-0.0049	-0.86	-0.0021	-0.33	-0.0007	-0.11		
$MTB_{i,t}$	(-)	-0.0025	-1.34	-0.0027	-1.4	-0.0030	-1.69	-0.0032	-1.8*		
$ROA_{i,t}$	(+)	0.1645	3.54***	0.1255	3.09***	0.1806	4.26***	0.1383	3.81***		
$ESEO_{i,t}$	(-)	-0.0584	-3.56***	-0.0605	-3.41***	-0.0831	-3.67***	-0.0884	-3.65***		
$EDISTRESS_{i,t}$	(-)	-0.0282	-1.35	-0.0211	-1.03	-0.0484	-1.71	-0.0428	-1.54		
$NOA_{i,t}$	(-)	-0.1291	-4.77***	-0.1359	-4.94***	-0.1107	-3.55***	-0.1162	-3.71***		
$DAC_{i,t}$	(-)	-0.1802	-3.47***			-0.2013	-3.47***			-0.0869	-2.21**
$ESCORE_{i,t}$	(-)	-0.0166	-2.1*	-0.0184	-2.24**					-0.0294	-2.84**

Notes: Specification 1 (column 3 and 4) report the results of estimating the following equation:

$$BHRR^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.11. Buy-and-hold annual size-adjusted returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2853	8.283***	0.2796	8.117***	0.2044	6.713***	0.1911	6.295***	0.0822	9.559***
$Ln(MVE_{i,t})$	(-)	-0.0131	-4.926***	-0.0121	-4.558***	-0.0098	-3.796***	-0.0084	-3.266***		
$MTB_{i,t}$	(-)	-0.0024	-2.414**	-0.0026	-2.552**	-0.0030	-2.989***	-0.0032	-3.191***		
$ROA_{i,t}$	(+)	0.1828	6.468***	0.1502	5.501***	0.1948	6.91***	0.1597	5.853***		
$ESEO_{i,t}$	(-)	-0.0572	-4.41***	-0.0603	-4.651***	-0.0831	-6.977***	-0.0888	-7.482***		
$EDISTRESS_{i,t}$	(-)	-0.0227	-1.357	-0.0162	-0.971	-0.0424	-2.606***	-0.0369	-2.271**		
$NOA_{i,t}$	(-)	-0.1228	-5.741***	-0.1287	-6.026***	-0.1060	-5.014***	-0.1112	-5.258***		
$DAC_{i,t}$	(-)	-0.1731	-4.416***			-0.1905	-4.874***			-0.0804	-2.185**
$ESCORE_{i,t}$	(-)	-0.0172	-5.006***	-0.0186	-5.415***					-0.0270	-10.168***
Adjusted R^2 (%)		2.20		2.04		1.99		1.80		0.89	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2955	4.66***	0.2918	4.39***	0.2069	5.81***	0.1938	5.24***	0.0786	3.33***
$Ln(MVE_{i,t})$	(-)	-0.0135	-3.12***	-0.0127	-2.84**	-0.0097	-3.14***	-0.0084	-2.69**		
$MTB_{i,t}$	(-)	-0.0023	-1.3	-0.0025	-1.36	-0.0028	-1.69	-0.0031	-1.8*		
$ROA_{i,t}$	(+)	0.1669	3.55***	0.1315	3.13***	0.1824	4.26***	0.1436	3.84***		
$ESEO_{i,t}$	(-)	-0.0529	-3.22***	-0.0548	-3.08***	-0.0788	-3.45***	-0.0838	-3.43***		
$EDISTRESS_{i,t}$	(-)	-0.0281	-1.29	-0.0215	-1.01	-0.0493	-1.72	-0.0442	-1.57		
$NOA_{i,t}$	(-)	-0.1300	-4.43***	-0.1358	-4.58***	-0.1106	-3.4***	-0.1153	-3.54***		
$DAC_{i,t}$	(-)	-0.1627	-3.08***			-0.1846	-3.15***			-0.0709	-1.83*
$ESCORE_{i,t}$	(-)	-0.0175	-2.38**	-0.0192	-2.5**					-0.0251	-3.15***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHSAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.12. Buy-and-hold annual market-adjusted returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1736	4.867***	0.1680	4.709***	0.0875	2.774***	0.0742	2.362**	0.0831	9.35***
$Ln(MVE_{i.t})$	(-)	-0.0042	-1.505	-0.0032	-1.146	-0.0006	-0.231	0.0008	0.296		
$MTB_{i.t}$	(-)	-0.0031	-3.002***	-0.0033	-3.133***	-0.0037	-3.595***	-0.0039	-3.79***		
$ROA_{i.t}$	(+)	0.1570	5.364***	0.1249	4.416***	0.1698	5.814***	0.1349	4.774***		
$ESEO_{i.t}$	(-)	-0.0791	-5.89***	-0.0822	-6.121***	-0.1067	-8.65***	-0.1123	-9.142***		
$EDISTRESS_{i.t}$	(-)	-0.0068	-0.395	-0.0004	-0.025	-0.0278	-1.651*	-0.0224	-1.329		
$NOA_{i.t}$	(-)	-0.1049	-4.734***	-0.1107	-5.005***	-0.0870	-3.973***	-0.0921	-4.208***		
$DAC_{i.t}$	(-)	-0.1706	-4.203***			-0.1891	-4.673***			-0.0994	-2.611***
$ESCORE_{i.t}$	(-)	-0.0183	-5.147***	-0.0196	-5.538***					-0.0318	-11.598***
Adjusted R^2 (%)		2.21		2.07		1.99		1.81		1.16	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1954	3.02***	0.1916	2.9**	0.1107	1.39	0.0970	1.18	0.0747	1.76*
$Ln(MVE_{i.t})$	(-)	-0.0059	-1.05	-0.0049	-0.86	-0.0021	-0.33	-0.0007	-0.11		
$MTB_{i.t}$	(-)	-0.0025	-1.34	-0.0027	-1.4	-0.0030	-1.69	-0.0032	-1.8*		
$ROA_{i.t}$	(+)	0.1645	3.54***	0.1255	3.09***	0.1806	4.26***	0.1383	3.81***		
$ESEO_{i.t}$	(-)	-0.0584	-3.56***	-0.0605	-3.41***	-0.0831	-3.67***	-0.0884	-3.65***		
$EDISTRESS_{i.t}$	(-)	-0.0282	-1.35	-0.0211	-1.03	-0.0484	-1.71	-0.0428	-1.54		
$NOA_{i.t}$	(-)	-0.1291	-4.77***	-0.1359	-4.94***	-0.1107	-3.55***	-0.1162	-3.71***		
$DAC_{i.t}$	(-)	-0.1802	-3.47***			-0.2013	-3.47***			-0.0869	-2.21**
$ESCORE_{i.t}$	(-)	-0.0166	-2.1*	-0.0184	-2.24**					-0.0294	-2.84**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHMAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.13. Buy-and-hold annual one-factor abnormal returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2022	5.707***	0.1962	5.537***	0.1230	3.929***	0.1090	3.493***	0.0858	9.707***
$Ln(MVE_{i,t})$	(-)	-0.0068	-2.485**	-0.0057	-2.099**	-0.0036	-1.34	-0.0021	-0.785		
$MTB_{i,t}$	(-)	-0.0028	-2.684***	-0.0029	-2.825***	-0.0033	-3.233***	-0.0035	-3.439***		
$ROA_{i,t}$	(+)	0.1724	5.93***	0.1379	4.912***	0.1841	6.351***	0.1473	5.249***		
$ESEO_{i,t}$	(-)	-0.0792	-5.932***	-0.0824	-6.18***	-0.1045	-8.531***	-0.1104	-9.051***		
$EDISTRESS_{i,t}$	(-)	-0.0121	-0.704	-0.0052	-0.305	-0.0314	-1.877*	-0.0256	-1.533		
$NOA_{i,t}$	(-)	-0.1005	-4.568***	-0.1068	-4.859***	-0.0841	-3.866***	-0.0895	-4.115***		
$DAC_{i,t}$	(-)	-0.1828	-4.535***			-0.1998	-4.972***			-0.0995	-2.631***
$ESCORE_{i,t}$	(-)	-0.0168	-4.763***	-0.0183	-5.181***					-0.0306	-11.21***
Adjusted R^2 (%)		2.25		2.08		2.06		1.86		1.09	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2244	3.42***	0.2205	3.25***	0.1487	2.01*	0.1347	1.77*	0.0773	2.12**
$Ln(MVE_{i,t})$	(-)	-0.0087	-1.39	-0.0078	-1.22	-0.0054	-0.8	-0.0040	-0.57		
$MTB_{i,t}$	(-)	-0.0022	-1.18	-0.0024	-1.26	-0.0026	-1.51	-0.0029	-1.65		
$ROA_{i,t}$	(+)	0.1832	3.89***	0.1418	3.62***	0.1985	4.43***	0.1544	4.25***		
$ESEO_{i,t}$	(-)	-0.0576	-3.69***	-0.0600	-3.51***	-0.0798	-3.56***	-0.0854	-3.55***		
$EDISTRESS_{i,t}$	(-)	-0.0324	-1.59	-0.0250	-1.27	-0.0501	-1.81*	-0.0444	-1.63		
$NOA_{i,t}$	(-)	-0.1198	-4.53***	-0.1271	-4.73***	-0.1035	-3.52***	-0.1094	-3.71***		
$DAC_{i,t}$	(-)	-0.1919	-3.53***			-0.2110	-3.53***			-0.0854	-2.28**
$ESCORE_{i,t}$	(-)	-0.0148	-1.94*	-0.0167	-2.1*					-0.0275	-2.73**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR1F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.14. Buy-and-hold annual three-factor abnormal returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1824	5.32***	0.1767	5.154***	0.1165	3.844***	0.1034	3.421***	0.0613	7.165***
$Ln(MVE_{i,t})$	(-)	-0.0068	-2.563**	-0.0058	-2.186**	-0.0041	-1.591	-0.0027	-1.055		
$MTB_{i,t}$	(-)	-0.0015	-1.55	-0.0017	-1.689*	-0.0020	-2.019**	-0.0022	-2.22**		
$ROA_{i,t}$	(+)	0.1555	5.525***	0.1228	4.519***	0.1653	5.89***	0.1307	4.813***		
$ESEO_{i,t}$	(-)	-0.0686	-5.31***	-0.0717	-5.553***	-0.0897	-7.568***	-0.0953	-8.069***		
$EDISTRESS_{i,t}$	(-)	-0.0250	-1.502	-0.0185	-1.114	-0.0411	-2.537**	-0.0357	-2.206**		
$NOA_{i,t}$	(-)	-0.1096	-5.148***	-0.1156	-5.434***	-0.0960	-4.559***	-0.1010	-4.801***		
$DAC_{i,t}$	(-)	-0.1733	-4.44***			-0.1875	-4.819***			-0.0932	-2.548**
$ESCORE_{i,t}$	(-)	-0.0140	-4.101***	-0.0154	-4.509***					-0.0261	-9.873***
Adjusted R^2 (%)		1.94		1.78		1.80		1.61		0.85	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2047	3.2***	0.2012	3.06***	0.1401	1.85*	0.1275	1.64	0.0531	2.04*
$Ln(MVE_{i,t})$	(-)	-0.0093	-1.51	-0.0084	-1.36	-0.0064	-0.94	-0.0051	-0.74		
$MTB_{i,t}$	(-)	-0.0011	-0.82	-0.0013	-0.92	-0.0015	-1.21	-0.0017	-1.39		
$ROA_{i,t}$	(+)	0.1569	3.53***	0.1199	3.21***	0.1708	4.02***	0.1311	3.73***		
$ESEO_{i,t}$	(-)	-0.0527	-3.55***	-0.0547	-3.4***	-0.0710	-3.26***	-0.0761	-3.26***		
$EDISTRESS_{i,t}$	(-)	-0.0389	-2.55**	-0.0324	-2.22**	-0.0543	-2.37**	-0.0493	-2.2**		
$NOA_{i,t}$	(-)	-0.1154	-4.73***	-0.1217	-4.9***	-0.1014	-3.57***	-0.1064	-3.75***		
$DAC_{i,t}$	(-)	-0.1706	-3.21***			-0.1890	-3.29***			-0.0765	-2.14**
$ESCORE_{i,t}$	(-)	-0.0125	-1.73	-0.0142	-1.89*					-0.0229	-2.24**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR3F^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.15. Buy-and-hold annual four-factor abnormal returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1647	4.843***	0.1586	4.662***	0.0932	3.1***	0.0791	2.639***	0.0642	7.575***
$Ln(MVE_{i,t})$	(-)	-0.0045	-1.7*	-0.0034	-1.289	-0.0015	-0.602	0.0000	-0.016		
$MTB_{i,t}$	(-)	-0.0012	-1.178	-0.0013	-1.327	-0.0017	-1.687*	-0.0019	-1.904*		
$ROA_{i,t}$	(+)	0.1380	4.946***	0.1030	3.822***	0.1486	5.341***	0.1115	4.141***		
$ESEO_{i,t}$	(-)	-0.0653	-5.096***	-0.0686	-5.357***	-0.0882	-7.5***	-0.0941	-8.038***		
$EDISTRESS_{i,t}$	(-)	-0.0290	-1.755*	-0.0220	-1.336	-0.0464	-2.89***	-0.0406	-2.531**		
$NOA_{i,t}$	(-)	-0.1191	-5.641***	-0.1255	-5.949***	-0.1043	-4.997***	-0.1097	-5.257***		
$DAC_{i,t}$	(-)	-0.1857	-4.799***			-0.2011	-5.213***			-0.1144	-3.155***
$ESCORE_{i,t}$	(-)	-0.0152	-4.485***	-0.0167	-4.925***					-0.0267	-10.216***
Adjusted R^2 (%)		1.95		1.76		1.79		1.56		0.94	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1858	3.17***	0.1827	3.03***	0.1143	1.64	0.1012	1.42	0.0559	2.27**
$Ln(MVE_{i,t})$	(-)	-0.0069	-1.23	-0.0060	-1.07	-0.0038	-0.6	-0.0024	-0.37		
$MTB_{i,t}$	(-)	-0.0009	-0.6	-0.0010	-0.7	-0.0012	-0.96	-0.0015	-1.13		
$ROA_{i,t}$	(+)	0.1486	3.84***	0.1059	3.18***	0.1635	4.48***	0.1178	3.87***		
$ESEO_{i,t}$	(-)	-0.0519	-3.38***	-0.0544	-3.31***	-0.0724	-3.13***	-0.0781	-3.17***		
$EDISTRESS_{i,t}$	(-)	-0.0419	-3.78***	-0.0350	-3.37***	-0.0590	-3.11***	-0.0538	-2.93***		
$NOA_{i,t}$	(-)	-0.1240	-5.43***	-0.1312	-5.56***	-0.1085	-3.98***	-0.1144	-4.15***		
$DAC_{i,t}$	(-)	-0.1917	-3.9***			-0.2119	-3.83***			-0.1030	-2.9**
$ESCORE_{i,t}$	(-)	-0.0140	-1.97*	-0.0158	-2.11*					-0.0237	-2.36**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR4F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

One issue with the above multivariate regression is the high correlation between the control variables and ESCORE, as highlighted in Table T3.9. The chapter responds to this issue in two ways. First, the control variables in Equation (E3.25) are dropped one at a time, one pair of a time, and all together. For brevity, only the results when all control variables are dropped (Specification 5 in Table T3.10, T3.11, T3.12, T3.13, T3.14 and T3.15) are reported. In all of those specifications, the main conclusions of the chapter remain qualitatively unchanged.

Another way to deal with the issue is to exclude ESEO, EDISTRESS and EOV from the construction of ESCORE. Four compressed versions of ESCORE are calculated in which ESEO, EDISTRESS and EOV are dropped one by one from the construction of ESCORE, and all together. The portfolio analyses and multivariate regressions are then replicated. Unreported results confirm that none of the main results change qualitatively. The hedge portfolio, using ESCORE without ESEO, EDISTRESS and EOV, yields an average $BHSAR^m$ ($BHMAR^m$, $BHAR1F^m$, $BHAR3F^m$ and $BHAR4F^m$) of 0.96% (1.17%, 1.15%, 1.13% and 1.05%, respectively), all are statistically significant at conventional levels. Using the compressed ESCORE without ESEO, EDISTRESS and EOV to estimate Equation (E3.25) using Newey-West-adjusted Fama-MacBeth regressions, the coefficient on ESCORE is –0.0171 (–0.0159, –0.0146, –0.0124 and –0.0140) when $BHSAR^a$ ($BHMAR^a$, $BHAR1F^a$, $BHAR3F^a$ and $BHAR4F^a$, respectively) is the dependent variable, all are statistically significant at conventional levels. The chapter, therefore, concludes that the power of ESCORE to predict future returns go beyond the known pattern of returns related to other known market anomalies.

3.6. ROBUSTNESS CHECKS

3.6.1. Value-weighted scheme

The main tests report the results where the equally-weighted scheme is employed to form portfolios. The advantage of that approach is that it could avoid the influential returns on very large stocks, which exists in the sample as evidenced in the descriptive statistics (see Section 2.5.2). Nevertheless, the pitfall of the equally-weighted scheme is that the portfolio returns could be largely influenced by returns on small stocks. Although the chapter already excludes all tiny stocks with market value of equity below £1 million, it is still necessary to check if investors could earn abnormal returns from applying ESCORE if they form portfolios on a value-weighted basis. Fama (1998) shows that many market anomalies shrink significantly in magnitude or even disappear when equally-weighted scheme is swapped with value-weighted scheme or via versa. This section addresses this concern by replicating the main tests using value-weighted scheme to construct portfolios.

Table T3.16, T3.17 and T3.18 present the summary statistics of estimating Equation (E3.4), (E3.5) and (E3.6), respectively, for portfolios formed based on the value-weighted scheme. In general, all the coefficients have the expected sign and are significant in most cases.

The portfolio analyses are then replicated using value-weighted scheme. The results from portfolio analyses, as reported in Table T3.19, are not qualitatively different from those reported in the main tests. In particular, the hedge portfolio yields an average $BHSAR^m$ ($BHMAR^m$, $BHAR1F^m$, $BHAR3F^m$ and $BHAR4F^m$) of 0.79% (1.05%, 1.05%, 1.06% and 0.78%, respectively), all are statistically significant at conventional levels. It is therefore unlikely that the main results of the chapter are affected by portfolio weighting schemes.

Table T3.16. Summary statistics of estimating the CAPM for value-weighted ESCORE portfolios

ESCORE	Intercept		Rm - Rf		R^2
	Coefficient	t-statistic	Coefficient	t-statistic	
0	0.0001	0.032	0.9929	15.074***	0.5294
1	0.0030	1.448	0.9598	19.347***	0.6495
2	0.0015	0.722	1.0700	21.849***	0.7027
3	0.0002	0.126	0.9784	21.445***	0.6948
4	-0.0006	-0.246	1.0232	16.409***	0.5714
5	-0.0095	-2.806***	1.0224	12.691***	0.4436
6	-0.0094	-1.664*	1.0774	8.013***	0.2412
7	-0.0078	-1.538	1.0091	8.381***	0.2580
8	-0.0263	-2.941***	1.1438	5.519***	0.1461
9	-0.0131	-1.148	0.7878	3.162***	0.0781
Low ESCORE (0)	0.0001	0.032	0.9929	15.074***	0.5294
Medium ESCORE (1-5)	0.0009	0.551	1.0356	27.767***	0.7924
High ESCORE (6-9)	-0.0104	-2.19**	1.0010	8.826***	0.2783

Notes: The table reports the estimated coefficients and the associated t-statistics obtained from running the following regression:

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \varepsilon \quad \text{(E3.4)}$$

Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.17. Summary statistics of estimating the Fama-French three-factor model for value-weighted ESCORE portfolios

ESCORE	Intercept		Rm - Rf		SMB		HML		R^2
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	
0	-0.0012	-0.509	0.9020	15.379***	0.3953	5.615***	0.4250	6.625***	0.6446
1	0.0018	1.097	0.8745	21.689***	0.4376	9.04***	0.3279	7.434***	0.7795
2	0.0006	0.323	1.0024	23.122***	0.3963	7.615***	0.2078	4.382***	0.7781
3	-0.0002	-0.09	0.9415	22.649***	0.3513	7.04***	-0.0295	-0.648	0.7587
4	-0.0014	-0.597	0.9603	16.467***	0.4396	6.279***	0.1185	1.858*	0.6430
5	-0.0105	-3.387***	0.9403	12.488***	0.5682	6.286***	0.1592	1.933*	0.5370
6	-0.0110	-2.233**	0.9369	7.824***	1.1525	8.017***	0.0832	0.635	0.4268
7	-0.0084	-1.719*	0.9489	7.975***	0.5428	3.8***	-0.0167	-0.128	0.3099
8	-0.0277	-3.417***	0.9316	4.847***	1.6113	6.626***	-0.1719	-0.657	0.3167
9	-0.0155	-1.39	0.7323	2.967***	0.8520	2.717***	-0.1501	-0.581	0.1445
Low ESCORE (0)	-0.0012	-0.509	0.9020	15.379***	0.3953	5.615***	0.4250	6.625***	0.6446
Medium ESCORE (1-5)	0.0000	0.026	0.9719	33.407***	0.4056	11.615***	0.1619	5.086***	0.8797
High ESCORE (6-9)	-0.0119	-2.948***	0.8743	8.945***	1.0601	9.034***	0.0520	0.486	0.4894

Notes: The table reports the estimated coefficients and the associated t-statistics obtained from running the following regression:

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \varepsilon \quad \text{(E3.5)}$$

Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.18. Summary statistics of estimating the augmented Fama-French four-factor model for value-weighted ESCORE portfolios

ESCORE	Intercept		Rm - Rf		SMB		HML		UMD		R^2
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	
0	-0.0010	-0.4	0.8982	15.024***	0.3894	5.364***	0.4098	5.247***	-0.0200	-0.345	0.6448
1	0.0020	1.184	0.8709	21.196***	0.4319	8.655***	0.3131	5.835***	-0.0193	-0.484	0.7797
2	0.0020	1.079	0.9793	22.624***	0.3601	6.851***	0.1141	2.018**	-0.1226	-2.92***	0.7872
3	0.0014	0.807	0.9156	22.235***	0.3108	6.214***	-0.1343	-2.497**	-0.1372	-3.434***	0.7722
4	0.0006	0.234	0.9268	15.973***	0.3872	5.494***	-0.0172	-0.227	-0.1776	-3.156***	0.6600
5	-0.0090	-2.82***	0.9154	12.018***	0.5292	5.721***	0.0579	0.582	-0.1325	-1.794*	0.5444
6	-0.0074	-1.476	0.8769	7.316***	1.0585	7.272***	-0.1603	-1.024	-0.3186	-2.741***	0.4477
7	-0.0085	-1.66*	0.9493	7.824***	0.5434	3.688***	-0.0152	-0.096	0.0020	0.017	0.3099
8	-0.0227	-2.702***	0.8442	4.324***	1.4345	5.603***	-0.4139	-1.453	-0.4084	-2.048**	0.3327
9	-0.0145	-1.271	0.7115	2.825***	0.8179	2.529**	-0.2414	-0.736	-0.1119	-0.455	0.1460
Low ESCORE (0)	-0.0010	-0.4	0.8982	15.024***	0.3894	5.364***	0.4098	5.247***	-0.0200	-0.345	0.6448
Medium ESCORE (1-5)	0.0013	1.119	0.9501	33.414***	0.3715	10.759***	0.0735	1.979**	-0.1156	-4.192***	0.8895
High ESCORE (6-9)	-0.0088	-2.157**	0.8239	8.43***	0.9810	8.265***	-0.1530	-1.199	-0.2683	-2.83***	0.5091

Notes: The table reports the estimated coefficients and the associated t-statistics obtained from running the following regression:

$$BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \beta_4 UMD_j + \varepsilon \quad \text{(E3.6)}$$

Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.19. Stock returns across ESCORE groups – Value-weighted scheme

ESCORE	$BHRR^m$		$BHSAR^m$		$BHMAR^m$		$BHAR1F^m$		$BHAR3F^m$		$BHAR4F^m$	
	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic
0	0.66	1.667*	-0.13	-0.548	0.01	0.024	0.01	0.032	-0.12	-0.509	-0.10	-0.4
1	0.95	2.721***	0.14	0.978	0.29	1.388	0.30	1.448	0.18	1.097	0.20	1.184
2	0.83	2.227**	0.03	0.214	0.17	0.841	0.15	0.722	0.06	0.323	0.20	1.079
3	0.67	1.972**	-0.11	-0.697	0.02	0.088	0.02	0.126	-0.02	-0.09	0.14	0.807
4	0.60	1.521	-0.17	-0.732	-0.06	-0.216	-0.06	-0.246	-0.14	-0.597	0.06	0.234
5	-0.28	-0.628	-0.92	-3.339***	-0.94	-2.799***	-0.95	-2.806***	-1.05	-3.387***	-0.90	-2.82***
6	-0.25	-0.395	-0.84	-1.835*	-0.91	-1.625	-0.94	-1.664*	-1.10	-2.233**	-0.74	-1.476
7	-0.12	-0.198	-0.53	-1.124	-0.77	-1.541	-0.78	-1.538	-0.84	-1.719*	-0.85	-1.66*
8	-1.99	-2.072**	-2.25	-2.803***	-2.58	-2.904***	-2.63	-2.941***	-2.77	-3.417***	-2.27	-2.702***
9	-0.83	-0.699	-0.72	-0.682	-1.37	-1.202	-1.31	-1.148	-1.55	-1.39	-1.45	-1.271
Low (0)	0.66	1.667*	-0.13	-0.548	0.01	0.024	0.01	0.032	-0.12	-0.509	-0.10	-0.4
Medium (1-5)	0.76	2.23**	-0.04	-0.519	0.10	0.633	0.09	0.551	0.00	0.026	0.13	1.119
High (6-9)	-0.38	-0.69	-0.92	-2.553**	-1.04	-2.202**	-1.04	-2.19**	-1.19	-2.948***	-0.88	-2.157**
Low - High	1.05	2.167**	0.79	1.723*	1.05	2.167**	1.05	2.173**	1.06	2.427**	0.78	1.813*

Notes: The table reports the returns on different portfolios formed on the basis of ESCORE. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

3.6.2. Cumulative abnormal returns

The multivariate regressions in the main tests use buy-and-hold returns. The approach replicates more closely the real investment practice where returns are compounded. Nevertheless, this section also employs the cumulative returns as a robustness check. In particular, cumulative returns are calculated as follows:

$$CRR^{a}_{i,t} = \sum_{j=1}^{12} BHRR^{m}_{i,j}\ (j = \text{June year t} \ldots \text{May year t + 1}) \quad \text{(E3.26)}$$

$$CSAR^{a}_{i,t} = \sum_{j=1}^{12} (BHRR^{m}_{i,j} - SDR^{m}_{d,j})\ (i \in d, j = \text{June year t} \ldots \text{May year t + 1}) \quad \text{(E3.27)}$$

$$CMAR^{a}_{i,t} = \sum_{j=1}^{12} (BHRR^{m}_{i,j} - FTSEALLR^{m}_{j})\ (j = \text{June year t} \ldots \text{May year t + 1}) \quad \text{(E3.28)}$$

$$CAR1F^{a}_{i,t} = \sum_{j=1}^{12} \left[BHRR^{m}_{i,j} - E(R1F^{m}_{i,j})\right]\ (j = \text{June year t} \ldots \text{May year t + 1}) \quad \text{(E3.29)}$$

$$CAR3F^{a}_{i,t} = \sum_{j=1}^{12} \left[BHRR^{m}_{i,j} - E(R3F^{m}_{i,j})\right]\ (j = \text{June year t} \ldots \text{May year t + 1}) \quad \text{(E3.30)}$$

$$CAR4F^{a}_{i,t} = \sum_{j=1}^{12} \left[BHRR^{m}_{i,j} - E(R4F^{m}_{i,j})\right]\ (j = \text{June year t} \ldots \text{May year t + 1}) \quad \text{(E3.31)}$$

The cumulative returns as obtained above are used to first of all examine if the individual signals could pick out stocks with low returns. Table T3.20 presents evidence which are qualitatively the same as in the main test.

Table T3.21, T3.22, T3.23, T3.24, T3.25 and T3.26 report the results of estimating Equation (E3.25) using cumulative returns. In the Fama-MacBeth regressions, the coefficient on ESCORE in Specification 1 is –0.0178 (–0.0169, –0.0154, –0.0131 and –0.0142) when $CSAR^{a}$ ($CMAR^{a}$, $CAR1F^{a}$, $CAR3F^{a}$ and $CAR4F^{a}$, respectively) is the dependent variable, all are significant. In general, the main conclusions are qualitatively unchanged.

Table T3.20. Stock returns of the suspicious firms versus the rest of the sample – Cumulative annual returns

	N		Mean returns			
	Rest of sample	Suspicious	Rest of sample	Suspicious	Suspicious - Rest of	t-statistic
Panel A: ESEO						
CRR[a]	9,408	2,512	0.0918	-0.0710	-0.1628	-13.076***
CSAR[a]	9,408	2,512	0.0245	-0.0947	-0.1193	-10.374***
CMAR[a]	9,408	2,512	0.0166	-0.1235	-0.1401	-11.823***
CAR1F[a]	9,408	2,512	0.0226	-0.1169	-0.1394	-11.822***
CAR3F[a]	9,408	2,512	0.0077	-0.1156	-0.1233	-10.738***
CAR4F[a]	9,408	2,512	0.0092	-0.1081	-0.1173	-10.319***
Panel B: EDDEBT						
CRR[a]	7,402	4,518	0.0775	0.0246	-0.0529	-5.58***
CSAR[a]	7,402	4,518	0.0188	-0.0323	-0.0511	-5.829***
CMAR[a]	7,402	4,518	0.0022	-0.0377	-0.0399	-4.383***
CAR1F[a]	7,402	4,518	0.0075	-0.0302	-0.0376	-4.166***
CAR3F[a]	7,402	4,518	-0.0045	-0.0408	-0.0363	-4.201***
CAR4F[a]	7,402	4,518	-0.0018	-0.0380	-0.0362	-4.233***
Panel C: EMA						
CRR[a]	11,326	594	0.0668	-0.1211	-0.1879	-7.836***
CSAR[a]	11,326	594	0.0062	-0.1312	-0.1374	-6.065***
CMAR[a]	11,326	594	-0.0067	-0.1312	-0.1244	-5.41***
CAR1F[a]	11,326	594	-0.0003	-0.1299	-0.1296	-5.648***
CAR3F[a]	11,326	594	-0.0119	-0.1399	-0.1280	-5.775***
CAR4F[a]	11,326	594	-0.0093	-0.1340	-0.1247	-5.69***
Panel D: EOV						
CRR[a]	9,344	2,576	0.0621	0.0406	-0.0216	-1.941*
CSAR[a]	9,344	2,576	0.0049	-0.0206	-0.0255	-2.483**
CMAR[a]	9,344	2,576	-0.0082	-0.0303	-0.0221	-2.077**
CAR1F[a]	9,344	2,576	-0.0026	-0.0220	-0.0194	-1.835*
CAR3F[a]	9,344	2,576	-0.0164	-0.0251	-0.0087	-0.852
CAR4F[a]	9,344	2,576	-0.0141	-0.0209	-0.0069	-0.681
Panel E: EROA						
CRR[a]	11,510	410	0.0558	0.1059	0.0501	1.998**
CSAR[a]	11,510	410	-0.0015	0.0258	0.0274	1.18
CMAR[a]	11,510	410	-0.0141	0.0199	0.0340	1.413
CAR1F[a]	11,510	410	-0.0077	0.0185	0.0262	1.098
CAR3F[a]	11,510	410	-0.0187	-0.0057	0.0130	0.566
CAR4F[a]	11,510	410	-0.0157	-0.0104	0.0053	0.231
Panel F: EDROA						
CRR[a]	11,329	591	0.0544	0.1161	0.0617	3.467***
CSAR[a]	11,329	591	-0.0028	0.0414	0.0442	2.773***
CMAR[a]	11,329	591	-0.0158	0.0416	0.0574	3.424***
CAR1F[a]	11,329	591	-0.0100	0.0548	0.0648	3.944***
CAR3F[a]	11,329	591	-0.0211	0.0349	0.0560	3.604***
CAR4F[a]	11,329	591	-0.0182	0.0359	0.0541	3.54***
Panel G: EDIV						
CRR[a]	11,261	659	0.0536	0.1234	0.0698	3.813***
CSAR[a]	11,261	659	-0.0036	0.0507	0.0543	3.183***
CMAR[a]	11,261	659	-0.0162	0.0428	0.0590	3.315***
CAR1F[a]	11,261	659	-0.0099	0.0457	0.0556	3.129***
CAR3F[a]	11,261	659	-0.0208	0.0251	0.0459	2.677***
CAR4F[a]	11,261	659	-0.0177	0.0209	0.0386	2.26**
Panel H: EDISTRESS						
CRR[a]	10,045	1,875	0.0690	-0.0042	-0.0732	-4.908***
CSAR[a]	10,045	1,875	0.0106	-0.0605	-0.0711	-5.166***
CMAR[a]	10,045	1,875	-0.0012	-0.0758	-0.0745	-5.172***
CAR1F[a]	10,045	1,875	0.0053	-0.0715	-0.0767	-5.379***
CAR3F[a]	10,045	1,875	-0.0070	-0.0789	-0.0719	-5.196***
CAR4F[a]	10,045	1,875	-0.0045	-0.0749	-0.0704	-5.148***
Panel I: EDEBT						
CRR[a]	9,016	2,904	0.0614	0.0455	-0.0159	-1.493
CSAR[a]	9,016	2,904	-0.0007	-0.0003	0.0004	0.038
CMAR[a]	9,016	2,904	-0.0094	-0.0241	-0.0147	-1.436
CAR1F[a]	9,016	2,904	-0.0032	-0.0179	-0.0147	-1.446
CAR3F[a]	9,016	2,904	-0.0162	-0.0248	-0.0086	-0.883
CAR4F[a]	9,016	2,904	-0.0139	-0.0206	-0.0067	-0.688

Table T3.20 (continued)

	N		Mean returns			
	Rest of sample	Suspicious	Rest of sample	Suspicious	Suspicious - Rest of	t-statistic
Panel J: ESIZE						
CRR[a]	9,342	2,578	0.0631	0.0372	-0.0259	-2.134**
CSAR[a]	9,342	2,578	0.0019	-0.0096	-0.0115	-1.017
CMAR[a]	9,342	2,578	-0.0072	-0.0338	-0.0266	-2.267**
CAR1F[a]	9,342	2,578	-0.0022	-0.0236	-0.0214	-1.831*
CAR3F[a]	9,342	2,578	-0.0148	-0.0310	-0.0162	-1.431
CAR4F[a]	9,342	2,578	-0.0106	-0.0333	-0.0227	-2.028**
Panel K: ECYCLE						
CRR[a]	11,594	326	0.0601	-0.0358	-0.0959	-2.916***
CSAR[a]	11,594	326	0.0016	-0.0789	-0.0805	-2.583**
CMAR[a]	11,594	326	-0.0106	-0.0960	-0.0854	-2.7***
CAR1F[a]	11,594	326	-0.0044	-0.0927	-0.0883	-2.783***
CAR3F[a]	11,594	326	-0.0159	-0.1026	-0.0866	-2.815***
CAR4F[a]	11,594	326	-0.0134	-0.0900	-0.0765	-2.581**
Panel L: EAUDIT						
CRR[a]	6,612	5,308	0.0828	0.0259	-0.0569	-6.132***
CSAR[a]	6,612	5,308	0.0073	-0.0104	-0.0177	-2.055**
CMAR[a]	6,612	5,308	0.0074	-0.0384	-0.0458	-5.138***
CAR1F[a]	6,612	5,308	0.0113	-0.0294	-0.0407	-4.598***
CAR3F[a]	6,612	5,308	-0.0037	-0.0365	-0.0327	-3.84***
CAR4F[a]	6,612	5,308	-0.0003	-0.0345	-0.0343	-4.06***
Panel M: EBLOAT						
CRR[a]	9,346	2,574	0.0596	0.0498	-0.0099	-0.887
CSAR[a]	9,346	2,574	0.0012	-0.0069	-0.0081	-0.788
CMAR[a]	9,346	2,574	-0.0105	-0.0219	-0.0114	-1.043
CAR1F[a]	9,346	2,574	-0.0042	-0.0161	-0.0119	-1.098
CAR3F[a]	9,346	2,574	-0.0166	-0.0245	-0.0079	-0.76
CAR4F[a]	9,346	2,574	-0.0138	-0.0218	-0.0080	-0.796
Panel N: ECAP						
CRR[a]	9,349	2,571	0.0690	0.0155	-0.0535	-4.452***
CSAR[a]	9,349	2,571	0.0095	-0.0373	-0.0467	-4.192***
CMAR[a]	9,349	2,571	-0.0013	-0.0552	-0.0539	-4.649***
CAR1F[a]	9,349	2,571	0.0040	-0.0460	-0.0500	-4.359***
CAR3F[a]	9,349	2,571	-0.0095	-0.0502	-0.0406	-3.681***
CAR4F[a]	9,349	2,571	-0.0065	-0.0485	-0.0420	-3.847***
Panel O: EBT						
CRR[a]	9,358	2,562	0.0794	-0.0227	-0.1022	-8.133***
CSAR[a]	9,358	2,562	0.0186	-0.0706	-0.0892	-7.633***
CMAR[a]	9,358	2,562	0.0091	-0.0936	-0.1027	-8.503***
CAR1F[a]	9,358	2,562	0.0154	-0.0878	-0.1032	-8.61***
CAR3F[a]	9,358	2,562	0.0019	-0.0921	-0.0940	-8.071***
CAR4F[a]	9,358	2,562	0.0043	-0.0879	-0.0921	-7.971***

Notes: The table reports the number of observations and returns of the suspicious firms versus the rest of the sample, together with the t-statistic under the null that the difference is zero. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.21. Cumulative annual raw returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2702	7.972***	0.2638	7.783***	0.1658	5.531***	0.1508	5.044***	0.1548	18.264***
$Ln(MVE_{i,t})$	(-)	-0.0045	-1.709*	-0.0034	-1.282	-0.0002	-0.078	0.0014	0.552		
$MTB_{i,t}$	(-)	-0.0041	-4.15***	-0.0042	-4.303***	-0.0048	-4.904***	-0.0050	-5.134***		
$ROA_{i,t}$	(+)	0.1989	7.151***	0.1627	6.053***	0.2143	7.721***	0.1747	6.503***		
$ESEO_{i,t}$	(-)	-0.0887	-6.949***	-0.0921	-7.221***	-0.1221	-10.412***	-0.1285	-10.995***		
$EDISTRESS_{i,t}$	(-)	0.0227	1.38	0.0300	1.824*	-0.0027	-0.169	0.0035	0.218		
$NOA_{i,t}$	(-)	-0.1436	-6.823***	-0.1502	-7.144***	-0.1220	-5.857***	-0.1277	-6.135***		
$DAC_{i,t}$	(-)	-0.1921	-4.982***			-0.2146	-5.577***			-0.1234	-3.402***
$ESCORE_{i,t}$	(-)	-0.0222	-6.563***	-0.0237	-7.025***					-0.0353	-13.502***
Adjusted R^2 (%)		3.26		3.06		2.91		2.66		1.58	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2285	4.14***	0.2249	4.07***	0.1438	2.15**	0.1295	1.89*	0.1452	4.7***
$Ln(MVE_{i,t})$	(-)	-0.0022	-0.52	-0.0012	-0.27	0.0015	0.29	0.0030	0.58		
$MTB_{i,t}$	(-)	-0.0022	-1.31	-0.0024	-1.41	-0.0027	-1.69	-0.0030	-1.86*		
$ROA_{i,t}$	(+)	0.1692	3.84***	0.1249	3.18***	0.1839	4.4***	0.1371	3.72***		
$ESEO_{i,t}$	(-)	-0.0533	-3.03***	-0.0558	-3.05***	-0.0790	-3.39***	-0.0849	-3.47***		
$EDISTRESS_{i,t}$	(-)	-0.0146	-0.73	-0.0075	-0.4	-0.0349	-1.37	-0.0295	-1.21		
$NOA_{i,t}$	(-)	-0.1373	-7.14***	-0.1458	-7.5***	-0.1199	-5.12***	-0.1268	-5.39***		
$DAC_{i,t}$	(-)	-0.2000	-5.63***			-0.2179	-5.11***			-0.1126	-4.53***
$ESCORE_{i,t}$	(-)	-0.0169	-2.98***	-0.0188	-3.14***					-0.0292	-3.21***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CRR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.22. Cumulative annual size-adjusted returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2657	8.455***	0.2597	8.26***	0.1809	6.51***	0.1668	6.018***	0.0724	9.221***
$Ln(MVE_{i,t})$	(-)	-0.0115	-4.742***	-0.0105	-4.31***	-0.0080	-3.413***	-0.0065	-2.791***		
$MTB_{i,t}$	(-)	-0.0023	-2.564**	-0.0025	-2.723***	-0.0029	-3.221***	-0.0031	-3.456***		
$ROA_{i,t}$	(+)	0.1866	7.234***	0.1519	6.098***	0.1991	7.739***	0.1619	6.499***		
$ESEO_{i,t}$	(-)	-0.0556	-4.698***	-0.0589	-4.977***	-0.0828	-7.613***	-0.0888	-8.194***		
$EDISTRESS_{i,t}$	(-)	-0.0065	-0.424	0.0004	0.029	-0.0271	-1.827*	-0.0213	-1.435		
$NOA_{i,t}$	(-)	-0.1369	-7.018***	-0.1433	-7.348***	-0.1194	-6.186***	-0.1248	-6.467***		
$DAC_{i,t}$	(-)	-0.1837	-5.137***			-0.2019	-5.662***			-0.1020	-3.036***
$ESCORE_{i,t}$	(-)	-0.0180	-5.751***	-0.0195	-6.224***					-0.0265	-10.923***
Adjusted R^2 (%)		2.59		2.38		2.32		2.06		1.05	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2622	5.07***	0.2586	4.81***	0.1736	5.62***	0.1600	5.19***	0.0685	3.35***
$Ln(MVE_{i,t})$	(-)	-0.0111	-2.78**	-0.0101	-2.5**	-0.0073	-2.42**	-0.0058	-1.98*		
$MTB_{i,t}$	(-)	-0.0021	-1.26	-0.0023	-1.36	-0.0026	-1.67	-0.0029	-1.84*		
$ROA_{i,t}$	(+)	0.1706	3.85***	0.1299	3.22***	0.1847	4.41***	0.1415	3.76***		
$ESEO_{i,t}$	(-)	-0.0483	-2.8**	-0.0506	-2.82**	-0.0752	-3.26***	-0.0807	-3.33***		
$EDISTRESS_{i,t}$	(-)	-0.0147	-0.71	-0.0081	-0.41	-0.0360	-1.39	-0.0310	-1.25		
$NOA_{i,t}$	(-)	-0.1383	-6.64***	-0.1458	-6.88***	-0.1199	-4.95***	-0.1260	-5.16***		
$DAC_{i,t}$	(-)	-0.1830	-5.03***			-0.2016	-4.67***			-0.0969	-3.72***
$ESCORE_{i,t}$	(-)	-0.0178	-3.46***	-0.0197	-3.57***					-0.0246	-3.48***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CSAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.23. Cumulative annual market-adjusted returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1373	4.207***	0.1312	4.019***	0.0494	1.71*	0.0351	1.218	0.0744	9.131***
$Ln(MVE_{i,t})$	(-)	-0.0013	-0.499	-0.0002	-0.068	0.0024	0.961	0.0039	1.588		
$MTB_{i,t}$	(-)	-0.0029	-3.016***	-0.0030	-3.17***	-0.0035	-3.675***	-0.0037	-3.903***		
$ROA_{i,t}$	(+)	0.1684	6.287***	0.1335	5.158***	0.1814	6.789***	0.1437	5.558***		
$ESEO_{i,t}$	(-)	-0.0757	-6.163***	-0.0790	-6.434***	-0.1039	-9.205***	-0.1100	-9.778***		
$EDISTRESS_{i,t}$	(-)	0.0078	0.49	0.0147	0.933	-0.0137	-0.886	-0.0078	-0.503		
$NOA_{i,t}$	(-)	-0.1173	-5.791***	-0.1237	-6.111***	-0.0991	-4.946***	-0.1046	-5.221***		
$DAC_{i,t}$	(-)	-0.1852	-4.988***			-0.2041	-5.512***			-0.1199	-3.439***
$ESCORE_{i,t}$	(-)	-0.0187	-5.745***	-0.0201	-6.206***					-0.0317	-12.597***
Adjusted R^2 (%)		2.67		2.46		2.40		2.15		1.39	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1496	2.63**	0.1459	2.58**	0.0648	0.95	0.0506	0.72	0.0662	1.63
$Ln(MVE_{i,t})$	(-)	-0.0022	-0.52	-0.0012	-0.27	0.0015	0.29	0.0030	0.58		
$MTB_{i,t}$	(-)	-0.0022	-1.31	-0.0024	-1.41	-0.0027	-1.69	-0.0030	-1.86*		
$ROA_{i,t}$	(+)	0.1692	3.84***	0.1249	3.18***	0.1839	4.4***	0.1371	3.72***		
$ESEO_{i,t}$	(-)	-0.0533	-3.03***	-0.0558	-3.05***	-0.0790	-3.39***	-0.0849	-3.47***		
$EDISTRESS_{i,t}$	(-)	-0.0146	-0.73	-0.0075	-0.4	-0.0349	-1.37	-0.0295	-1.21		
$NOA_{i,t}$	(-)	-0.1373	-7.14***	-0.1458	-7.5***	-0.1199	-5.12***	-0.1268	-5.39***		
$DAC_{i,t}$	(-)	-0.2000	-5.63***			-0.2179	-5.11***			-0.1126	-4.53***
$ESCORE_{i,t}$	(-)	-0.0169	-2.98***	-0.0188	-3.14***					-0.0292	-3.21***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CMAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.24. Cumulative annual one-factor abnormal returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1614	4.984***	0.1550	4.783***	0.0793	2.77***	0.0644	2.255**	0.0777	9.612***
$Ln(MVE_{i,t})$	(-)	-0.0034	-1.365	-0.0023	-0.91	-0.0001	-0.021	0.0015	0.634		
$MTB_{i,t}$	(-)	-0.0026	-2.733***	-0.0027	-2.897***	-0.0031	-3.353***	-0.0034	-3.592***		
$ROA_{i,t}$	(+)	0.1821	6.854***	0.1453	5.658***	0.1943	7.329***	0.1550	6.039***		
$ESEO_{i,t}$	(-)	-0.0757	-6.206***	-0.0792	-6.493***	-0.1020	-9.105***	-0.1083	-9.704***		
$EDISTRESS_{i,t}$	(-)	0.0037	0.237	0.0111	0.706	-0.0163	-1.064	-0.0101	-0.662		
$NOA_{i,t}$	(-)	-0.1133	-5.636***	-0.1201	-5.975***	-0.0963	-4.844***	-0.1021	-5.133***		
$DAC_{i,t}$	(-)	-0.1954	-5.303***			-0.2131	-5.798***			-0.1197	-3.458***
$ESCORE_{i,t}$	(-)	-0.0175	-5.404***	-0.0190	-5.891***					-0.0307	-12.28***
Adjusted R^2 (%)		2.69		2.47		2.46		2.18		1.33	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1740	3.27***	0.1704	3.17***	0.0971	1.56	0.0827	1.29	0.0696	2*
$Ln(MVE_{i,t})$	(-)	-0.0046	-0.88	-0.0035	-0.67	-0.0013	-0.22	0.0003	0.06		
$MTB_{i,t}$	(-)	-0.0020	-1.1	-0.0022	-1.22	-0.0024	-1.44	-0.0027	-1.64		
$ROA_{i,t}$	(+)	0.1863	4.19***	0.1400	3.68***	0.2003	4.63***	0.1521	4.17***		
$ESEO_{i,t}$	(-)	-0.0524	-3.32***	-0.0551	-3.34***	-0.0759	-3.42***	-0.0821	-3.5***		
$EDISTRESS_{i,t}$	(-)	-0.0178	-0.89	-0.0104	-0.55	-0.0360	-1.43	-0.0304	-1.26		
$NOA_{i,t}$	(-)	-0.1286	-6.43***	-0.1376	-6.85***	-0.1131	-4.97***	-0.1203	-5.27***		
$DAC_{i,t}$	(-)	-0.2097	-5.67***			-0.2258	-5.2***			-0.1100	-4.57***
$ESCORE_{i,t}$	(-)	-0.0154	-2.83**	-0.0174	-3.02***					-0.0276	-3.12***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR1F^{a}_{i,t+1} = \alpha + \beta_1 Log\big(MVE_{i,t}\big) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.25. Cumulative annual three-factor abnormal returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1381	4.422***	0.1320	4.224***	0.0677	2.452**	0.0536	1.947*	0.0553	7.093***
$Ln(MVE_{i,t})$	(-)	-0.0029	-1.192	-0.0018	-0.742	0.0000	0.004	0.0015	0.646		
$MTB_{i,t}$	(-)	-0.0017	-1.826*	-0.0018	-1.989**	-0.0021	-2.375**	-0.0024	-2.611***		
$ROA_{i,t}$	(+)	0.1621	6.325***	0.1270	5.13***	0.1725	6.75***	0.1354	5.473***		
$ESEO_{i,t}$	(-)	-0.0667	-5.671***	-0.0700	-5.955***	-0.0893	-8.265***	-0.0952	-8.85***		
$EDISTRESS_{i,t}$	(-)	-0.0072	-0.477	-0.0002	-0.016	-0.0244	-1.654*	-0.0186	-1.26		
$NOA_{i,t}$	(-)	-0.1219	-6.285***	-0.1283	-6.621***	-0.1073	-5.597***	-0.1127	-5.879***		
$DAC_{i,t}$	(-)	-0.1860	-5.235***			-0.2012	-5.679***			-0.1161	-3.48***
$ESCORE_{i,t}$	(-)	-0.0150	-4.807***	-0.0164	-5.286***					-0.0267	-11.079***
Adjusted R^2 (%)		2.39		2.17		2.21		1.94		1.10	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1485	2.91**	0.1451	2.82**	0.0820	1.29	0.0687	1.06	0.0472	2.14**
$Ln(MVE_{i,t})$	(-)	-0.0046	-0.87	-0.0036	-0.69	-0.0017	-0.28	-0.0002	-0.03		
$MTB_{i,t}$	(-)	-0.0011	-0.85	-0.0013	-1.01	-0.0015	-1.28	-0.0017	-1.56		
$ROA_{i,t}$	(+)	0.1631	3.96***	0.1202	3.34***	0.1758	4.37***	0.1310	3.76***		
$ESEO_{i,t}$	(-)	-0.0483	-3.27***	-0.0509	-3.35***	-0.0682	-3.27***	-0.0739	-3.39***		
$EDISTRESS_{i,t}$	(-)	-0.0225	-1.35	-0.0159	-1.02	-0.0384	-1.76*	-0.0335	-1.61		
$NOA_{i,t}$	(-)	-0.1223	-7.17***	-0.1304	-7.55***	-0.1088	-5.22***	-0.1154	-5.52***		
$DAC_{i,t}$	(-)	-0.1923	-5.84***			-0.2078	-5.37***			-0.1043	-4.83***
$ESCORE_{i,t}$	(-)	-0.0131	-2.58**	-0.0150	-2.76**					-0.0235	-2.66**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR3F^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.26. Cumulative annual four-factor abnormal returns regressed on DAC, ESCORE and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1214	3.928***	0.1150	3.718***	0.0474	1.735*	0.0326	1.197	0.0581	7.536***
$Ln(MVE_{i,t})$	(-)	-0.0009	-0.36	0.0003	0.12	0.0022	0.939	0.0037	1.624		
$MTB_{i,t}$	(-)	-0.0011	-1.263	-0.0013	-1.435	-0.0016	-1.842*	-0.0019	-2.092**		
$ROA_{i,t}$	(+)	0.1461	5.762***	0.1093	4.461***	0.1571	6.21***	0.1181	4.824***		
$ESEO_{i,t}$	(-)	-0.0612	-5.258***	-0.0647	-5.558***	-0.0849	-7.944***	-0.0912	-8.561***		
$EDISTRESS_{i,t}$	(-)	-0.0106	-0.706	-0.0032	-0.217	-0.0286	-1.961**	-0.0225	-1.543		
$NOA_{i,t}$	(-)	-0.1275	-6.648***	-0.1343	-7.002***	-0.1122	-5.915***	-0.1179	-6.214***		
$DAC_{i,t}$	(-)	-0.1952	-5.552***			-0.2111	-6.022***			-0.1331	-4.034***
$ESCORE_{i,t}$	(-)	-0.0157	-5.106***	-0.0173	-5.613***					-0.0266	-11.191***
Adjusted R^2 (%)		2.36		2.11		2.15		1.85		1.15	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1335	2.87**	0.1305	2.79**	0.0618	1.06	0.0483	0.81	0.0499	2.4**
$Ln(MVE_{i,t})$	(-)	-0.0027	-0.55	-0.0017	-0.35	0.0005	0.09	0.0020	0.37		
$MTB_{i,t}$	(-)	-0.0007	-0.57	-0.0009	-0.72	-0.0011	-0.96	-0.0014	-1.21		
$ROA_{i,t}$	(+)	0.1531	3.87***	0.1060	3.11***	0.1666	4.3***	0.1173	3.57***		
$ESEO_{i,t}$	(-)	-0.0453	-3.08***	-0.0482	-3.2***	-0.0668	-3.15***	-0.0730	-3.28***		
$EDISTRESS_{i,t}$	(-)	-0.0246	-1.81*	-0.0178	-1.4	-0.0418	-2.24**	-0.0368	-2.09*		
$NOA_{i,t}$	(-)	-0.1282	-7.8***	-0.1371	-8.26***	-0.1136	-5.53***	-0.1210	-5.86***		
$DAC_{i,t}$	(-)	-0.2076	-6.17***			-0.2246	-5.56***			-0.1254	-5.95***
$ESCORE_{i,t}$	(-)	-0.0142	-2.78**	-0.0161	-2.94***					-0.0235	-2.69**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR4F^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE is dropped, in Specification 4 DAC and ESCORE are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

3.6.3. Different versions of ESCORE

This section tests if the more practice-oriented versions of ESCORE as specified in Chapter 2, namely ESCORE_FIXED and ESCORE_9 (see Section 2.6.3), could yield abnormal returns. The rationale of this sub-test is twofold. On the one hand, the test provides assurance that the main conclusions of the chapter are not sensitive to the way ESCORE is constructed. On the other hand, ESCORE_FIXED and ESCORE_9 are deliberately designed to be easily calculated in practice. Hence, the results in this section would be helpful for investors who are interested in using the ESCORE model in real-life stock trading. The section employs both the equally-weighted and value-weighted schemes in portfolio formation as well as both the buy-and-hold and cumulative returns in this robustness test. The results are reported in Table T3.27 to Table T3.54. In general, the conclusions from the main section remain qualitatively unchanged.

Table T3.27. Stock returns across ESCORE_FIXED groups – Equally-weighted scheme

ESCORE_FIXED	$BHRR^m$		$BHSAR^m$		$BHMAR^m$		$BHAR1F^m$		$BHAR3F^m$		$BHAR4F^m$	
	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic
0	1.10	3.128***	0.44	3.713***	0.44	1.846*	0.47	2.001**	0.34	2.279**	0.31	2.013**
1	0.94	2.843***	0.33	3.96***	0.28	1.289	0.33	1.518	0.18	1.762*	0.21	1.994**
2	0.74	2.339**	0.17	2.553**	0.08	0.355	0.15	0.689	0.03	0.215	0.03	0.269
3	0.61	1.819*	0.08	1.089	-0.05	-0.21	0.01	0.044	-0.12	-0.894	-0.07	-0.496
4	0.22	0.576	-0.26	-2.505**	-0.44	-1.628	-0.40	-1.491	-0.53	-3.086***	-0.50	-2.807***
5	-0.02	-0.056	-0.46	-2.861***	-0.68	-2.245**	-0.64	-2.109**	-0.76	-3.233***	-0.68	-2.803***
6	-0.39	-0.845	-0.73	-2.928***	-1.04	-2.812***	-1.01	-2.72***	-1.16	-3.771***	-1.09	-3.425***
7	-0.40	-0.685	-0.78	-1.89*	-1.00	-2.046**	-1.02	-2.08**	-1.16	-2.662***	-1.09	-2.423**
8	0.15	0.196	-0.10	-0.151	-0.32	-0.447	-0.31	-0.427	-0.56	-0.822	-0.48	-0.675
9	-2.75	-2.572**	-2.56	-2.73***	-3.03	-3.072***	-3.03	-3.062***	-3.22	-3.275***	-3.17	-3.078***
Low (0)	1.10	3.128***	0.44	3.713***	0.44	1.846*	0.47	2.001**	0.34	2.279**	0.31	2.013**
Medium (1-5)	0.57	1.73*	0.03	1.618	-0.09	-0.404	-0.03	-0.155	-0.16	-1.467	-0.13	-1.135
High (6-9)	-0.38	-0.877	-0.74	-3.432***	-1.04	-3.084***	-1.03	-3.024***	-1.15	-4.225***	-1.08	-3.846***
Low - High	1.48	5.283***	1.18	4.532***	1.48	5.283***	1.50	5.368***	1.49	5.386***	1.39	5.067***

Notes: The table reports the returns on different portfolios formed on the basis of ESCORE_FIXED. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.28. Stock returns across ESCORE_FIXED groups – Value-weighted scheme

ESCORE_FIXED	BHRR^m		BHSAR^m		BHMAR^m		BHAR1F^m		BHAR3F^m		BHAR4F^m	
	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic
0	0.70	1.697*	-0.09	-0.35	0.04	0.148	0.06	0.18	-0.10	-0.367	-0.04	-0.151
1	0.94	2.621***	0.14	0.93	0.28	1.36	0.28	1.344	0.16	0.958	0.25	1.447
2	0.88	2.553**	0.08	0.607	0.23	1.234	0.22	1.21	0.15	0.926	0.27	1.579
3	0.66	1.819*	-0.13	-0.808	0.00	0.01	-0.01	-0.042	-0.08	-0.451	0.08	0.436
4	0.54	1.323	-0.23	-1.119	-0.12	-0.488	-0.15	-0.617	-0.21	-0.981	-0.14	-0.605
5	0.16	0.305	-0.59	-1.755*	-0.50	-1.28	-0.56	-1.425	-0.63	-1.723*	-0.39	-1.054
6	-0.59	-0.968	-1.02	-2.317**	-1.24	-2.374**	-1.26	-2.386**	-1.44	-3.063***	-1.15	-2.394**
7	-0.23	-0.346	-0.74	-1.552	-0.83	-1.447	-0.86	-1.497	-1.11	-2.184**	-0.95	-1.802*
8	0.92	0.871	0.52	0.557	0.45	0.454	0.42	0.427	0.12	0.128	0.49	0.49
9	-3.11	-2.971***	-2.89	-3.114***	-3.39	-3.453***	-3.39	-3.438***	-3.61	-3.709***	-3.53	-3.466***
Low (0)	0.70	1.697*	-0.09	-0.35	0.04	0.148	0.06	0.18	-0.10	-0.367	-0.04	-0.151
Medium (1-5)	0.76	2.235**	-0.03	-0.472	0.10	0.668	0.09	0.567	0.01	0.063	0.13	1.134
High (6-9)	-0.50	-0.904	-0.94	-2.645***	-1.16	-2.51**	-1.18	-2.533**	-1.36	-3.483***	-1.07	-2.685***
Low - High	1.20	2.443**	0.84	1.795*	1.20	2.443**	1.23	2.501**	1.26	2.761***	1.03	2.263**

Notes: The table reports the returns on different portfolios formed on the basis of ESCORE_FIXED. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.29. Buy-and-hold annual raw returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.3286	8.81***	0.3236	8.675***	0.2101	6.385***	0.1961	5.979***	0.1729	18.878***
$Ln(MVE_{i,t})$	(-)	-0.0082	-2.836***	-0.0072	-2.503**	-0.0032	-1.157	-0.0017	-0.629		
$MTB_{i,t}$	(-)	-0.0044	-4.042***	-0.0045	-4.167***	-0.0051	-4.776***	-0.0054	-4.973***		
$ROA_{i,t}$	(+)	0.1802	5.887***	0.1474	4.988***	0.2034	6.677***	0.1666	5.651***		
$ESEO_{i,t}$	(-)	-0.0865	-6.138***	-0.0893	-6.342***	-0.1251	-9.722***	-0.1311	-10.224***		
$EDISTRESS_{i,t}$	(-)	0.0119	0.658	0.0185	1.027	-0.0165	-0.938	-0.0107	-0.61		
$NOA_{i,t}$	(-)	-0.1358	-5.876***	-0.1418	-6.147***	-0.1112	-4.865***	-0.1165	-5.102***		
$DAC_{i,t}$	(-)	-0.1722	-4.067***			-0.1996	-4.727***			-0.1051	-2.644***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0251	-6.705***	-0.0265	-7.126***					-0.0375	-13.251***
Adjusted R^2 (%)		2.81		2.67		2.44		2.26		1.49	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2719	4.69***	0.2694	4.55***	0.1947	2.44**	0.1810	2.21**	0.1571	4.29***
$Ln(MVE_{i,t})$	(-)	-0.0058	-1.1	-0.0049	-0.92	-0.0021	-0.33	-0.0007	-0.11		
$MTB_{i,t}$	(-)	-0.0026	-1.4	-0.0028	-1.46	-0.0030	-1.69	-0.0032	-1.8*		
$ROA_{i,t}$	(+)	0.1659	3.68***	0.1255	3.19***	0.1806	4.26***	0.1383	3.81***		
$ESEO_{i,t}$	(-)	-0.0618	-3.57***	-0.0634	-3.44***	-0.0831	-3.67***	-0.0884	-3.65***		
$EDISTRESS_{i,t}$	(-)	-0.0307	-1.4	-0.0233	-1.07	-0.0484	-1.71	-0.0428	-1.54		
$NOA_{i,t}$	(-)	-0.1241	-4.43***	-0.1312	-4.62***	-0.1107	-3.55***	-0.1162	-3.71***		
$DAC_{i,t}$	(-)	-0.1832	-3.55***			-0.2013	-3.47***			-0.0860	-2.14**
$ESCORE\_FIXED_{i,t}$	(-)	-0.0137	-2.16**	-0.0159	-2.4**					-0.0278	-2.83**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHRR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.30. Buy-and-hold annual size-adjusted returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2751	7.961***	0.2700	7.812***	0.2044	6.713***	0.1911	6.295***	0.0787	9.278***
$Ln(MVE_{i,t})$	(-)	-0.0128	-4.776***	-0.0118	-4.418***	-0.0098	-3.796***	-0.0084	-3.266***		
$MTB_{i,t}$	(-)	-0.0025	-2.513**	-0.0027	-2.65***	-0.0030	-2.989***	-0.0032	-3.191***		
$ROA_{i,t}$	(+)	0.1810	6.382***	0.1478	5.398***	0.1948	6.91***	0.1597	5.853***		
$ESEO_{i,t}$	(-)	-0.0600	-4.602***	-0.0629	-4.822***	-0.0831	-6.977***	-0.0888	-7.482***		
$EDISTRESS_{i,t}$	(-)	-0.0255	-1.524	-0.0188	-1.129	-0.0424	-2.606***	-0.0369	-2.271**		
$NOA_{i,t}$	(-)	-0.1207	-5.639***	-0.1268	-5.932***	-0.1060	-5.014***	-0.1112	-5.258***		
$DAC_{i,t}$	(-)	-0.1741	-4.438***			-0.1905	-4.874***			-0.0809	-2.197**
$ESCORE\_FIXED_{i,t}$	(-)	-0.0149	-4.315***	-0.0164	-4.762***					-0.0259	-9.875***
Adjusted R^2 (%)		2.14		1.98		1.99		1.80		0.84	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2864	4.7***	0.2839	4.48***	0.2069	5.81***	0.1938	5.24***	0.0748	3.2***
$Ln(MVE_{i,t})$	(-)	-0.0134	-3.12***	-0.0126	-2.87**	-0.0097	-3.14***	-0.0084	-2.69**		
$MTB_{i,t}$	(-)	-0.0024	-1.37	-0.0026	-1.42	-0.0028	-1.69	-0.0031	-1.8*		
$ROA_{i,t}$	(+)	0.1683	3.67***	0.1316	3.22***	0.1824	4.26***	0.1436	3.84***		
$ESEO_{i,t}$	(-)	-0.0565	-3.24***	-0.0579	-3.12***	-0.0788	-3.45***	-0.0838	-3.43***		
$EDISTRESS_{i,t}$	(-)	-0.0308	-1.36	-0.0239	-1.07	-0.0493	-1.72	-0.0442	-1.57		
$NOA_{i,t}$	(-)	-0.1248	-4.17***	-0.1309	-4.34***	-0.1106	-3.4***	-0.1153	-3.54***		
$DAC_{i,t}$	(-)	-0.1655	-3.14***			-0.1846	-3.15***			-0.0696	-1.76*
$ESCORE\_FIXED_{i,t}$	(-)	-0.0146	-2.47**	-0.0166	-2.69**					-0.0229	-3.01***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHSAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.31. Buy-and-hold annual market-adjusted returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1695	4.736***	0.1645	4.597***	0.0875	2.774***	0.0742	2.362**	0.0815	9.291***
$Ln(MVE_{i,t})$	(-)	-0.0040	-1.461	-0.0031	-1.114	-0.0006	-0.231	0.0008	0.296		
$MTB_{i,t}$	(-)	-0.0032	-3.062***	-0.0033	-3.191***	-0.0037	-3.595***	-0.0039	-3.79***		
$ROA_{i,t}$	(+)	0.1537	5.235***	0.1213	4.279***	0.1698	5.814***	0.1349	4.774***		
$ESEO_{i,t}$	(-)	-0.0800	-5.918***	-0.0827	-6.126***	-0.1067	-8.65***	-0.1123	-9.142***		
$EDISTRESS_{i,t}$	(-)	-0.0082	-0.474	-0.0017	-0.097	-0.0278	-1.651*	-0.0224	-1.329		
$NOA_{i,t}$	(-)	-0.1040	-4.694***	-0.1100	-4.97***	-0.0870	-3.973***	-0.0921	-4.208***		
$DAC_{i,t}$	(-)	-0.1702	-4.189***			-0.1891	-4.673***			-0.1003	-2.635***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0173	-4.835***	-0.0188	-5.261***					-0.0315	-11.599***
Adjusted R^2 (%)		2.19		2.04		1.99		1.81		1.16	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1879	3.46***	0.1853	3.34***	0.1107	1.39	0.0970	1.18	0.0731	1.77*
$Ln(MVE_{i,t})$	(-)	-0.0058	-1.1	-0.0049	-0.92	-0.0021	-0.33	-0.0007	-0.11		
$MTB_{i,t}$	(-)	-0.0026	-1.4	-0.0028	-1.46	-0.0030	-1.69	-0.0032	-1.8*		
$ROA_{i,t}$	(+)	0.1659	3.68***	0.1255	3.19***	0.1806	4.26***	0.1383	3.81***		
$ESEO_{i,t}$	(-)	-0.0618	-3.57***	-0.0634	-3.44***	-0.0831	-3.67***	-0.0884	-3.65***		
$EDISTRESS_{i,t}$	(-)	-0.0307	-1.4	-0.0233	-1.07	-0.0484	-1.71	-0.0428	-1.54		
$NOA_{i,t}$	(-)	-0.1241	-4.43***	-0.1312	-4.62***	-0.1107	-3.55***	-0.1162	-3.71***		
$DAC_{i,t}$	(-)	-0.1832	-3.55***			-0.2013	-3.47***			-0.0860	-2.14**
$ESCORE\_FIXED_{i,t}$	(-)	-0.0137	-2.16**	-0.0159	-2.4**					-0.0278	-2.83**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHMAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.32. Buy-and-hold annual one-factor abnormal returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1972	5.55***	0.1919	5.399***	0.1230	3.929***	0.1090	3.493***	0.0840	9.64***
$Ln(MVE_{i,t})$	(-)	-0.0067	-2.423**	-0.0056	-2.051**	-0.0036	-1.34	-0.0021	-0.785		
$MTB_{i,t}$	(-)	-0.0028	-2.747***	-0.0030	-2.886***	-0.0033	-3.233***	-0.0035	-3.439***		
$ROA_{i,t}$	(+)	0.1696	5.816***	0.1348	4.787***	0.1841	6.351***	0.1473	5.249***		
$ESEO_{i,t}$	(-)	-0.0803	-5.983***	-0.0833	-6.208***	-0.1045	-8.531***	-0.1104	-9.051***		
$EDISTRESS_{i,t}$	(-)	-0.0137	-0.793	-0.0066	-0.388	-0.0314	-1.877*	-0.0256	-1.533		
$NOA_{i,t}$	(-)	-0.0995	-4.519***	-0.1059	-4.817***	-0.0841	-3.866***	-0.0895	-4.115***		
$DAC_{i,t}$	(-)	-0.1827	-4.528***			-0.1998	-4.972***			-0.1004	-2.655***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0157	-4.405***	-0.0172	-4.861***					-0.0302	-11.189***
Adjusted R^2 (%)		2.22		2.05		2.06		1.86		1.08	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2149	3.83***	0.2124	3.68***	0.1487	2.01*	0.1347	1.77*	0.0744	2.13**
$Ln(MVE_{i,t})$	(-)	-0.0086	-1.41	-0.0077	-1.25	-0.0054	-0.8	-0.0040	-0.57		
$MTB_{i,t}$	(-)	-0.0023	-1.24	-0.0025	-1.32	-0.0026	-1.51	-0.0029	-1.65		
$ROA_{i,t}$	(+)	0.1851	4.03***	0.1422	3.75***	0.1985	4.43***	0.1544	4.25***		
$ESEO_{i,t}$	(-)	-0.0615	-3.72***	-0.0634	-3.55***	-0.0798	-3.56***	-0.0854	-3.55***		
$EDISTRESS_{i,t}$	(-)	-0.0354	-1.65	-0.0277	-1.32	-0.0501	-1.81*	-0.0444	-1.63		
$NOA_{i,t}$	(-)	-0.1147	-4.26***	-0.1223	-4.49***	-0.1035	-3.52***	-0.1094	-3.71***		
$DAC_{i,t}$	(-)	-0.1955	-3.62***			-0.2110	-3.53***			-0.0846	-2.2**
$ESCORE\_FIXED_{i,t}$	(-)	-0.0116	-1.96*	-0.0139	-2.23**					-0.0255	-2.68**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR1F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.33. Buy-and-hold annual three-factor abnormal returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1683	4.892***	0.1632	4.742***	0.1165	3.844***	0.1034	3.421***	0.0567	6.723***
Ln($MVE_{i,t}$)	(-)	-0.0063	-2.352**	-0.0053	-1.982**	-0.0041	-1.591	-0.0027	-1.055		
$MTB_{i,t}$	(-)	-0.0017	-1.67*	-0.0018	-1.808*	-0.0020	-2.019**	-0.0022	-2.22**		
$ROA_{i,t}$	(+)	0.1551	5.494***	0.1217	4.464***	0.1653	5.89***	0.1307	4.813***		
$ESEO_{i,t}$	(-)	-0.0728	-5.604***	-0.0757	-5.827***	-0.0897	-7.568***	-0.0953	-8.069***		
$EDISTRESS_{i,t}$	(-)	-0.0287	-1.723*	-0.0220	-1.323	-0.0411	-2.537**	-0.0357	-2.206**		
$NOA_{i,t}$	(-)	-0.1067	-5.008***	-0.1129	-5.303***	-0.0960	-4.559***	-0.1010	-4.801***		
$DAC_{i,t}$	(-)	-0.1755	-4.492***			-0.1875	-4.819***			-0.0935	-2.554**
$ESCORE\_FIXED_{i,t}$	(-)	-0.0110	-3.178***	-0.0124	-3.626***					-0.0246	-9.419***
Adjusted R^2 (%)		1.88		1.72		1.80		1.61		0.78	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1903	3.27***	0.1877	3.16***	0.1401	1.85*	0.1275	1.64	0.0484	1.87*
Ln($MVE_{i,t}$)	(-)	-0.0089	-1.51	-0.0081	-1.36	-0.0064	-0.94	-0.0051	-0.74		
$MTB_{i,t}$	(-)	-0.0012	-0.94	-0.0014	-1.05	-0.0015	-1.21	-0.0017	-1.39		
$ROA_{i,t}$	(+)	0.1602	3.69***	0.1214	3.34***	0.1708	4.02***	0.1311	3.73***		
$ESEO_{i,t}$	(-)	-0.0582	-3.6***	-0.0599	-3.47***	-0.0710	-3.26***	-0.0761	-3.26***		
$EDISTRESS_{i,t}$	(-)	-0.0434	-2.62**	-0.0364	-2.28**	-0.0543	-2.37**	-0.0493	-2.2**		
$NOA_{i,t}$	(-)	-0.1094	-4.23***	-0.1159	-4.41***	-0.1014	-3.57***	-0.1064	-3.75***		
$DAC_{i,t}$	(-)	-0.1760	-3.34***			-0.1890	-3.29***			-0.0759	-2.07*
$ESCORE\_FIXED_{i,t}$	(-)	-0.0083	-1.36	-0.0103	-1.61					-0.0203	-2.05*

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR3F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t}\_FIXED + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.34. Buy-and-hold annual four-factor abnormal returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1490	4.367***	0.1435	4.205***	0.0932	3.1***	0.0791	2.639***	0.0590	7.059***
$Ln(MVE_{i,t})$	(-)	-0.0039	-1.466	-0.0028	-1.063	-0.0015	-0.602	0.0000	-0.016		
$MTB_{i,t}$	(-)	-0.0013	-1.31	-0.0014	-1.46	-0.0017	-1.687*	-0.0019	-1.904*		
$ROA_{i,t}$	(+)	0.1377	4.918***	0.1018	3.766***	0.1486	5.341***	0.1115	4.141***		
$ESEO_{i,t}$	(-)	-0.0699	-5.43***	-0.0730	-5.67***	-0.0882	-7.5***	-0.0941	-8.038***		
$EDISTRESS_{i,t}$	(-)	-0.0331	-2.001**	-0.0259	-1.57	-0.0464	-2.89***	-0.0406	-2.531**		
$NOA_{i,t}$	(-)	-0.1159	-5.484***	-0.1225	-5.803***	-0.1043	-4.997***	-0.1097	-5.257***		
$DAC_{i,t}$	(-)	-0.1882	-4.858***			-0.2011	-5.213***			-0.1146	-3.158***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0118	-3.454***	-0.0134	-3.937***					-0.0250	-9.674***
Adjusted R^2 (%)		1.89		1.69		1.79		1.56		0.85	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1703	3.12***	0.1679	3.03***	0.1143	1.64	0.1012	1.42	0.0505	2.02*
$Ln(MVE_{i,t})$	(-)	-0.0065	-1.21	-0.0056	-1.05	-0.0038	-0.6	-0.0024	-0.37		
$MTB_{i,t}$	(-)	-0.0010	-0.72	-0.0011	-0.82	-0.0012	-0.96	-0.0015	-1.13		
$ROA_{i,t}$	(+)	0.1522	4.09***	0.1076	3.39***	0.1635	4.48***	0.1178	3.87***		
$ESEO_{i,t}$	(-)	-0.0578	-3.36***	-0.0601	-3.3***	-0.0724	-3.13***	-0.0781	-3.17***		
$EDISTRESS_{i,t}$	(-)	-0.0467	-3.62***	-0.0395	-3.2***	-0.0590	-3.11***	-0.0538	-2.93***		
$NOA_{i,t}$	(-)	-0.1176	-4.72***	-0.1250	-4.89***	-0.1085	-3.98***	-0.1144	-4.15***		
$DAC_{i,t}$	(-)	-0.1974	-4.02***			-0.2119	-3.83***			-0.1022	-2.81**
$ESCORE\_FIXED_{i,t}$	(-)	-0.0095	-1.55	-0.0115	-1.78*					-0.0208	-2.13**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR4F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.35. Cumulative annual raw returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2840	8.359***	0.2785	8.195***	0.1658	5.531***	0.1508	5.044***	0.1590	19.031***
$Ln(MVE_{i,t})$	(-)	-0.0051	-1.953*	-0.0041	-1.551	-0.0002	-0.078	0.0014	0.552		
$MTB_{i,t}$	(-)	-0.0040	-4.104***	-0.0042	-4.252***	-0.0048	-4.904***	-0.0050	-5.134***		
$ROA_{i,t}$	(+)	0.1912	6.857***	0.1555	5.776***	0.2143	7.721***	0.1747	6.503***		
$ESEO_{i,t}$	(-)	-0.0835	-6.513***	-0.0866	-6.753***	-0.1221	-10.412***	-0.1285	-10.995***		
$EDISTRESS_{i,t}$	(-)	0.0256	1.555	0.0328	1.997**	-0.0027	-0.169	0.0035	0.218		
$NOA_{i,t}$	(-)	-0.1465	-6.961***	-0.1530	-7.281***	-0.1220	-5.857***	-0.1277	-6.135***		
$DAC_{i,t}$	(-)	-0.1873	-4.855***			-0.2146	-5.577***			-0.1254	-3.461***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0250	-7.338***	-0.0266	-7.836***					-0.0371	-14.371***
Adjusted R^2 (%)		3.35		3.16		2.91		2.66		1.78	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2221	4.82***	0.2192	4.75***	0.1438	2.15**	0.1295	1.89*	0.1433	4.77***
$Ln(MVE_{i,t})$	(-)	-0.0022	-0.55	-0.0012	-0.29	0.0015	0.29	0.0030	0.58		
$MTB_{i,t}$	(-)	-0.0023	-1.37	-0.0025	-1.47	-0.0027	-1.69	-0.0030	-1.86*		
$ROA_{i,t}$	(+)	0.1696	3.97***	0.1243	3.25***	0.1839	4.4***	0.1371	3.72***		
$ESEO_{i,t}$	(-)	-0.0564	-2.99***	-0.0586	-3.01***	-0.0790	-3.39***	-0.0849	-3.47***		
$EDISTRESS_{i,t}$	(-)	-0.0170	-0.81	-0.0096	-0.48	-0.0349	-1.37	-0.0295	-1.21		
$NOA_{i,t}$	(-)	-0.1332	-6.49***	-0.1419	-6.86***	-0.1199	-5.12***	-0.1268	-5.39***		
$DAC_{i,t}$	(-)	-0.2018	-5.7***			-0.2179	-5.11***			-0.1122	-4.4***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0144	-2.72**	-0.0166	-3.02***					-0.0276	-3.06***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CRR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.36. Cumulative annual size-adjusted returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2542	8.064***	0.2488	7.889***	0.1809	6.51***	0.1668	6.018***	0.0685	8.844***
$Ln(MVE_{i,t})$	(-)	-0.0111	-4.558***	-0.0101	-4.137***	-0.0080	-3.413***	-0.0065	-2.791***		
$MTB_{i,t}$	(-)	-0.0025	-2.683***	-0.0026	-2.841***	-0.0029	-3.221***	-0.0031	-3.456***		
$ROA_{i,t}$	(+)	0.1847	7.141***	0.1495	5.984***	0.1991	7.739***	0.1619	6.499***		
$ESEO_{i,t}$	(-)	-0.0588	-4.941***	-0.0618	-5.196***	-0.0828	-7.613***	-0.0888	-8.194***		
$EDISTRESS_{i,t}$	(-)	-0.0096	-0.627	-0.0025	-0.163	-0.0271	-1.827*	-0.0213	-1.435		
$NOA_{i,t}$	(-)	-0.1346	-6.892***	-0.1411	-7.232***	-0.1194	-6.186***	-0.1248	-6.467***		
$DAC_{i,t}$	(-)	-0.1850	-5.167***			-0.2019	-5.662***			-0.1024	-3.046***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0155	-4.907***	-0.0171	-5.425***					-0.0253	-10.534***
Adjusted R^2 (%)		2.52		2.30		2.32		2.06		0.98	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2543	4.71***	0.2516	4.52***	0.1736	5.62***	0.1600	5.19***	0.0648	3.09***
$Ln(MVE_{i,t})$	(-)	-0.0110	-2.68**	-0.0100	-2.41**	-0.0073	-2.42**	-0.0058	-1.98*		
$MTB_{i,t}$	(-)	-0.0022	-1.32	-0.0023	-1.42	-0.0026	-1.67	-0.0029	-1.84*		
$ROA_{i,t}$	(+)	0.1709	3.96***	0.1294	3.29***	0.1847	4.41***	0.1415	3.76***		
$ESEO_{i,t}$	(-)	-0.0516	-2.78**	-0.0535	-2.79**	-0.0752	-3.26***	-0.0807	-3.33***		
$EDISTRESS_{i,t}$	(-)	-0.0171	-0.8	-0.0102	-0.5	-0.0360	-1.39	-0.0310	-1.25		
$NOA_{i,t}$	(-)	-0.1340	-6.16***	-0.1417	-6.43***	-0.1199	-4.95***	-0.1260	-5.16***		
$DAC_{i,t}$	(-)	-0.1845	-5.08***			-0.2016	-4.67***			-0.0960	-3.61***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0152	-3.16***	-0.0173	-3.44***					-0.0226	-3.19***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CSAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.37. Cumulative annual market-adjusted returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1321	4.036***	0.1267	3.869***	0.0494	1.71*	0.0351	1.218	0.0725	9.02***
$Ln(MVE_{i,t})$	(-)	-0.0011	-0.435	0.0000	-0.02	0.0024	0.961	0.0039	1.588		
$MTB_{i,t}$	(-)	-0.0029	-3.089***	-0.0031	-3.241***	-0.0035	-3.675***	-0.0037	-3.903***		
$ROA_{i,t}$	(+)	0.1652	6.149***	0.1299	5.009***	0.1814	6.789***	0.1437	5.558***		
$ESEO_{i,t}$	(-)	-0.0769	-6.221***	-0.0799	-6.467***	-0.1039	-9.205***	-0.1100	-9.778***		
$EDISTRESS_{i,t}$	(-)	0.0062	0.388	0.0132	0.838	-0.0137	-0.886	-0.0078	-0.503		
$NOA_{i,t}$	(-)	-0.1163	-5.736***	-0.1228	-6.063***	-0.0991	-4.946***	-0.1046	-5.221***		
$DAC_{i,t}$	(-)	-0.1850	-4.978***			-0.2041	-5.512***			-0.1208	-3.465***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0175	-5.335***	-0.0191	-5.837***					-0.0312	-12.559***
Adjusted R^2 (%)		2.63		2.43		2.40		2.15		1.38	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1431	3.01***	0.1403	2.97***	0.0648	0.95	0.0506	0.72	0.0644	1.62
$Ln(MVE_{i,t})$	(-)	-0.0022	-0.55	-0.0012	-0.29	0.0015	0.29	0.0030	0.58		
$MTB_{i,t}$	(-)	-0.0023	-1.37	-0.0025	-1.47	-0.0027	-1.69	-0.0030	-1.86*		
$ROA_{i,t}$	(+)	0.1696	3.97***	0.1243	3.25***	0.1839	4.4***	0.1371	3.72***		
$ESEO_{i,t}$	(-)	-0.0564	-2.99***	-0.0586	-3.01***	-0.0790	-3.39***	-0.0849	-3.47***		
$EDISTRESS_{i,t}$	(-)	-0.0170	-0.81	-0.0096	-0.48	-0.0349	-1.37	-0.0295	-1.21		
$NOA_{i,t}$	(-)	-0.1332	-6.49***	-0.1419	-6.86***	-0.1199	-5.12***	-0.1268	-5.39***		
$DAC_{i,t}$	(-)	-0.2018	-5.7***			-0.2179	-5.11***			-0.1122	-4.4***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0144	-2.72**	-0.0166	-3.02***					-0.0276	-3.06***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CMAR^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.38. Cumulative annual one-factor abnormal returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1554	4.785***	0.1498	4.607***	0.0793	2.77***	0.0644	2.255**	0.0758	9.494***
$Ln(MVE_{i,t})$	(-)	-0.0032	-1.286	-0.0021	-0.845	-0.0001	-0.021	0.0015	0.634		
$MTB_{i,t}$	(-)	-0.0026	-2.809***	-0.0028	-2.971***	-0.0031	-3.353***	-0.0034	-3.592***		
$ROA_{i,t}$	(+)	0.1794	6.729***	0.1421	5.52***	0.1943	7.329***	0.1550	6.039***		
$ESEO_{i,t}$	(-)	-0.0771	-6.287***	-0.0803	-6.548***	-0.1020	-9.105***	-0.1083	-9.704***		
$EDISTRESS_{i,t}$	(-)	0.0020	0.124	0.0094	0.602	-0.0163	-1.064	-0.0101	-0.662		
$NOA_{i,t}$	(-)	-0.1121	-5.573***	-0.1190	-5.919***	-0.0963	-4.844***	-0.1021	-5.133***		
$DAC_{i,t}$	(-)	-0.1955	-5.299***			-0.2131	-5.798***			-0.1205	-3.482***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0161	-4.947***	-0.0178	-5.478***					-0.0302	-12.22***
Adjusted R^2 (%)		2.66		2.43		2.46		2.18		1.32	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1657	3.76***	0.1628	3.66***	0.0971	1.56	0.0827	1.29	0.0666	1.99*
$Ln(MVE_{i,t})$	(-)	-0.0045	-0.88	-0.0034	-0.68	-0.0013	-0.22	0.0003	0.06		
$MTB_{i,t}$	(-)	-0.0020	-1.16	-0.0022	-1.28	-0.0024	-1.44	-0.0027	-1.64		
$ROA_{i,t}$	(+)	0.1872	4.34***	0.1399	3.8***	0.2003	4.63***	0.1521	4.17***		
$ESEO_{i,t}$	(-)	-0.0560	-3.23***	-0.0584	-3.24***	-0.0759	-3.42***	-0.0821	-3.5***		
$EDISTRESS_{i,t}$	(-)	-0.0206	-0.99	-0.0129	-0.66	-0.0360	-1.43	-0.0304	-1.26		
$NOA_{i,t}$	(-)	-0.1244	-6.02***	-0.1335	-6.43***	-0.1131	-4.97***	-0.1203	-5.27***		
$DAC_{i,t}$	(-)	-0.2120	-5.74***			-0.2258	-5.2***			-0.1097	-4.48***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0125	-2.55**	-0.0148	-2.88**					-0.0257	-2.94***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR1F^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.39. Cumulative annual three-factor abnormal returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1215	3.878***	0.1160	3.7***	0.0677	2.452**	0.0536	1.947*	0.0500	6.496***
$Ln(MVE_{i,t})$	(-)	-0.0022	-0.923	-0.0012	-0.481	0.0000	0.004	0.0015	0.646		
$MTB_{i,t}$	(-)	-0.0018	-1.976**	-0.0019	-2.139**	-0.0021	-2.375**	-0.0024	-2.611***		
$ROA_{i,t}$	(+)	0.1620	6.3***	0.1260	5.074***	0.1725	6.75***	0.1354	5.473***		
$ESEO_{i,t}$	(-)	-0.0717	-6.059***	-0.0748	-6.32***	-0.0893	-8.265***	-0.0952	-8.85***		
$EDISTRESS_{i,t}$	(-)	-0.0115	-0.759	-0.0043	-0.283	-0.0244	-1.654*	-0.0186	-1.26		
$NOA_{i,t}$	(-)	-0.1185	-6.104***	-0.1251	-6.451***	-0.1073	-5.597***	-0.1127	-5.879***		
$DAC_{i,t}$	(-)	-0.1887	-5.305***			-0.2012	-5.679***			-0.1162	-3.483***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0114	-3.625***	-0.0130	-4.151***					-0.0249	-10.463***
Adjusted R^2 (%)		2.31		2.08		2.21		1.94		0.99	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1349	2.94***	0.1319	2.86**	0.0820	1.29	0.0687	1.06	0.0423	1.84*
$Ln(MVE_{i,t})$	(-)	-0.0043	-0.84	-0.0033	-0.65	-0.0017	-0.28	-0.0002	-0.03		
$MTB_{i,t}$	(-)	-0.0012	-0.97	-0.0014	-1.14	-0.0015	-1.28	-0.0017	-1.56		
$ROA_{i,t}$	(+)	0.1653	4.14***	0.1212	3.47***	0.1758	4.37***	0.1310	3.76***		
$ESEO_{i,t}$	(-)	-0.0538	-3.22***	-0.0562	-3.27***	-0.0682	-3.27***	-0.0739	-3.39***		
$EDISTRESS_{i,t}$	(-)	-0.0268	-1.51	-0.0200	-1.19	-0.0384	-1.76*	-0.0335	-1.61		
$NOA_{i,t}$	(-)	-0.1170	-6.35***	-0.1252	-6.7***	-0.1088	-5.22***	-0.1154	-5.52***		
$DAC_{i,t}$	(-)	-0.1963	-6.02***			-0.2078	-5.37***			-0.1041	-4.64***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0091	-1.77*	-0.0112	-2.06*					-0.0208	-2.34**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR3F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t}\_FIXED + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.40. Cumulative annual four-factor abnormal returns regressed on DAC, ESCORE_FIXED and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1035	3.339***	0.0977	3.151***	0.0474	1.735*	0.0326	1.197	0.0523	6.87***
$Ln(MVE_{i,t})$	(-)	-0.0002	-0.069	0.0010	0.402	0.0022	0.939	0.0037	1.624		
$MTB_{i,t}$	(-)	-0.0013	-1.425	-0.0014	-1.598	-0.0016	-1.842*	-0.0019	-2.092**		
$ROA_{i,t}$	(+)	0.1461	5.741***	0.1083	4.407***	0.1571	6.21***	0.1181	4.824***		
$ESEO_{i,t}$	(-)	-0.0666	-5.686***	-0.0698	-5.962***	-0.0849	-7.944***	-0.0912	-8.561***		
$EDISTRESS_{i,t}$	(-)	-0.0152	-1.011	-0.0076	-0.507	-0.0286	-1.961**	-0.0225	-1.543		
$NOA_{i,t}$	(-)	-0.1239	-6.45***	-0.1308	-6.818***	-0.1122	-5.915***	-0.1179	-6.214***		
$DAC_{i,t}$	(-)	-0.1981	-5.629***			-0.2111	-6.022***			-0.1332	-4.034***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0119	-3.821***	-0.0136	-4.379***					-0.0247	-10.489***
Adjusted R^2 (%)		2.27		2.01		2.15		1.85		1.03	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1188	2.73**	0.1161	2.66**	0.0618	1.06	0.0483	0.81	0.0443	2.01*
$Ln(MVE_{i,t})$	(-)	-0.0023	-0.5	-0.0013	-0.28	0.0005	0.09	0.0020	0.37		
$MTB_{i,t}$	(-)	-0.0008	-0.68	-0.0010	-0.85	-0.0011	-0.96	-0.0014	-1.21		
$ROA_{i,t}$	(+)	0.1556	4.09***	0.1072	3.27***	0.1666	4.3***	0.1173	3.57***		
$ESEO_{i,t}$	(-)	-0.0512	-3.02***	-0.0540	-3.11***	-0.0668	-3.15***	-0.0730	-3.28***		
$EDISTRESS_{i,t}$	(-)	-0.0293	-1.89*	-0.0223	-1.53	-0.0418	-2.24**	-0.0368	-2.09*		
$NOA_{i,t}$	(-)	-0.1226	-6.67***	-0.1316	-7.07***	-0.1136	-5.53***	-0.1210	-5.86***		
$DAC_{i,t}$	(-)	-0.2120	-6.28***			-0.2246	-5.56***			-0.1251	-5.64***
$ESCORE\_FIXED_{i,t}$	(-)	-0.0099	-1.88*	-0.0120	-2.15**					-0.0207	-2.33**

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR4F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_FIXED_{i,t} + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_FIXED is dropped, in Specification 4 DAC and ESCORE_FIXED are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.41. Stock returns across ESCORE_9 groups – Equally-weighted scheme

ESCORE_9	BHRR^m		BHSAR^m		BHMAR^m		BHAR1F^m		BHAR3F^m		BHAR4F^m	
	Returns	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**
0	1.04	3.159***	0.42	6.019***	0.38	1.721*	0.43	1.977**	0.30	2.636***	0.31	2.618***
1	0.77	2.454**	0.23	4.33***	0.12	0.534	0.18	0.859	0.06	0.532	0.07	0.597
2	0.23	0.689	-0.26	-4.504***	-0.42	-1.728*	-0.36	-1.504	-0.50	-3.468***	-0.46	-3.107***
3	-0.07	-0.181	-0.52	-4.021***	-0.73	-2.524**	-0.71	-2.452**	-0.86	-4.546***	-0.81	-4.12***
4	-0.54	-1.138	-0.89	-3.466***	-1.19	-3.282***	-1.20	-3.286***	-1.33	-4.387***	-1.17	-3.755***
5	0.15	0.177	-0.21	-0.266	-0.50	-0.614	-0.51	-0.612	-0.50	-0.634	-0.61	-0.752
6	0.73	0.387	1.19	0.696	0.72	0.417	0.80	0.46	0.97	0.563	0.83	0.484
7	0.17	0.066	1.52	0.797	0.78	0.334	0.72	0.291	1.59	0.635	3.89	1.865
Low (0)	1.04	3.159***	0.42	6.019***	0.38	1.721*	0.43	1.977**	0.30	2.636***	0.31	2.618***
Medium (1-2)	0.55	1.698*	0.02	0.755	-0.11	-0.497	-0.05	-0.217	-0.18	-1.523	-0.16	-1.295
High (3-7)	-0.15	-0.383	-0.58	-4.862***	-0.81	-2.855***	-0.80	-2.792***	-0.94	-5.059***	-0.86	-4.521***
Low - High	1.19	6.707***	1.00	6.105***	1.19	6.707***	1.23	7.024***	1.23	7.233***	1.17	6.897***

Notes: The table reports the returns on different portfolios formed on the basis of ESCORE_9. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.42. Stock returns across ESCORE_9 groups – Value-weighted scheme

ESCORE_9	$BHRR^m$		$BHSAR^m$		$BHMAR^m$		$BHAR1F^m$		$BHAR3F^m$		$BHAR4F^m$	
	Returns	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**	**Returns**	**t-statistic**
0	0.95	2.644***	0.16	1.096	0.30	1.446	0.29	1.402	0.19	1.1	0.32	1.805*
1	0.81	2.324**	0.01	0.063	0.15	0.835	0.14	0.786	0.05	0.311	0.11	0.72
2	0.68	1.893*	-0.11	-0.685	0.02	0.1	0.01	0.028	-0.05	-0.268	0.08	0.478
3	0.39	0.767	-0.34	-1.181	-0.26	-0.708	-0.35	-0.947	-0.49	-1.601	-0.33	-1.047
4	-0.54	-0.94	-1.08	-2.529**	-1.20	-2.391**	-1.19	-2.356**	-1.32	-2.837***	-1.05	-2.197**
5	-0.33	-0.367	-0.75	-0.916	-0.99	-1.156	-0.98	-1.143	-1.03	-1.282	-1.18	-1.409
6	0.73	0.376	1.17	0.664	0.73	0.409	0.85	0.478	1.04	0.589	0.95	0.537
7	0.17	0.066	1.52	0.797	0.78	0.334	0.72	0.291	1.59	0.635	3.89	1.865
Low (0)	0.95	2.644***	0.16	1.096	0.30	1.446	0.29	1.402	0.19	1.1	0.32	1.805*
Medium (1-2)	0.72	2.138**	-0.07	-0.755	0.06	0.397	0.05	0.339	-0.03	-0.196	0.07	0.501
High (3-7)	0.23	0.477	-0.50	-2.12**	-0.43	-1.324	-0.50	-1.534	-0.63	-2.392**	-0.45	-1.661*
Low - High	0.73	2.482**	0.66	2.293**	0.73	2.482**	0.79	2.712***	0.82	2.978***	0.77	2.781***

Notes: The table reports the returns on different portfolios formed on the basis of ESCORE_9. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.43. Buy-and-hold annual raw returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2411	7.177***	0.2286	6.821***	0.2101	6.385***	0.1961	5.979***	0.1549	18.887***
$Ln(MVE_{i,t})$	(-)	-0.0045	-1.593	-0.0031	-1.1	-0.0032	-1.157	-0.0017	-0.629		
$MTB_{i,t}$	(-)	-0.0050	-4.615***	-0.0052	-4.8***	-0.0051	-4.776***	-0.0054	-4.973***		
$ROA_{i,t}$	(+)	0.2017	6.626***	0.1660	5.636***	0.2034	6.677***	0.1666	5.651***		
$ESEO_{i,t}$	(-)	-0.0905	-6.03***	-0.0951	-6.347***	-0.1251	-9.722***	-0.1311	-10.224***		
$EDISTRESS_{i,t}$	(-)	0.0091	0.491	0.0155	0.841	-0.0165	-0.938	-0.0107	-0.61		
$NOA_{i,t}$	(-)	-0.0943	-4.073***	-0.0989	-4.275***	-0.1112	-4.865***	-0.1165	-5.102***		
$DAC_{i,t}$	(-)	-0.1935	-4.584***			-0.1996	-4.727***			-0.1102	-2.771***
$ESCORE\_9_{i,t}$	(-)	-0.0270	-4.49***	-0.0279	-4.636***					-0.0594	-12.87***
Adjusted R^2 (%)		2.61		2.43		2.44		2.26		1.41	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2232	3.14***	0.2107	2.89**	0.1947	2.44**	0.1810	2.21**	0.1453	4.51***
$Ln(MVE_{i,t})$	(-)	-0.0039	-0.65	-0.0026	-0.41	-0.0021	-0.33	-0.0007	-0.11		
$MTB_{i,t}$	(-)	-0.0029	-1.64	-0.0031	-1.75*	-0.0030	-1.69	-0.0032	-1.8*		
$ROA_{i,t}$	(+)	0.1792	4.23***	0.1377	3.81***	0.1806	4.26***	0.1383	3.81***		
$ESEO_{i,t}$	(-)	-0.0672	-3.79***	-0.0708	-3.76***	-0.0831	-3.67***	-0.0884	-3.65***		
$EDISTRESS_{i,t}$	(-)	-0.0361	-1.62	-0.0294	-1.34	-0.0484	-1.71	-0.0428	-1.54		
$NOA_{i,t}$	(-)	-0.1044	-3.07***	-0.1091	-3.22***	-0.1107	-3.55***	-0.1162	-3.71***		
$DAC_{i,t}$	(-)	-0.1981	-3.5***			-0.2013	-3.47***			-0.0945	-2.24**
$ESCORE\_9_{i,t}$	(-)	-0.0128	-1.39	-0.0140	-1.53					-0.0476	-3.47***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHRR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.44. Buy-and-hold annual size-adjusted returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.2219	7.133***	0.2098	6.76***	0.2044	6.713***	0.1911	6.295***	0.0697	9.184***
$Ln(MVE_{i,t})$	(-)	-0.0105	-4.046***	-0.0092	-3.544***	-0.0098	-3.796***	-0.0084	-3.266***		
$MTB_{i,t}$	(-)	-0.0029	-2.889***	-0.0031	-3.082***	-0.0030	-2.989***	-0.0032	-3.191***		
$ROA_{i,t}$	(+)	0.1939	6.877***	0.1594	5.842***	0.1948	6.91***	0.1597	5.853***		
$ESEO_{i,t}$	(-)	-0.0636	-4.579***	-0.0681	-4.907***	-0.0831	-6.977***	-0.0888	-7.482***		
$EDISTRESS_{i,t}$	(-)	-0.0281	-1.639	-0.0218	-1.278	-0.0424	-2.606***	-0.0369	-2.271**		
$NOA_{i,t}$	(-)	-0.0965	-4.504***	-0.1010	-4.714***	-0.1060	-5.014***	-0.1112	-5.258***		
$DAC_{i,t}$	(-)	-0.1871	-4.785***			-0.1905	-4.874***			-0.0853	-2.317**
$ESCORE\_9_{i,t}$	(-)	-0.0152	-2.728***	-0.0160	-2.881***					-0.0435	-10.167***
Adjusted R^2 (%)		2.05		1.86		1.99		1.80		0.89	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.2350	5.42***	0.2231	5.04***	0.2069	5.81***	0.1938	5.24***	0.0674	4.05***
$Ln(MVE_{i,t})$	(-)	-0.0114	-3.22***	-0.0101	-2.85**	-0.0097	-3.14***	-0.0084	-2.69**		
$MTB_{i,t}$	(-)	-0.0028	-1.65	-0.0030	-1.75*	-0.0028	-1.69	-0.0031	-1.8*		
$ROA_{i,t}$	(+)	0.1809	4.23***	0.1430	3.83***	0.1824	4.26***	0.1436	3.84***		
$ESEO_{i,t}$	(-)	-0.0616	-3.46***	-0.0649	-3.42***	-0.0788	-3.45***	-0.0838	-3.43***		
$EDISTRESS_{i,t}$	(-)	-0.0366	-1.53	-0.0304	-1.29	-0.0493	-1.72	-0.0442	-1.57		
$NOA_{i,t}$	(-)	-0.1033	-2.96***	-0.1072	-3.08***	-0.1106	-3.4***	-0.1153	-3.54***		
$DAC_{i,t}$	(-)	-0.1808	-3.15***			-0.1846	-3.15***			-0.0762	-1.83*
$ESCORE\_9_{i,t}$	(-)	-0.0137	-1.7	-0.0149	-1.85*					-0.0407	-3.99***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHSAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.45. Buy-and-hold annual market-adjusted returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	**Spec. 1**		**Spec. 2**		**Spec. 3**		**Spec. 4**		**Spec. 5**	
		Coef.	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1070	3.321***	0.0950	2.956***	0.0875	2.774***	0.0742	2.362**	0.0655	8.332***
$Ln(MVE_{i,t})$	(-)	-0.0014	-0.519	-0.0001	-0.021	-0.0006	-0.231	0.0008	0.296		
$MTB_{i,t}$	(-)	-0.0036	-3.488***	-0.0038	-3.673***	-0.0037	-3.595***	-0.0039	-3.79***		
$ROA_{i,t}$	(+)	0.1687	5.779***	0.1345	4.762***	0.1698	5.814***	0.1349	4.774***		
$ESEO_{i,t}$	(-)	-0.0849	-5.902***	-0.0893	-6.218***	-0.1067	-8.65***	-0.1123	-9.142***		
$EDISTRESS_{i,t}$	(-)	-0.0118	-0.664	-0.0056	-0.317	-0.0278	-1.651*	-0.0224	-1.329		
$NOA_{i,t}$	(-)	-0.0764	-3.442***	-0.0808	-3.644***	-0.0870	-3.973***	-0.0921	-4.208***		
$DAC_{i,t}$	(-)	-0.1853	-4.577***			-0.1891	-4.673***			-0.1044	-2.74***
$ESCORE\_9_{i,t}$	(-)	-0.0170	-2.945***	-0.0178	-3.091***					-0.0492	-11.112***
Adjusted R^2 (%)		2.07		1.89		1.99		1.81		1.07	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1392	2.01*	0.1267	1.78*	0.1107	1.39	0.0970	1.18	0.0613	1.8*
$Ln(MVE_{i,t})$	(-)	-0.0039	-0.65	-0.0026	-0.41	-0.0021	-0.33	-0.0007	-0.11		
$MTB_{i,t}$	(-)	-0.0029	-1.64	-0.0031	-1.75*	-0.0030	-1.69	-0.0032	-1.8*		
$ROA_{i,t}$	(+)	0.1792	4.23***	0.1377	3.81***	0.1806	4.26***	0.1383	3.81***		
$ESEO_{i,t}$	(-)	-0.0672	-3.79***	-0.0708	-3.76***	-0.0831	-3.67***	-0.0884	-3.65***		
$EDISTRESS_{i,t}$	(-)	-0.0361	-1.62	-0.0294	-1.34	-0.0484	-1.71	-0.0428	-1.54		
$NOA_{i,t}$	(-)	-0.1044	-3.07***	-0.1091	-3.22***	-0.1107	-3.55***	-0.1162	-3.71***		
$DAC_{i,t}$	(-)	-0.1981	-3.5***			-0.2013	-3.47***			-0.0945	-2.24**
$ESCORE\_9_{i,t}$	(-)	-0.0128	-1.39	-0.0140	-1.53					-0.0476	-3.47***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHMAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.46. Buy-and-hold annual one-factor abnormal returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1402	4.382***	0.1275	3.995***	0.1230	3.929***	0.1090	3.493***	0.0695	8.901***
$Ln(MVE_{i,t})$	(-)	-0.0042	-1.59	-0.0028	-1.064	-0.0036	-1.34	-0.0021	-0.785		
$MTB_{i,t}$	(-)	-0.0032	-3.137***	-0.0034	-3.334***	-0.0033	-3.233***	-0.0035	-3.439***		
$ROA_{i,t}$	(+)	0.1832	6.319***	0.1469	5.238***	0.1841	6.351***	0.1473	5.249***		
$ESEO_{i,t}$	(-)	-0.0853	-5.972***	-0.0900	-6.308***	-0.1045	-8.531***	-0.1104	-9.051***		
$EDISTRESS_{i,t}$	(-)	-0.0173	-0.982	-0.0107	-0.611	-0.0314	-1.877*	-0.0256	-1.533		
$NOA_{i,t}$	(-)	-0.0747	-3.391***	-0.0794	-3.605***	-0.0841	-3.866***	-0.0895	-4.115***		
$DAC_{i,t}$	(-)	-0.1965	-4.887***			-0.1998	-4.972***			-0.1045	-2.761***
$ESCORE\_9_{i,t}$	(-)	-0.0149	-2.609***	-0.0158	-2.766***					-0.0477	-10.854***
Adjusted R^2 (%)		2.12		1.92		2.06		1.86		1.02	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1728	2.58**	0.1601	2.32**	0.1487	2.01*	0.1347	1.77*	0.0645	2.33**
$Ln(MVE_{i,t})$	(-)	-0.0070	-1.07	-0.0056	-0.84	-0.0054	-0.8	-0.0040	-0.57		
$MTB_{i,t}$	(-)	-0.0025	-1.46	-0.0028	-1.6	-0.0026	-1.51	-0.0029	-1.65		
$ROA_{i,t}$	(+)	0.1972	4.42***	0.1537	4.25***	0.1985	4.43***	0.1544	4.25***		
$ESEO_{i,t}$	(-)	-0.0667	-4.08***	-0.0707	-3.96***	-0.0798	-3.56***	-0.0854	-3.55***		
$EDISTRESS_{i,t}$	(-)	-0.0402	-1.84*	-0.0334	-1.56	-0.0501	-1.81*	-0.0444	-1.63		
$NOA_{i,t}$	(-)	-0.0982	-3.07***	-0.1033	-3.24***	-0.1035	-3.52***	-0.1094	-3.71***		
$DAC_{i,t}$	(-)	-0.2082	-3.56***			-0.2110	-3.53***			-0.0929	-2.32**
$ESCORE\_9_{i,t}$	(-)	-0.0104	-1.28	-0.0117	-1.43					-0.0444	-3.33***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR1F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.47. Buy-and-hold annual three-factor abnormal returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1318	4.256***	0.1198	3.88***	0.1165	3.844***	0.1034	3.421***	0.0510	6.75***
$Ln(MVE_{i,t})$	(-)	-0.0047	-1.819*	-0.0034	-1.311	-0.0041	-1.591	-0.0027	-1.055		
$MTB_{i,t}$	(-)	-0.0019	-1.932*	-0.0021	-2.123**	-0.0020	-2.019**	-0.0022	-2.22**		
$ROA_{i,t}$	(+)	0.1644	5.861***	0.1304	4.803***	0.1653	5.89***	0.1307	4.813***		
$ESEO_{i,t}$	(-)	-0.0726	-5.253***	-0.0770	-5.579***	-0.0897	-7.568***	-0.0953	-8.069***		
$EDISTRESS_{i,t}$	(-)	-0.0285	-1.675*	-0.0224	-1.317	-0.0411	-2.537**	-0.0357	-2.206**		
$NOA_{i,t}$	(-)	-0.0876	-4.109***	-0.0921	-4.317***	-0.0960	-4.559***	-0.1010	-4.801***		
$DAC_{i,t}$	(-)	-0.1844	-4.741***			-0.1875	-4.819***			-0.0984	-2.688***
$ESCORE\_9_{i,t}$	(-)	-0.0133	-2.401**	-0.0141	-2.552**					-0.0432	-10.16***
Adjusted R^2 (%)		1.85		1.66		1.80		1.61		0.90	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1617	2.36**	0.1502	2.15**	0.1401	1.85*	0.1275	1.64	0.0464	2.63**
$Ln(MVE_{i,t})$	(-)	-0.0078	-1.2	-0.0065	-0.99	-0.0064	-0.94	-0.0051	-0.74		
$MTB_{i,t}$	(-)	-0.0014	-1.16	-0.0016	-1.33	-0.0015	-1.21	-0.0017	-1.39		
$ROA_{i,t}$	(+)	0.1696	4***	0.1305	3.73***	0.1708	4.02***	0.1311	3.73***		
$ESEO_{i,t}$	(-)	-0.0585	-3.89***	-0.0620	-3.76***	-0.0710	-3.26***	-0.0761	-3.26***		
$EDISTRESS_{i,t}$	(-)	-0.0448	-2.58**	-0.0388	-2.3**	-0.0543	-2.37**	-0.0493	-2.2**		
$NOA_{i,t}$	(-)	-0.0961	-3.12***	-0.1005	-3.28***	-0.1014	-3.57***	-0.1064	-3.75***		
$DAC_{i,t}$	(-)	-0.1862	-3.3***			-0.1890	-3.29***			-0.0844	-2.19**
$ESCORE\_9_{i,t}$	(-)	-0.0099	-1.39	-0.0110	-1.54					-0.0401	-3.01***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR3F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t}\_9 + \varepsilon. \quad (E3.25)$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.48. Buy-and-hold annual four-factor abnormal returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1091	3.552***	0.0963	3.142***	0.0932	3.1***	0.0791	2.639***	0.0527	7.046***
$Ln(MVE_{i,t})$	(-)	-0.0022	-0.846	-0.0007	-0.29	-0.0015	-0.602	0.0000	-0.016		
$MTB_{i,t}$	(-)	-0.0016	-1.596	-0.0018	-1.803*	-0.0017	-1.687*	-0.0019	-1.904*		
$ROA_{i,t}$	(+)	0.1477	5.31***	0.1112	4.131***	0.1486	5.341***	0.1115	4.141***		
$ESEO_{i,t}$	(-)	-0.0704	-5.133***	-0.0751	-5.484***	-0.0882	-7.5***	-0.0941	-8.038***		
$EDISTRESS_{i,t}$	(-)	-0.0333	-1.973**	-0.0267	-1.586	-0.0464	-2.89***	-0.0406	-2.531**		
$NOA_{i,t}$	(-)	-0.0956	-4.521***	-0.1004	-4.746***	-0.1043	-4.997***	-0.1097	-5.257***		
$DAC_{i,t}$	(-)	-0.1979	-5.13***			-0.2011	-5.213***			-0.1195	-3.293***
$ESCORE\_9_{i,t}$	(-)	-0.0138	-2.521**	-0.0147	-2.684***					-0.0437	-10.361***
Adjusted R^2 (%)		1.84		1.62		1.79		1.56		0.96	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1379	2.2**	0.1260	1.98*	0.1143	1.64	0.1012	1.42	0.0482	2.79**
$Ln(MVE_{i,t})$	(-)	-0.0052	-0.89	-0.0039	-0.65	-0.0038	-0.6	-0.0024	-0.37		
$MTB_{i,t}$	(-)	-0.0012	-0.9	-0.0014	-1.07	-0.0012	-0.96	-0.0015	-1.13		
$ROA_{i,t}$	(+)	0.1624	4.46***	0.1173	3.87***	0.1635	4.48***	0.1178	3.87***		
$ESEO_{i,t}$	(-)	-0.0582	-3.63***	-0.0624	-3.57***	-0.0724	-3.13***	-0.0781	-3.17***		
$EDISTRESS_{i,t}$	(-)	-0.0481	-3.53***	-0.0418	-3.17***	-0.0590	-3.11***	-0.0538	-2.93***		
$NOA_{i,t}$	(-)	-0.1023	-3.45***	-0.1075	-3.61***	-0.1085	-3.98***	-0.1144	-4.15***		
$DAC_{i,t}$	(-)	-0.2091	-3.86***			-0.2119	-3.83***			-0.1114	-2.88**
$ESCORE\_9_{i,t}$	(-)	-0.0112	-1.52	-0.0124	-1.68					-0.0409	-3.04***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$BHAR4F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.49. Cumulative annual raw returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**	**Coef.**	**t-statistic**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1948	6.364***	0.1813	5.935***	0.1658	5.531***	0.1508	5.044***	0.1400	18.705***
$Ln(MVE_{i,t})$	(-)	-0.0014	-0.529	0.0002	0.062	-0.0002	-0.078	0.0014	0.552		
$MTB_{i,t}$	(-)	-0.0047	-4.739***	-0.0049	-4.956***	-0.0048	-4.904***	-0.0050	-5.134***		
$ROA_{i,t}$	(+)	0.2127	7.67***	0.1742	6.488***	0.2143	7.721***	0.1747	6.503***		
$ESEO_{i,t}$	(-)	-0.0897	-6.565***	-0.0947	-6.936***	-0.1221	-10.412***	-0.1285	-10.995***		
$EDISTRESS_{i,t}$	(-)	0.0212	1.257	0.0281	1.672*	-0.0027	-0.169	0.0035	0.218		
$NOA_{i,t}$	(-)	-0.1062	-5.035***	-0.1112	-5.272***	-0.1220	-5.857***	-0.1277	-6.135***		
$DAC_{i,t}$	(-)	-0.2089	-5.43***			-0.2146	-5.577***			-0.1302	-3.589***
$ESCORE\_9_{i,t}$	(-)	-0.0252	-4.602***	-0.0261	-4.773***					-0.0579	-13.751***
Adjusted R^2 (%)		0.03		2.84		2.91		2.66		1.64	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1698	2.86**	0.1569	2.59**	0.1438	2.15**	0.1295	1.89*	0.1302	4.9***
$Ln(MVE_{i,t})$	(-)	-0.0001	-0.03	0.0014	0.29	0.0015	0.29	0.0030	0.58		
$MTB_{i,t}$	(-)	-0.0027	-1.63	-0.0029	-1.79*	-0.0027	-1.69	-0.0030	-1.86*		
$ROA_{i,t}$	(+)	0.1832	4.39***	0.1367	3.73***	0.1839	4.4***	0.1371	3.72***		
$ESEO_{i,t}$	(-)	-0.0633	-3.27***	-0.0674	-3.36***	-0.0790	-3.39***	-0.0849	-3.47***		
$EDISTRESS_{i,t}$	(-)	-0.0231	-1.09	-0.0165	-0.81	-0.0349	-1.37	-0.0295	-1.21		
$NOA_{i,t}$	(-)	-0.1136	-4.39***	-0.1196	-4.59***	-0.1199	-5.12***	-0.1268	-5.39***		
$DAC_{i,t}$	(-)	-0.2162	-5.28***			-0.2179	-5.11***			-0.1197	-4.46***
$ESCORE\_9_{i,t}$	(-)	-0.0122	-1.54	-0.0136	-1.76*					-0.0457	-3.49***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CRR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.50. Cumulative annual size-adjusted returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.1978	6.968***	0.1850	6.528***	0.1809	6.51***	0.1668	6.018***	0.0596	8.6***
$Ln(MVE_{i,t})$	(-)	-0.0087	-3.682***	-0.0073	-3.091***	-0.0080	-3.413***	-0.0065	-2.791***		
$MTB_{i,t}$	(-)	-0.0028	-3.116***	-0.0030	-3.339***	-0.0029	-3.221***	-0.0031	-3.456***		
$ROA_{i,t}$	(+)	0.1982	7.705***	0.1615	6.488***	0.1991	7.739***	0.1619	6.499***		
$ESEO_{i,t}$	(-)	-0.0639	-5.04***	-0.0686	-5.419***	-0.0828	-7.613***	-0.0888	-8.194***		
$EDISTRESS_{i,t}$	(-)	-0.0132	-0.847	-0.0066	-0.425	-0.0271	-1.827*	-0.0213	-1.435		
$NOA_{i,t}$	(-)	-0.1102	-5.634***	-0.1150	-5.877***	-0.1194	-6.186***	-0.1248	-6.467***		
$DAC_{i,t}$	(-)	-0.1986	-5.567***			-0.2019	-5.662***			-0.1067	-3.173***
$ESCORE\_9_{i,t}$	(-)	-0.0147	-2.891***	-0.0156	-3.068***					-0.0423	-10.821***
Adjusted R^2 (%)		0.02		2.14		2.32		2.06		1.03	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1992	5.25***	0.1868	4.95***	0.1736	5.62***	0.1600	5.19***	0.0565	3.61***
$Ln(MVE_{i,t})$	(-)	-0.0088	-2.58**	-0.0074	-2.19**	-0.0073	-2.42**	-0.0058	-1.98*		
$MTB_{i,t}$	(-)	-0.0025	-1.62	-0.0028	-1.78*	-0.0026	-1.67	-0.0029	-1.84*		
$ROA_{i,t}$	(+)	0.1839	4.4***	0.1411	3.77***	0.1847	4.41***	0.1415	3.76***		
$ESEO_{i,t}$	(-)	-0.0583	-3.04***	-0.0620	-3.11***	-0.0752	-3.26***	-0.0807	-3.33***		
$EDISTRESS_{i,t}$	(-)	-0.0238	-1.06	-0.0175	-0.81	-0.0360	-1.39	-0.0310	-1.25		
$NOA_{i,t}$	(-)	-0.1127	-4.25***	-0.1179	-4.43***	-0.1199	-4.95***	-0.1260	-5.16***		
$DAC_{i,t}$	(-)	-0.1993	-4.77***			-0.2016	-4.67***			-0.1017	-3.64***
$ESCORE\_9_{i,t}$	(-)	-0.0131	-1.88*	-0.0144	-2.14**					-0.0388	-3.83***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CSAR^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.51. Cumulative annual market-adjusted returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.0675	2.292**	0.0546	1.856*	0.0494	1.71*	0.0351	1.218	0.0556	7.732***
$Ln(MVE_{i,t})$	(-)	0.0016	0.662	0.0031	1.256	0.0024	0.961	0.0039	1.588		
$MTB_{i,t}$	(-)	-0.0034	-3.565***	-0.0036	-3.783***	-0.0035	-3.675***	-0.0037	-3.903***		
$ROA_{i,t}$	(+)	0.1804	6.753***	0.1434	5.546***	0.1814	6.789***	0.1437	5.558***		
$ESEO_{i,t}$	(-)	-0.0835	-6.348***	-0.0883	-6.718***	-0.1039	-9.205***	-0.1100	-9.778***		
$EDISTRESS_{i,t}$	(-)	0.0013	0.082	0.0080	0.495	-0.0137	-0.886	-0.0078	-0.503		
$NOA_{i,t}$	(-)	-0.0892	-4.393***	-0.0940	-4.63***	-0.0991	-4.946***	-0.1046	-5.221***		
$DAC_{i,t}$	(-)	-0.2006	-5.414***			-0.2041	-5.512***			-0.1246	-3.57***
$ESCORE\_9_{i,t}$	(-)	-0.0158	-3.003***	-0.0168	-3.175***					-0.0481	-11.87***
Adjusted R^2 (%)		0.02		2.23		2.40		2.15		1.25	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.0909	1.52	0.0779	1.28	0.0648	0.95	0.0506	0.72	0.0513	1.48
$Ln(MVE_{i,t})$	(-)	-0.0001	-0.03	0.0014	0.29	0.0015	0.29	0.0030	0.58		
$MTB_{i,t}$	(-)	-0.0027	-1.63	-0.0029	-1.79*	-0.0027	-1.69	-0.0030	-1.86*		
$ROA_{i,t}$	(+)	0.1832	4.39***	0.1367	3.73***	0.1839	4.4***	0.1371	3.72***		
$ESEO_{i,t}$	(-)	-0.0633	-3.27***	-0.0674	-3.36***	-0.0790	-3.39***	-0.0849	-3.47***		
$EDISTRESS_{i,t}$	(-)	-0.0231	-1.09	-0.0165	-0.81	-0.0349	-1.37	-0.0295	-1.21		
$NOA_{i,t}$	(-)	-0.1136	-4.39***	-0.1196	-4.59***	-0.1199	-5.12***	-0.1268	-5.39***		
$DAC_{i,t}$	(-)	-0.2162	-5.28***			-0.2179	-5.11***			-0.1197	-4.46***
$ESCORE\_9_{i,t}$	(-)	-0.0122	-1.54	-0.0136	-1.76*					-0.0457	-3.49***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CMAR^{a}_{i,t+1} = \alpha + \beta_1 Log\left(MVE_{i,t}\right) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.52. Cumulative annual one-factor abnormal returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.0958	3.276***	0.0823	2.818***	0.0793	2.77***	0.0644	2.255**	0.0603	8.44***
$Ln(MVE_{i,t})$	(-)	-0.0007	-0.29	0.0008	0.332	-0.0001	-0.021	0.0015	0.634		
$MTB_{i,t}$	(-)	-0.0031	-3.252***	-0.0033	-3.481***	-0.0031	-3.353***	-0.0034	-3.592***		
$ROA_{i,t}$	(+)	0.1934	7.296***	0.1547	6.028***	0.1943	7.329***	0.1550	6.039***		
$ESEO_{i,t}$	(-)	-0.0835	-6.393***	-0.0885	-6.782***	-0.1020	-9.105***	-0.1083	-9.704***		
$EDISTRESS_{i,t}$	(-)	-0.0027	-0.166	0.0043	0.269	-0.0163	-1.064	-0.0101	-0.662		
$NOA_{i,t}$	(-)	-0.0873	-4.334***	-0.0924	-4.583***	-0.0963	-4.844***	-0.1021	-5.133***		
$DAC_{i,t}$	(-)	-0.2098	-5.708***			-0.2131	-5.798***			-0.1244	-3.591***
$ESCORE\_9_{i,t}$	(-)	-0.0144	-2.749***	-0.0153	-2.93***					-0.0471	-11.696***
Adjusted R^2 (%)		0.03		2.25		2.46		2.18		1.21	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1195	2.15**	0.1063	1.86*	0.0971	1.56	0.0827	1.29	0.0552	1.94*
$Ln(MVE_{i,t})$	(-)	-0.0027	-0.48	-0.0011	-0.19	-0.0013	-0.22	0.0003	0.06		
$MTB_{i,t}$	(-)	-0.0023	-1.39	-0.0026	-1.58	-0.0024	-1.44	-0.0027	-1.64		
$ROA_{i,t}$	(+)	0.1997	4.61***	0.1517	4.17***	0.2003	4.63***	0.1521	4.17***		
$ESEO_{i,t}$	(-)	-0.0625	-3.58***	-0.0668	-3.65***	-0.0759	-3.42***	-0.0821	-3.5***		
$EDISTRESS_{i,t}$	(-)	-0.0261	-1.23	-0.0192	-0.95	-0.0360	-1.43	-0.0304	-1.26		
$NOA_{i,t}$	(-)	-0.1074	-4.32***	-0.1138	-4.57***	-0.1131	-4.97***	-0.1203	-5.27***		
$DAC_{i,t}$	(-)	-0.2244	-5.34***			-0.2258	-5.2***			-0.1170	-4.56***
$ESCORE\_9_{i,t}$	(-)	-0.0103	-1.48	-0.0117	-1.72					-0.0431	-3.4***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR1F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.53. Cumulative annual three-factor abnormal returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.0832	2.95***	0.0704	2.5**	0.0677	2.452**	0.0536	1.947*	0.0435	6.317***
$Ln(MVE_{i,t})$	(-)	-0.0006	-0.258	0.0008	0.351	0.0000	0.004	0.0015	0.646		
$MTB_{i,t}$	(-)	-0.0021	-2.278**	-0.0023	-2.502**	-0.0021	-2.375**	-0.0024	-2.611***		
$ROA_{i,t}$	(+)	0.1717	6.718***	0.1351	5.462***	0.1725	6.75***	0.1354	5.473***		
$ESEO_{i,t}$	(-)	-0.0719	-5.711***	-0.0766	-6.093***	-0.0893	-8.265***	-0.0952	-8.85***		
$EDISTRESS_{i,t}$	(-)	-0.0116	-0.75	-0.0050	-0.326	-0.0244	-1.654*	-0.0186	-1.26		
$NOA_{i,t}$	(-)	-0.0988	-5.088***	-0.1036	-5.332***	-0.1073	-5.597***	-0.1127	-5.879***		
$DAC_{i,t}$	(-)	-0.1981	-5.591***			-0.2012	-5.679***			-0.1210	-3.627***
$ESCORE\_9_{i,t}$	(-)	-0.0135	-2.673***	-0.0144	-2.851***					-0.0433	-11.168***
Adjusted R^2 (%)		0.02		2.01		2.21		1.94		1.12	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.1024	1.8*	0.0902	1.56	0.0820	1.29	0.0687	1.06	0.0384	2.34**
$Ln(MVE_{i,t})$	(-)	-0.0029	-0.52	-0.0014	-0.26	-0.0017	-0.28	-0.0002	-0.03		
$MTB_{i,t}$	(-)	-0.0014	-1.22	-0.0017	-1.49	-0.0015	-1.28	-0.0017	-1.56		
$ROA_{i,t}$	(+)	0.1752	4.34***	0.1306	3.76***	0.1758	4.37***	0.1310	3.76***		
$ESEO_{i,t}$	(-)	-0.0552	-3.47***	-0.0592	-3.57***	-0.0682	-3.27***	-0.0739	-3.39***		
$EDISTRESS_{i,t}$	(-)	-0.0288	-1.57	-0.0227	-1.3	-0.0384	-1.76*	-0.0335	-1.61		
$NOA_{i,t}$	(-)	-0.1033	-4.57***	-0.1092	-4.82***	-0.1088	-5.22***	-0.1154	-5.52***		
$DAC_{i,t}$	(-)	-0.2064	-5.47***			-0.2078	-5.37***			-0.1117	-4.85***
$ESCORE\_9_{i,t}$	(-)	-0.0099	-1.6	-0.0112	-1.87*					-0.0393	-3.15***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR3F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE_{i,t}\_9 + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T3.54. Cumulative annual four-factor abnormal returns regressed on DAC, ESCORE_9 and control variables

	Predicted sign	Spec. 1		Spec. 2		Spec. 3		Spec. 4		Spec. 5	
		Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Pooled regression											
INTERCEPT		0.0635	2.277**	0.0501	1.798*	0.0474	1.735*	0.0326	1.197	0.0458	6.729***
$Ln(MVE_{i,t})$	(-)	0.0015	0.659	0.0030	1.309	0.0022	0.939	0.0037	1.624		
$MTB_{i,t}$	(-)	-0.0016	-1.74*	-0.0018	-1.978**	-0.0016	-1.842*	-0.0019	-2.092**		
$ROA_{i,t}$	(+)	0.1562	6.177***	0.1178	4.813***	0.1571	6.21***	0.1181	4.824***		
$ESEO_{i,t}$	(-)	-0.0668	-5.364***	-0.0718	-5.766***	-0.0849	-7.944***	-0.0912	-8.561***		
$EDISTRESS_{i,t}$	(-)	-0.0153	-0.998	-0.0084	-0.548	-0.0286	-1.961**	-0.0225	-1.543		
$NOA_{i,t}$	(-)	-0.1034	-5.38***	-0.1084	-5.638***	-0.1122	-5.915***	-0.1179	-6.214***		
$DAC_{i,t}$	(-)	-0.2079	-5.93***			-0.2111	-6.022***			-0.1379	-4.179***
$ESCORE\_9_{i,t}$	(-)	-0.0140	-2.815***	-0.0150	-3.003***					-0.0429	-11.191***
Adjusted R^2 (%)		0.02		1.92		2.15		1.85		1.15	
Panel B: Fama-MacBeth regression with Newey-West adjusted t-statistic											
INTERCEPT		0.0844	1.62	0.0721	1.37	0.0618	1.06	0.0483	0.81	0.0408	2.58**
$Ln(MVE_{i,t})$	(-)	-0.0009	-0.17	0.0006	0.12	0.0005	0.09	0.0020	0.37		
$MTB_{i,t}$	(-)	-0.0011	-0.9	-0.0013	-1.14	-0.0011	-0.96	-0.0014	-1.21		
$ROA_{i,t}$	(+)	0.1661	4.26***	0.1170	3.55***	0.1666	4.3***	0.1173	3.57***		
$ESEO_{i,t}$	(-)	-0.0521	-3.26***	-0.0565	-3.37***	-0.0668	-3.15***	-0.0730	-3.28***		
$EDISTRESS_{i,t}$	(-)	-0.0307	-1.93*	-0.0245	-1.61	-0.0418	-2.24**	-0.0368	-2.09*		
$NOA_{i,t}$	(-)	-0.1071	-4.84***	-0.1137	-5.11***	-0.1136	-5.53***	-0.1210	-5.86***		
$DAC_{i,t}$	(-)	-0.2231	-5.66***			-0.2246	-5.56***			-0.1335	-5.75***
$ESCORE\_9_{i,t}$	(-)	-0.0114	-1.69	-0.0127	-1.95*					-0.0393	-3.1***

Notes: Specification 1 (columns 3 and 4) report the results of estimating the following equation:

$$CAR4F^{a}_{i,t+1} = \alpha + \beta_1 Log(MVE_{i,t}) + \beta_2 MTB_{i,t} + \beta_3 ROA_{i,t} + \beta_4 ESEO_{i,t} + \beta_5 EDISTRESS_{i,t} + \beta_6 NOA_{i,t} + \beta_7 DAC_{i,t} + \gamma ESCORE\_9_{i,t} + \varepsilon. \quad \text{(E3.25)}$$

From Specification 1 as the full specification, in Specification 2 DAC is dropped, in Specification 3 ESCORE_9 is dropped, in Specification 4 DAC and ESCORE_9 are dropped, in Specification 5 Ln(MVE), MTB, ROA, ESEO, EDISTRESS, NOA are dropped from the explanatory variables. Panel A (B) reports the results from the pooled regression (Fama-Macbeth regression in which the standard errors are adjusted for serial correlation using Newey-West procedure). Column (2) exhibits the expected sign of the explanatory variables. 'Spec.' is abbreviation for 'Specification' and 'Coef.' is abbreviation for 'Coefficient'. Definitions of variables are in Section 3.8. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

3.7. CONCLUSIONS

Chapter 2 has demonstrated that ESCORE, a model which accumulates fifteen individual financial-statement-based earnings management signals, is able to reveal the context of earnings management. This chapter goes further showing that ESCORE could reliably predict future stock returns. Stocks with low ESCORE (i.e. those which are less susceptible to earnings management) are shown to earn significantly higher than the high ESCORE (i.e. more susceptible) counterpart in one year after portfolio formation. The returns earned by the trading strategy designed based on ESCORE are shown to be abnormal after controlling for the risk loading on the market, size, book-to-market and momentum factors and after controlling for other known market anomalies embedded in ESCORE. The results are robust after various modifications made to the methodologies.

The chapter proposes a behavioural-based explanation for the observed pattern of anomalous returns earned from ESCORE-based trading strategy. In particular, the chapter argues that investors are systematically biased under the influence of the base rate fallacy. It has been widely documented in the psychology literature that human-beings make erroneous assessment of probability by systematically ignoring the base rate and focusing too much on detailed information (Tversky and Kahneman, 1982). The base rate fallacy causes investors to focus too much on specific information acquired from financial statements, in the media and elsewhere. Therefore, they are more likely to misprice the information contained in the context of earnings management. Metonymically, if “there’s no smoke without fire”, the market seems to fail to extrapolate that there is a ‘fire’ (i.e. earnings management exists) from observing the ‘smoke’ (the context of earnings management captured by ESCORE). The chapter provides evidence that a trading strategy which could exploit the sub-optimal behaviour of investors under the influence of the base rate fallacy could yield returns which are abnormally higher than a fair compensation for risk. This is a very interesting and important finding which further our understanding on how the market reacts to earnings management. The chapter is also a significant contribution to the market anomaly literature which original evidence of abnormal returns earned based on published information. While the existing literature suggests aggressive (conservative) earnings management is related to negative (positive) future stock returns (e.g. Xie, 2001), the chapter suggests that the presence of earnings management, regardless of the direction, affects stock returns negatively because any deviation from the 'true' earnings could distort the usefulness of reported earnings. In addition, the chapter could potentially be of significant interest to investment practitioners as a practical tool to screen out the information about the context of earnings management which is currently mispriced by the market, hence earn economically large abnormal returns. Last but not least, the chapter has illustrated the relevant usage of ESCORE in helping accounting and finance researcher to pursue research questions which would have been not possible to pursue without an empirical proxy of the general context of earnings management. This opens up a lot of opportunities for future research to pursue. The next chapter is another example of how researchers could use ESCORE to control for the context in which earnings management occurs.

3.8. DEFINITIONS OF VARIABLES USED IN CHAPTER 3

DAC is discretionary accruals as defined in Chapter 2 (see Section 2.8).

ESCORE, ESCORE_FIXED and **ESCORE_9** are three versions of the aggregate index which accumulates individual signals of earnings management as defined in Chapter 2 (see Section 2.8).

$\mathbf{BHRR^{m}_{i,j}}$ is monthly buy-and-hold raw returns of stock *i* in month *j*, calculated as the percentage change in the Returns Index downloaded from Datastream at the end of each month.

$\mathbf{BHRR^{m}_{p,j}}$ is monthly buy-and-hold raw returns of portfolio *p* in month *j*, calculated as the equally-weighted $\mathrm{BHRR^{m}_{i,j}}$ of all stocks belong to portfolio *p*.

$\mathbf{BHRR^{a}_{i,t}}$ is annual buy-and-hold raw returns of stock *i* in year *t*, calculated as $\mathrm{BHRR^{a}_{i,t}} = \prod_{j=1}^{12}(1 + \mathrm{BHRR^{m}_{i,j}}) - 1$ (j = June year t … May year t + 1).

$\mathbf{CRR^{a}_{i,t}}$ is annual cumulative raw returns of stock *i* in year *t*, calculated as $\mathrm{CRR^{a}_{i,t}} = \sum_{j=1}^{12} \mathrm{BHRR^{m}_{i,j}}$ (j = June year t … May year t + 1).

$\mathbf{SDR^{m}_{d,j}}$ is the average monthly $\mathrm{BHRR^{m}_{i,j}}$ of all stocks in size decile *d* in month *j* (*j* = June year t … May year t + 1), where the deciles are determined by sorting stocks by market value of equity at the end of year *t–1*.

$\mathbf{BHSAR^{m}_{i,j}}$ is monthly buy-and-hold size-adjusted returns of stock *i* in month *j*, calculated as the difference between $\mathrm{BHRR^{m}_{i,j}}$ and the $\mathrm{SDR^{m}_{d,j}}$ of the corresponding size decile to which stock *i* belongs.

$\mathbf{BHSAR^{m}_{p,j}}$ is monthly buy-and-hold size-adjusted returns of portfolio *p* in month *j*, calculated as the equally-weighted $\mathrm{BHSAR^{m}_{i,j}}$ of all stocks belong to portfolio *p*.

$\mathbf{BHSAR^{a}_{i,t}}$ is annual buy-and-hold size-adjusted returns of stock *i* in year *t*, calculated as $\mathrm{BHSAR^{a}_{i,t}} = \prod_{j=1}^{12}(1 + \mathrm{BHRR^{m}_{i,j}}) - \prod_{j=1}^{12}\left(1 + \mathrm{SDR^{m}_{d,j}}\right)$ (i ∈ d, j = June year t … May year t + 1).

$\mathbf{CSAR^{a}_{i,t}}$ is annual cumulative size-adjusted returns of stock *i* in year *t*, calculated as $\mathrm{CSAR^{a}_{i,t}} = \sum_{j=1}^{12}(\mathrm{BHRR^{m}_{i,j}} - \mathrm{SDR^{m}_{d,j}})$ (i ∈ d, j = June year t … May year t + 1).

$\mathbf{FTSEALLR_j^m}$ is the monthly returns on the FTSE All Shares Index in month *j*.

$\mathbf{BHMAR_{i,j}^m}$ is monthly buy-and-hold market-adjusted returns of stock *i* in month *j*, calculated as the difference between $BHRR_{i,j}^m$ and $FTSEALLR_j^m$.

$\mathbf{BHMAR_{p,j}^m}$ is monthly buy-and-hold market-adjusted returns of portfolio *p* in month *j*, calculated as the equally-weighted $BHMAR_i^m$ of all stocks belong to portfolio *p*.

$\mathbf{BHMAR_{i,t}^a}$ is annual buy-and-hold market-adjusted returns of stock *i* in year *t*, calculated as $BHMAR_{i,t}^a = \prod_{j=1}^{12}(1 + BHRR_{i,j}^m) - \prod_{j=1}^{12}(1 + FTSEALLR_j^m)$ (j = June year t ... May year t + 1).

$\mathbf{CMAR_{i,t}^a}$ is annual cumulative market-adjusted returns of stock *i* in year *t*, calculated as $CMAR_{i,t}^a = \sum_{j=1}^{12}(BHRR_{i,j}^m - FTSEALLR_j^m)$ (j = June year t ... May year t + 1).

$\mathbf{BHAR1F_{p,j}^m} = BHRR_{p,j}^m - [Rf_j + \hat{\beta}_{1,p}^{1F}(Rm_j - Rf_j)]$ is monthly buy-and-hold abnormal returns of portfolio *p* in month *j* adjusted for the market factor; where: $\hat{\beta}_{1,p}^{1F}$ is the estimated intercept from the regression $BHRR_{p,j}^m - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \varepsilon$; Rf_j, Rm_j are, respectively, the risk-free rate and returns on the market portfolio in month *j*, all taken from Gregory et al. (2013).

$\mathbf{E(R1F_{i,j}^m)} = Rf_j + \hat{\beta}_{1,i}^{1F}(Rm_j - Rf_j)$ is monthly buy-and-hold expected returns of stock *i* in month *j* adjusted for the market factor; where: $\hat{\beta}_{1,i}^{1F}$ is the estimated coefficient from the regression $BHRR_{i,j}^m - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \varepsilon$; Rf_j, Rm_j are, respectively, the risk-free rate and returns on the market portfolio in month *j*, all taken from Gregory et al. (2013).

$\mathbf{BHAR1F^{a}_{i,t}}$ is annual buy-and-hold abnormal returns of stock *i* in year *t* adjusted for the market factor, calculated as $\mathrm{BHAR1F^{a}_{i,t}} = \prod_{j=1}^{12}(1 + \mathrm{BHRR^{m}_{i,j}}) - \prod_{j=1}^{12}\left[1 + \mathrm{E(R1F^{m}_{i,j})}\right]$ (j = June year t … May year t + 1).

$\mathbf{CAR1F^{a}_{i,t}}$ is annual cumulative abnormal returns of stock *i* in year *t* adjusted for the market factor, calculated as $\mathrm{CAR1F^{a}_{i,t}} = \sum_{j=1}^{12}\left[\mathrm{BHRR^{m}_{i,j}} - \mathrm{E(R1F^{m}_{i,j})}\right]$ (j = June year t … May year t + 1).

$\mathbf{BHAR3F^{m}_{p,j}} = \mathrm{BHRR^{m}_{p,j}} - [\mathrm{Rf_j} + \hat{\beta}^{3F}_{1,p}(\mathrm{Rm_j} - \mathrm{Rf_j}) + \hat{\beta}^{3F}_{2,p}\mathrm{SMB_j} + \hat{\beta}^{3F}_{3,p}\mathrm{HML_j}]$ is monthly buy-and-hold abnormal returns of portfolio *p* in month *j* adjusted for the market, size and book-to-market factors; where: $\hat{\beta}^{3F}_{1,p}$, $\hat{\beta}^{3F}_{2,p}$, $\hat{\beta}^{3F}_{3,p}$is the estimated intercept from the regression $\mathrm{BHRR^{m}_{p,j}} - \mathrm{Rf_j} = \alpha + \beta_1(\mathrm{Rm_j} - \mathrm{Rf_j}) + \beta_2\mathrm{SMB_j} + \beta_3\mathrm{HML_j} + \varepsilon$; $\mathrm{Rf_j}$, $\mathrm{Rm_j}$, $\mathrm{SMB_j}$, $\mathrm{HML_j}$ are, respectively, the risk-free rate, returns on the market portfolio, size factor, book-to-market factor in month *j*, all taken from Gregory et al. (2013).

$\mathbf{E(R3F^{m}_{i,j})} = \mathrm{Rf_j} + \hat{\beta}^{3F}_{1,i}(\mathrm{Rm_j} - \mathrm{Rf_j}) + \hat{\beta}^{3F}_{2,i}\mathrm{SMB_j} + \hat{\beta}^{3F}_{3,i}\mathrm{HML_j}$ is monthly buy-and-hold expected returns of stock *i* in month *j* adjusted for the market, size and book-to-market factors; where: $\hat{\beta}^{3F}_{1,i}$, $\hat{\beta}^{3F}_{2,i}$, $\hat{\beta}^{3F}_{3,i}$ is the estimated coefficient from the regression $\mathrm{BHRR^{m}_{\mathit{i},j}} - \mathrm{Rf_j} = \alpha + \beta_1(\mathrm{Rm_j} - \mathrm{Rf_j}) + \beta_2\mathrm{SMB_j} + \beta_3\mathrm{HML_j} + \varepsilon$; $\mathrm{Rf_j}$, $\mathrm{Rm_j}$, $\mathrm{SMB_j}$, $\mathrm{HML_j}$ are, respectively, the risk-free rate, returns on the market portfolio, size factor, book-to-market factor in month *j*, all taken from Gregory et al. (2013).

$\mathbf{BHAR3F^{a}_{i,t}}$ is annual buy-and-hold abnormal returns of stock *i* in year *t* adjusted for the market, size and book-to-market factors, calculated as $\mathrm{BHAR3F^{a}_{i,t}} = \prod_{j=1}^{12}(1 + \mathrm{BHRR^{m}_{i,j}}) - \prod_{j=1}^{12}\left[1 + \mathrm{E(R3F^{m}_{i,j})}\right]$ (j = June year t … May year t + 1).

$\mathbf{CAR3F^{a}_{i,t}}$ is annual cumulative abnormal returns of stock *i* in year *t* adjusted for the market, size and book-to-market factors, calculated as $CAR3F^{a}_{i,t} = \sum_{j=1}^{12}\left[BHRR^{m}_{i,j} - E(R3F^{m}_{i,j})\right]$ (j = June year t … May year t + 1).

$\mathbf{BHAR4F^{m}_{p,j}} = BHRR^{m}_{p,j} - [Rf_j + \hat{\beta}^{4F}_{1,p}(Rm_j - Rf_j) + \hat{\beta}^{4F}_{2,p}SMB_j + \hat{\beta}^{4F}_{3,p}HML_j + \hat{\beta}^{4F}_{4,p}UMD_j]$ is monthly buy-and-hold abnormal returns of portfolio *p* in month *j* adjusted for the market, size, book-to-market and momentum factors; where: $\hat{\beta}^{4F}_{1,p}$, $\hat{\beta}^{4F}_{2,p}$, $\hat{\beta}^{4F}_{3,p}$, $\hat{\beta}^{4F}_{4,p}$ is the estimated intercept from the regression $BHRR^{m}_{p,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \beta_4 UMD_j + \varepsilon$; Rf_j, Rm_j, SMB_j, HML_j, UMD_j are, respectively, the risk-free rate, returns on the market portfolio, size factor, book-to-market factor, momentum factor in month *j*, all taken from Gregory et al. (2013).

$\mathbf{E(R4F^{m}_{i,j})} = Rf_j + \hat{\beta}^{4F}_{1,i}(Rm_j - Rf_j) + \hat{\beta}^{4F}_{2,i}SMB_j + \hat{\beta}^{4F}_{3,i}HML_j + \hat{\beta}^{4F}_{4,i}UMD_j$ is monthly buy-and-hold expected returns of stock *i* in month *j* adjusted for the market, size, book-to-market and momentum factors; where: $\hat{\beta}^{4F}_{1,i}$, $\hat{\beta}^{4F}_{2,i}$, $\hat{\beta}^{4F}_{3,i}$, $\hat{\beta}^{4F}_{4,i}$ is the estimated coefficient from the regression $BHRR^{m}_{i,j} - Rf_j = \alpha + \beta_1(Rm_j - Rf_j) + \beta_2 SMB_j + \beta_3 HML_j + \beta_4 UMD_j + \varepsilon$; Rf_j, Rm_j, SMB_j, HML_j, UMD_j are, respectively, the risk-free rate, returns on the market portfolio, size factor, book-to-market factor, momentum factor in month *j*, all taken from Gregory et al. (2013).

$\mathbf{BHAR4F^{a}_{i,t}}$ is annual buy-and-hold abnormal returns of stock *i* in year *t* adjusted for the market, size, book-to-market and momentum factors, calculated as $BHAR4F^{a}_{i,t} = \prod_{j=1}^{12}(1 + BHRR^{m}_{i,j}) - \prod_{j=1}^{12}\left[1 + E(R4F^{m}_{i,j})\right]$ (j = June year t … May year t + 1).

$\mathbf{CAR4F^{a}_{i,t}}$ is annual cumulative abnormal returns of stock *i* in year *t* adjusted for the market, size, book-to-market and momentum factors, calculated as $CAR4F^{a}_{i,t} = \sum_{j=1}^{12}\left[BHRR^{m}_{i,j} - E(R4F^{m}_{i,j})\right]$ (j = June year t … May year t + 1).

CHAPTER 4

THE CONTAGION OF AGGRESSIVE EARNINGS MANAGEMENT THROUGH BOARD INTERLOCKS[28]

4.1. INTRODUCTION

It is well established that certain actions could spread through a network via mechanisms which are deeply rooted in the way people behave and societies operate collectively (Hirshleifer and Teoh, 2003; Hirshleifer and Teoh, 2009). Looking at this through the lens of the board of directors setting, very interesting research avenues open up. Directors are generally allowed to serve on more than one board, partly because the source for such high-profile job market is limited. Besides, appointment of outside directors would allow firms to flexibly pool together necessary expertise and experience at the board level to run the business. It is, therefore, a 'small world' where it would be very likely that directors know each other well, a setting which intensifies the likelihood of spreading behaviour. If the spread of behaviour is shown to be irrational or pernicious, it would be costly to the society because sub-optimal

[28] The chapter has been greatly benefited from the comments and advices of Steven Young, Mark Clatworthy, Joanne Horton as well as the editors of a journal to which a draft of the paper written on the basis of this chapter has been submitted, the reviewers and participants at the 2015 and 2016 British Accounting and Finance Association Doctoral Colloquium, 2015 Sussex Young Finance Scholars Conference, 2015 Kent Business School PhD Conference, 2016 European Accounting Association Annual Congress, 2016 International Finance and Banking Society Conference, 2016 Financial Management Association European Conference.

decisions, by definition, destroy value. It necessitates research which could provide evidence of the spread of corporate decisions from one firm to another through the network of board directors. The literature on this topic is growing fast in recent years (e.g. Chiu et al., 2013; Brown and Drake, 2014; Cai et al., 2014 etc.).

Chiu et al. (2013) use a sample of US firms during the period from 1997 to 2002 and find that earnings management which later results in restatements is contagious from one firm to another through board interlocks. They also document that the contagion effect is stronger if the interlocked directors hold important positions which could influence financial reporting practices. The evidence presented by Chiu et al. (2013) is very interesting and contributes significantly to our knowledge of how board interlocks spread earnings management across firms. Nevertheless, there is still a lot to be done to help us better understand the nature and mechanism behind the documented contagion of earnings management.

This chapter extends the evidence in Chiu et al. (2013) to further ask the following important questions. First, what particular methods of earnings management (i.e. accruals and/or real earnings management) are contagious via board interlock? Earnings management which later results in restatements typically involves accruals-based violations of GAAP. Hence, it is interesting to know if board interlocks would spread real earnings management, which often does not violate GAAP and thus does not necessarily result in restatements. Second, the chapter also investigates which characteristics of the shared directors could have an impact on the contagion effect. On this issue, the chapter extends existing evidence by further looking at the effects on earnings management contagion of the interlocked directors' gender, age, and nationality beside their financial-related positions. This is an important investigation as it would help us better understand what really drives the contagion of earnings management.

Using a sample of UK listed firms during the period 2005 to 2012, the chapter presents empirical evidence consistent with board interlocks spreading aggressive accruals and real earnings management from one firm to another. The focus on aggressive earnings management ensures the chapter could provide insights into the type of earnings management which could potentially be most harmful for financial statement users. The chapter employs the modified-Jones model (Dechow et al., 1995) to proxy for accruals earnings management and Roychowdhury's (2006) models for real earnings management. Accruals aggressors are then defined as those with too high discretionary accruals compared to their peers in the same industry and year. Similarly, firms with too low abnormal cash flows, too high abnormal production costs, and too low abnormal discretionary expenses are defined as aggressors via manipulation of sales, production level, and discretionary expenses, respectively. For each of the above four methods of earnings management (one based on accruals and three on real activities), the following test of the contagion effect is done. When a firm is identified as an aggressor in a year, the period covering that year and two years afterwards is defined as the contagious period and the aggressive firm is defined as a 'contagious' firm during that period. Any firms which have an interlock with the contagious firm during the contagious period is defined as 'exposed' firms. The central hypothesis is that exposed firms are more likely to be aggressors too. Logistic regressions are employed to test the hypothesis.

It is found that being linked with a firm which is aggressive using accruals management during the contagious period makes an exposed firm more likely to be an accruals aggressor. Similarly, a firm which shares a director with a contagious firm which is aggressively managing earnings via manipulation of production activities (discretionary expenses) is also found to be more likely to be an aggressive manipulator of production activities (discretionary expenses, respectively). The chapter does not find evidence that sales manipulation is contagious via the board network. Moreover, the contagion of aggressive practices is found to be stronger if the interlocked director is male, older, British, or charged with duties which could influence financial reporting. The evidence is also shown to be robust after controlling for the issues of endogenous matching (i.e. firms which are aggressive might have appointed the same directors) and common firm characteristics (i.e. the exposed and contagious firms are both aggressive because they share some common characteristics).

The chapter makes some major contributions. First, the evidence of the spread of aggressive accounting practices across UK firms via the board network is original and of significant importance to both practitioners and regulators, especially in the setting of the current pressures to reform corporate governance structure in response to recent accounting scandals. In the post-'Brexit'[29] era, the pressure to reform corporate governance system in the UK is more real than ever. The pressure is now coming from the very top level of the country as MacLellan (2016) reports the following statement from Mrs Theresa May, the UK's newest Prime Minister at the time this thesis is submitted:

> The people who run big businesses are supposed to be accountable to outsiders, to non-executive directors... In practice, they are drawn from the same, narrow social and professional circles as the executive team… We're going to change that system.

In that context, the evidence provided in this chapter that the 'small world' of corporate directors could spread aggressive earnings management around would add additional rationales for the efforts to reform corporate governance system. Being

[29] The term is used popularly in 2016 to refer to the UK's vote to leave the European Union (the EU hereafter).

aggressive in financial reporting, by definition, is a deviation from optimal practices which would inflate reported earnings and hence would typically bias financial information users' decision. While aggressive accruals earnings management simply inflate earnings through adopting aggressive accounting policies and estimations (i.e. only 'cooking the books'), being aggressive using real earnings management usually destroy real values. For example, if an aggressor is cutting down on staff training and R&D expenses to report higher earnings, the firm would lose in the long term as it will become less efficient and competitive. The spread of aggressive accounting practices via board network as evidenced in this chapter implies that allowing the 'small world' of board directors to serve in several companies would be harmful for the efficient flow of capital in particular and for the wealth of the economy in general. Academically, the evidence extends the contagion of restatements initiated by Chiu et al. (2013) by showing that both accruals and real earnings management are contagious. The chapter also provides new evidence that gender, age, and nationality of the interlocked directors do play a role in driving the contagion effect. Moreover, using a sample of restatements, such as the GAO's release of restatements as used in Chiu et al. (2013), introduces a sample selection bias (e.g. Dechow et al., 2010). In particular, GAO does not select firms randomly for investigation due to their limited resources. As a result, many manipulators might not have been covered in GAO sample (Type II error). This might be a particularly important issue in this kind of research because focusing only on restated firms would not allow the full network of directors to be mapped. Instead, the sample used in this chapter covers all UK listed firms, which is an important advantage as the chapter could map the full network of UK directors.

The rest of the chapter proceeds as follows. Section 4.2 reviews the relevant literature followed by the development of testable hypotheses in Section 4.3. Section 4.4 presents the data selection criteria and Section 4.5 explains the methodologies employed. Section 4.6 reports the main results while some additional tests are reported in Section 4.7. Section 4.8 concludes and highlights key contributions of the chapter. Section 4.9 provides the definitions of all variables used in this chapter.

4.2. LITERATURE REVIEW

4.2.1. Theoretical backgrounds: Why would corporate decisions spread from one company to another through the board network?

Theoretically, there are well-established grounds for the spread of behaviour within a network. The sociology literature suggests at least four major theories to explain why people in a same network tend to mimic each other, a phenomenon called *localized conformity*. First, the sanctions on deviants theory proposes that deviation from the norm of a network would be costly, hence people tend to be reluctant to act differently when they belong to a group or network (Akerlof, 1976; Bendor and Mookherjee, 1987; Hirshleifer and Rasmusen, 1989; Kuran, 1989 etc.). Second, the theory of positive payoff externalities suggests that being in conformity with the majority would create a positive payoff for both the individuals and the group (Dybvig and Spatt, 1983; Farrell and Saloner, 1986; Arthur, 1989; Hung and Plott, 2001 etc.). Third, following the conformity preference theory, people with a preference to conform tend to attract more support from the network to which they belong, hence one would inherently prefer to conform with others in the network (Jones, 1984). Finally, the communication theory implies that if communication is effective and costless, individuals within a network would communicate with each other so that everyone with adopt the optimal course of action (Rogers, 1983).

Overall, the sociology literature reviewed above has established that people in the same network systematically mimic each other. It is interesting to know if in the setting of board rooms, board directors would conform to each other’s action. The seminal work of Bikhchandani et al. (1992) revolutionarily propose a theory of *information cascade* which is built upon the foundation of the localized conformity theory. An information cascade occurs when in equilibrium one would follow the action of those ahead of her/him and disregard her/his own information. The ones who are followed are often those with more expertise or experience. For example, in a board meeting where directors are discussing about a financial matter, the financial expertise and experience of a few directors would likely to cascade and the rest of the board are likely to follow the actions of the experts. The theory is closely linked with the herding mentality which is very well documented in the psychological literature (e.g. Hirshleifer and Teoh, 2003; Belhoula and Naoui, 2011; Mabrouk Houda and Mohamed, 2013; Philippas et al., 2013; Weisberg, 2013; Zhou and Anderson, 2013; Yao et al., 2014). Herding behaviour has been shown to be ubiquitous in all aspects of human decision-making process, including in the board setting (González et al., 2006).

Taken together, existing theories suggest that certain actions could spread through a network via mechanisms which are deeply rooted in the way people behave and societies operate collectively. Looking at this under the lens of the board of directors setting, very interesting research avenues open up. The prevailing Anglo-Saxon model of corporate governance allows directors to sit in the board of several companies, partly because the source for such high-profile job market is limited. It is, therefore, a ‘small world’ where it would be very likely that directors know each other well, a setting which intensifies the likelihood of spread of behaviour. If the spread of behaviour is shown to be irrational or pernicious, it would be costly to the society because sub-optimal decisions, by definition, destroy value. It necessitates research which could bring about evidence of the spread of corporate decisions from one firm to another through the network of board directors. This body of the literature is very promising with a lot of potential to contribute to our knowledge and influence policy at the world-level; hence the literature is young but is growing very fast. The next two sub-sections will review some key findings emerged from this literature.

4.2.2. The characteristics and roles of board interlocks

A board interlock exists when a director serves on the boards of at least two companies. Board interlocks could be created by both executive and non-executive directors. Many executive directors, especially in larger companies, often serve on the boards of other companies. Alternatively, an interlock could be created by a firm appointing a non-executive director. Corporate governance codes, especially in the US and UK, generally require the boards to have some outside directors. It makes board interlocks a very common phenomena. Interlocked directors seem to benefit firms in gathering and assessing information about business opportunities (Haunschild and Beckman, 1998; Fick, 2003; Connelly and Van Slyke, 2012). Burt (1980) finds that larger firms tend to have greater and more diverse network of board directors. Palmer (1983) analyses data on interlocks which are disrupted accidentally and concludes that interlocked directors generally provide a vehicle for formal coordination. Research also suggests that board interlock represents connections between local city-based groups (Koenig et al., 1979; Kono et al., 1998). Renneboog and Zhao (2011) suggest that board interlocks are form to facilitate information sharing as well as for managers to accumulate power. Despite the popularity of board interlocks, there is also evidence suggesting that the practice might be harmful for companies (Connelly and Van Slyke, 2012; Mizruchi, 1996). Devos et al. (2009) find that the presence of board interlocks is associated with lower firms' performance and suboptimal chief executive officers' compensation packages. Hallock (1997) provides evidence that chief executive officers who also serve as director at other companies tend to lead larger firms and enjoy better compensation packages. Kang (2008) suggests that directors who are interlocked with firms being accused of financial reporting frauds would suffer from reputational penalty. Krishnan et al. (2011) find that non-executive directors are usually socially connected to the chief executives of the firms through, for example, past employment, alumni network, professional membership or religious organization. It suggests that the world of interlocked directors is a very ‘small’ world.

It has also been very well documented that interlocked directors play a significant and important role in all aspects of corporate decisions. Cai and Sevilir (2012) document a significantly higher returns obtained by acquirers in M&A deals where there is a board connection between the acquirer and the target before the deal announcement. Their evidence suggests that board interlocks provide acquirers with information advantage about the true value of the targets. Palmer et al. (1995) find that having interlocked directors on board also makes a firm less likely to be a target for a predatory M&A. Renneboog and Zhao (2014) present evidence suggesting interlocked directors make it more likely for an M&A to be completed successfully with shorter negotiation time. Cai et al. (2014) find that interlocked directors facilitate information sharing, hence help constrain quarterly earnings forecasts guidance. Johansen and Pettersson (2013) find that director interlocks play a significant role in the decision of auditor appointment.

4.2.3. Evidence of the spread of corporate decisions through the board network

Within the strand of research examining the role and characteristics of board interlocks, a recent niche looks particularly at whether interlocked directors would spread certain behaviour or practices from one company to another. Brown and Drake (2014) present evidence in line with the hypothesis that tax avoidance strategies spread around through the network of ‘elite’ directors and top executives. Cai et al. (2014) document empirical evidence that disclosure policies diffuse between firms which share a common director. Bizjak et al. (2009) find that being interlocked with a director who have prior experience of backdating stock options would make a firm more likely to backdate its stock options. Brown (2011) presents evidence in line with aggressive corporate tax reporting also spreads through the board network via the use of corporate-owned life insurance shelter. Davis (1991) suggests that the use of Poison Pill, a takeover defence to protect the targets, spread through the inter-corporate network. Stuart and Yim (2010) find evidence that directors with private equity experience, through their social ties with the key players in the private equity ecosystem, would make a public firm more likely to be the target for a private-equity-based deal. Engelberg et al. (2012) find that firms with board connections with banks enjoy lower interest rates. Haunschild (1993) present evidence that firms imitate M&A activities of other firms which they are interlocked with.

From the literature reviewed above, it is quite established that board interlock would serve as a channel through which a company might mimic certain actions or behaviour from another company. Building on that, recent attempts from accounting researchers have provided evidence that the contagion of behaviour via the board network is also observable in the financial reporting function. Chiu et al. (2013) find that earnings management behaviour, proxied by subsequent earnings restatement, is contagious between firms which share a common board director. Chiu et al. (2013) argue that the earnings management practice that later requires a restatement is unobservable to outsiders at the time it occurs, but it is observable to the insiders, including the directors. Therefore, at the time the earnings management practice occurs, it is observed by the directors under (arguably false) impression that it is a low cost practice. If those directors are also serving on the boards of other companies, they may then diffuse bad financial reporting practices to those companies. The contagion effect is found to be stronger if the interlocked director holds leadership or accounting-related role on the board. The key mechanism for such earnings management contagion is herding behaviour resulting from the influence of an interlocked director perceiving lower cost of manipulating earnings upon observing such behaviour from another firm which he or she is also serving as a director.

The insights provided by the literature on the role of interlocked directors in spreading certain corporate behaviour and practices are striking and very informative for policy-makers, especially with the increasing stricter regulations imposed in the US in recent years regarding the composition of boards and what directors could and could not do. Nevertheless, as an emerging field, the agenda is still full of opportunities for further research to contribute. One immediate direction is to investigate *other behaviour* spread in *other contexts* (apart from the US where most of the existing studies tend to focus on). Another dimension which is still under-researched is to investigate the *underlying mechanism* of the spread of behaviour. In addition, more exploration of which situations would intensify or diminish the spread of behaviour would also be a fruitful avenue for meaningful contributions. This chapter will contribute to the existing literature by responding to the above identified gaps. The next section will refine these research ideas into testable hypotheses.

4.3. HYPOTHESES DEVELOPMENT

The evidence presented by Chiu et al. (2013) is very interesting and invites further research to investigate if other financial reporting practices are also contagious. Moreover, the contagion of restatements is silent regarding what particular methods to manage earnings are contagious. Assuming the interlocked directors would bring earnings management practices to the exposed firms because they had observed the high benefit and/or low cost of those practices at the contagious firms, it is reasonable to expect the directors to implement the particular methods of earnings management engaged by the contagious firms at the exposed firms. To manage earnings, it is not always necessary to ‘cook the book’ as managers could manage real activities to influence reported earnings (Roychowdhury, 2006).

The chapter argues that if an interlocked director observed aggressive accruals earnings management at the contagious firm, it would be likely for the director to influence the board at the exposed firm to adopt aggressive accruals earnings management rather than other methods. Similarly, if a firm is interlocked with a real earnings aggressor, it is more likely to manage earnings aggressively using real earnings management methods. Testing this intuition would bring about evidence which could significantly extend our knowledge of the mechanism behind the contagion effect of earnings management. The first hypothesis is therefore:

H1: Exposure via board links to an accruals (real earnings) aggressor increases the likelihood of the exposed firm being an accruals (real earnings, respectively) aggressor.

If the contagion of aggressive earnings management through board interlocks does exist, there are several factors which could restrain or intensify the contagion effect. Firstly, existing evidence suggests that the gender of directors plays a role in determining the extent of earnings management. For example, Arun et al. (2015) finds that female directors would restrain earnings management. Kyaw et al. (2015) find that gender diversity plays an important role in mitigating earnings management, especially in countries where gender equality is well respected. Srinidhi et al. (2011) find that having female directors on the boards would improve earnings quality. Similar evidence is obtained in the particular context of high-technology firms (Gavious et al., 2012). Francis et al. (2015) also find that an appointment of female directors would generally make a firm more conservative in external financial reporting. It is therefore reasonable to expect, if the contagion of aggressive earnings management does exist, the effect would be more pronounced if the interlocked directors are male. An investigation of the effect of gender on the spread of earnings management via board interlock is important because corporate governance regulations in most parts of the world, including in the UK, is increasingly placing pressure on boards to have more female directors.

Secondly, evidence in the psychology literature suggests that experts who are respected as opinion leaders have greater influence over other team members (Bikhchandani et al., 1992; Rogers, 1983). Opinion leaders are likely to be older directors who generally have more experience and recognized reputation. The evidence of the impact of directors' age on earnings management is, however, rather mixed. Davidson et al. (2007) find that firms with older chief executive officers manage earnings upwards in the year prior to the executive's retire. On the contrary, Huang et al. (2012b) document a positive relationship between directors' age and financial reporting quality measured by the likelihood of meeting or beating analysts' consensus earnings forecast and financial restatements. Based on the literature, it is expected that the contagion of aggressive earnings management, if it indeed exists, would be affected by the age of the involved interlocked directors.

Thirdly, if a director is to be successful in influencing the exposed firm to adopt aggressive earnings management, his/her connections with and influence over the other directors on the board would be crucial. In fact, it has been shown that even when a firm declares a director as 'independent', he or she might not in many cases 'truly independent' as a result of the complex, formal and informal, network links established through educational background, work history, or social group (Hwang and Kim, 2009; Crespí-Cladera and Pascual-Fuster, 2014). Hoitash (2011) provides evidence that the existence of outside directors who are socially tied with management is likely to affect financial reporting quality. Within UK listed firms, directors who are British would be dominant in terms of number. Hence, British directors tend to know each other well because of their common involvement in various formal and informal networks (Renneboog and Zhao, 2011). It is therefore expected that the spread of earnings management would be more pronounced through a British interlocked director.

Finally, the literature generally suggests that earnings management is significantly affected by directors with financial background and those who hold positions which could influence financial reporting function. Xie et al. (2003) and Bédard et al. (2004) find that directors who serve on the audit committees and have financial expertise could mitigate accruals earnings management. Similar evidence is reported by Carcello et al. (2006) and Badolato et al. (2014) which look at other types of earnings management, including real earnings and accounting irregularities. Overall, the existing literature suggests that in the board room setting, directors who have expertise in and/or holds position related to financial reporting would have more influence on firm’s financial reporting practices. Hence, the contagion of aggressive earnings management via an interlocked director who holds a position which could influence financial reporting function, such as chief executive officer, chief financial officer, chairman or audit committee member, is expected to be greater.

Following the arguments outlined above, the second hypothesis is developed as follows:

> ***H2: Exposure via board links to an accruals (real earnings) aggressor through a male, older, British director, or one who holds important financial-reporting-related position increases the likelihood of the exposed firm being an accruals (real earnings, respectively) aggressor.***

4.4. SAMPLE SELECTION

The chapter starts from an initial sample including all firms listed on the LSE as at the end of 2012 which includes 1,814 firms. The sample covers the period from 2005 to 2012. The sample selection approach means firms which are listed on the

LSE at some stages during the 2005-2012 period but delisted before 2012 are excluded. It is fully acknowledged that this approach would introduce survivorship bias into the sample. However, it is for practical purpose that the sample has to exclude delisted firms because it is very difficult to locate original annual reports of delisted firms which are needed for data on corporate governance and compensation. Nevertheless, it could be argued that the results of the chapter are not sensitive to the exclusion of delisted firms because there are no established reasons why directors serving on the boards of those delisted firms would have more or less incentives and/or pressures to spread aggressive earnings management.

Financial and utilities firms are then excluded. Financial data is sourced from Datastream. The chapter also deletes observations with market value of equity smaller than £1 million as well as those with negative book-to-market ratio. The following steps are then applied to arrive at the final sample. First, only observations which have enough data to estimate discretionary accruals using the modified-Jones model and Roychowdhury’s (2006) measures of real earnings management (as described in Section 2.5.1 in Chapter 2) are retained. Of the remained firms, those without a Stock Exchange Daily Official List code (SEDOL hereafter) are deleted. Data on external auditor, M&A, compensation, membership in board sub-committees and managerial roles are collected from Bloomberg and matched with data from Datastream via SEDOL. For each firms, details of board directors, including name, appointment and resignation dates, are hand collected from Key Note. To get data from Key Note, a search for the company’s name is conducted, and on the resulting list a check on a trial-and-error basis is done until the SEDOL is matched. If a firm’s SEDOL cannot be matched with any firm in the Key Note’s search result list, the firm is excluded from the sample. Bloomberg only provides details of board of directors and compensation for a limited number of years and include a lot of missing data. Hence, to maintain the largest possible sample, the original annual reports of each firm in each year are also downloaded from Key Note. Where membership in board sub-committees and managerial roles, compensation are missing from Bloomberg, data is supplemented from the hand-collected data directly from annual reports. Finally, the sample excludes all observations without enough data to calculate all variables used in this chapter as described in Section 4.9. The process yields a sample of 2,365 observations, including 473 unique firms across 31 Datastream level-six industries, which is quite comparable to prior studies using UK data on board directors (e.g. Beekes et al., 2004; Peasnell et al., 2005). All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

4.5. METHODOLOGIES

4.5.1. Indicators of aggressive earnings management

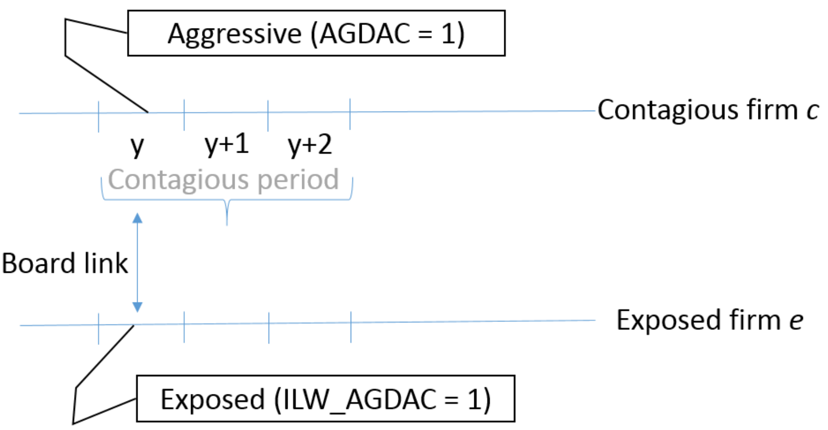
The chapter employs the modified-Jones model (Jones, 1991; Dechow et al., 1995) to estimate discretionary accruals and Roychowdhury's (2006) three measures of real earnings management as described in Section 2.5.1. Using the above four measures of earnings management, the chapter then sorts each of them into 10 deciles in each industry-year and define the membership in the top deciles as indicators of the 'aggressors', i.e. those with too high DAC, DCF, DPROD, DDISEXP, and denote them as AGDAC, AGDCF, AGDPROD, AGDDISEXP, respectively.

4.5.2. Contagious board interlocks

The key variable of interest used in this chapter is the indicator of a firm being exposed through a board link with an aggressive firm during the contagious period. The hypothesis is if a firm has such link, it would be more likely to be an aggressive firm as well. The following explains how the indicator of exposed firms is constructed. Only accruals earnings management is used to illustrate because the same procedures are applicable for all other measures of real earnings management. If firm *c* is an accruals aggressor in year *cy* (i.e. AGDAC of firm *c* in year *y* is equal to one), the period from year *y* to *y+2* (inclusive) is defined as the 'contagious period' and firm *c* is defined as a 'contagious firm' during this period. Following Chiu et al. (2013), the chapter allows the contagious period to extend two years after the recorded aggressive earnings management because it might take time for the interlocked directors to bring the aggressive financial reporting practices from the contagious firms to the exposed firms.

A dummy, denoted ILW_AGDAC, is then created as follows. During the contagious period, if another firm *e* has a board link with the contagious firm *c*, firm *e* is defined as an 'exposed' firm and the indicator ILW_AGDAC is set to one, zero otherwise. For the purpose of determining board links, a director is considered as serving on a firm's board in a year if he or she is listed as a director of the firm in that year in Key Note, regardless of the appointment and resignation date. The approach means a director might be on a firm's board for less than a full year[30]. Figure F4.1 further illustrates the procedures described above. Similar procedures are then applied to create ILW_AGDCF, ILW_AGDPROD and ILW_AGDDISEXP.

Figure F4.1. Contagious board interlocks



Notes: Definitions of variables are in Section 4.9.

[30] All main analyses in this chapter are replicated and unreported results show that requiring directors to serve on the boards of directors for at least 6 months in a fiscal year would not qualitatively change the main conclusions of the chapter.

4.5.3. Control variables

Using the above indicators of aggressive earnings management as dependent variables, the regressions control for factors that prior research has identified as determinants of earnings management. The following sub-sections describe the construction of those control variables.

4.5.3.1. Industry-year adjustment

Because the measures earnings management are estimated within each industry-year, it is a common approach in the literature that the control variables are also adjusted for the corresponding industry-year mean (e.g. Roychowdhury, 2006; Houmes and Skantz, 2010). Following the literature, except for the dummies, all other control variables used in this chapter are added to the regression after adjusted for the corresponding mean of the industry-year as follows:

$$aCONTROL_{i,t} = CONTROL_{i,t} - \overline{CONTROL}_{t,k} \ (i \in k) \qquad \text{(E4.1)}$$

where: $aCONTROL_{i,t}$ is the industry-year adjusted control variable of firm *i* in year *t* (the lowercase letter 'a' is used to represent industry-year adjusted control variable); $CONTROL_{i,t}$ is the actual value of the control variable of firm *i* in year *t*; $\overline{CONTROL}_{t,k}$ is the corresponding mean of the control variable of all firms in industry *k* in year *t*; k=1…31 are the 31 unique Datastream level-six industry remained in the sample.

4.5.3.2. Corporate governance and performance-linked executive compensation

The literature, as reviewed in Section 2.5.5.2 in Chapter 2, is well established that corporate governance and performance-linked executive compensation packages significantly affect earnings management. Following the literature, the chapter controls for the characteristics of the board of directors which could drive aggressive earnings management by adding to the regressions the number of board links (denoted aBOLINK), number of directors on board (aBOSIZE), percentage of non-executive directors on board (aBOIND), number of directors on audit committee (aAUCOMSIZE), percentage of non-executive directors on audit committee (aAUCOMIND) and an indicator which is equal to one if the chief executive officer is also the chairman of a company, zero otherwise (DUALITY).

The chapter also considers four components of executive compensation which are typically linked to performance, namely bonus, stocks, options and long-term incentive pay awarded during the year. Data is collected manually from each sample firm's annual reports. For each executive director, the four components are summed up to get the total performance-linked compensation for each individual. Because performance-linked executive compensation is generally quite small compared to sales (which is used as the deflator for this variable), it is multiplied by 1,000 before proceeding to avoid too small values. TOTCOMPEN is then calculated as the average of the total performance-linked compensation across all executive directors scaled by sales. aTOTCOMPEN, which is used as the control variable in the regressions, is finally arrived at by demeaning TOTCOMPEN within the industry-year using the procedures described in Section 4.5.3.1.

4.5.3.3. Firm's fundamentals

Following the literature reviewed in Section 2.4 of Chapter 2, this chapter also controls for factors that have been shown to be related to earnings management. In particular, the multivariate regressions control for firm size [using aLn(MVE)], market-to-book ratio (aMTB), profitability (aROA), debt ratio (aDEBT), balance sheet bloat (aNOA), tangible assets (aCAP), book-tax difference (aBOOKTAX), seasonal equity offers (ESEO), non-Big-5 auditors (EAUDIT), announcement of an M&A deal (EMA), and financial distress (EDISTRESS). All of these variables are as defined in Chapter 2 with the prefix 'a' indicating the variable has been demeaned within each industry-year using the procedures outlined in Section 4.5.3.1. In addition to the above variables, this chapter also controls for R&D expense which is one of the strong determinants of earnings management as suggested by the literature (Bange and De Bondt, 1998; Francis et al., 2004; Osma and Young, 2009; Athanasakou and Olsson, 2012; Nogara, 2013). RD is defined as research and development expenses divided by sales[31]. aRD is then used in the regressions after RD is demeaned within each industry using the procedures described in Section 4.5.3.1. Noted that aNOA and EAUDIT are only used in accruals earnings management regressions.

4.5.4. Empirical models

To test hypothesis *H1*, the following logistic regressions are estimated:

$$\begin{aligned} Logit(Y_{i,t}) = {} & \alpha + \beta_1 ILW\_Y_{i,t} + \beta_2 aBOLINK_{i,t} + \beta_3 aBOSIZE_{i,t} + \beta_4 aBOIND_{i,t} + \\ & \beta_5 aAUCOMSIZE_{i,t} + \beta_6 aAUCOMIND_{i,t} + \beta_7 aDUALITY_{i,t} + \\ & \beta_8 aTOTCOMPEN_{i,t} + \beta_9 aLn(MVE)_{i,t-1} + \beta_{10} aMTB_{i,t-1} + \\ & \beta_{11} aROA_{i,t} + \beta_{12} aDEBT_{i,t-1} + \beta_{13} aNOA_{i,t-1} + \beta_{14} aRD_{i,t} + \\ & \beta_{15} aCAP_{i,t} + \beta_{16} aBOOKTAX_{i,t} + \beta_{17} ESEO_{i,t} + \beta_{18} EAUDIT_{i,t} + \\ & \beta_{19} EMA_{i,t} + \beta_{20} EDISTRESS_{i,t} + \varepsilon \end{aligned} \quad \text{(E4.2)}$$

where: $Y_{i,t}$ is the indicator of aggressive earnings management (Y is replaced in each regression by an indicator of aggressive earnings management, i.e. AGDAC, AGDCF, AGDPROD and AGDDISEXP) of firm *i* in year *t*; $ILW\_Y_{i,t}$ is one if firm *i* in year *t* has an interlock with a contagious firm during the contagious period, zero

[31] If R&D expense is missing from Datastream, it is assumed that the firm does not invest in R&D, hence a value of zero is used.

otherwise; all control variables are as defined in Section 4.5.3 (note that aNOA and EAUDIT are only included when the dependent variable is AGDAC).

The coefficient of interest is ILW_Y, which is the indicator of the exposed firm being interlocked with a contagious firm during the year the contagious firm is identified as an aggressive firm and two following years. If β_1 in Equation (E4.2) is significantly positive, it would suggest the likelihood of a firm being aggressive increases if the firm is interlocked with a contagious firm during the contagious period, i.e. the evidence is in support of *H1*.

For hypothesis *H2*, the chapter tests the impact of gender, age, nationality, and financial-reporting-related positions of interlocked directors on the contagion of aggressive earnings management separately. First, to test the impact of the gender of interlocked directors on the contagion effect, ILW_Y is decomposed into ILW_Y_MALE and ILW_Y_FEMALE and the following regressions are estimated:

$$Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \sum \beta_k\, Control_k + \varepsilon \quad \text{(E4.3)}$$

where: Y is replaced in each regression by an indicator of aggressive earnings management, i.e. AGDAC, AGDCF, AGDPROD and AGDDISEXP; ILW_Y_MALE is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is male, zero otherwise; ILW_Y_FEMALE is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is female, zero otherwise; $Control_k$ is the set of control variables which have been shown in the literature to be determinants of earnings management as outlined in Section 4.5.3; time and firm subscripts are the same as in (E4.2) and suppressed for simplicity.

If the contagion effect is more pronounced through male interlocked directors, β_1 in the above regressions would be significantly positive and β_2 would be insignificant.

Second, ILW_Y is interacted with ILW_Y_AGE, the variable capturing the age of the interlocked director:

$$Logit(Y) = \alpha + \beta_1 ILW\_Y \times ILW\_Y\_AGE + \sum \beta_k \, Control_k + \varepsilon \quad \text{(E4.4)}$$

where: Y is replaced in each regression by an indicator of aggressive earnings management, i.e. AGDAC, AGDCF, AGDPROD and AGDDISEXP; ILW_Y_AGE is age of the interlocked director at fiscal year-end (rounded to the nearest whole number of years) if a firm has an interlock with a contagious firm during the contagious period, zero otherwise; $Control_k$ is the set of control variables which have been shown in the literature to be determinants of earnings management as outlined in Section 4.5.3; time and firm subscripts are the same as in (E4.2) and suppressed for simplicity.

If β_1 in the above regressions are positive and statistically significant, it is evidence that the older the interlocked director, the stronger the spread of aggressive earnings management.

Third, ILW_Y is decomposed into ILW_Y_BRIT, which is one if the interlocked director is British and zero otherwise, and ILW_Y_NONBRIT, which is one if the interlocked director is not British and zero otherwise. The following regressions are then estimated:

$$Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \sum \beta_k \, Control_k + \varepsilon \quad \text{(E4.5)}$$

where: Y is replaced in each regression by an indicator of aggressive earnings management, i.e. AGDAC, AGDCF, AGDPROD and AGDDISEXP; ILW_Y_BRIT is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is British, zero otherwise; ILW_Y_NONBRIT is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is not British, zero otherwise; $Control_k$ is the set of control variables which have been shown in the literature to be determinants of earnings management as outlined in Section 4.5.3; time and firm subscripts are the same as in (E4.2) and suppressed for simplicity.

H2 predicts β_1 in the above regressions to be significantly positive and β_2 to be insignificant.

Finally, ILW_Y is decomposed into ILW_Y_FINEX and ILW_Y_NOFINEX and the following regressions are estimated:

$$Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \sum \beta_k\, Control_k + \varepsilon \quad \text{(E4.6)}$$

where: Y is replaced in each regression by an indicator of aggressive earnings management, i.e. AGDAC, AGDCF, AGDPROD and AGDDISEXP; ILW_Y_FINEX is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is a chairman, chief executive officer, chief financial officer or member of audit committee of the exposed firm, zero otherwise; ILW_Y_NOFINEX is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is not a chairman, chief executive officer, chief financial officer or member of audit committee of the exposed firm, zero otherwise; $Control_k$ is the set of control variables which have been shown in the literature to be determinants of earnings management as outlined in Section 4.5.3; time and firm subscripts are the same as in (E4.2) and suppressed for simplicity.

In a similar fashion, ILW_Y_FINCO and ILW_Y_NOFINCO are used in the following regressions:

$$Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \sum \beta_k\, Control_k + \varepsilon \quad \text{(E4.7)}$$

where: Y is replaced in each regression by an indicator of aggressive earnings management, i.e. AGDAC, AGDCF, AGDPROD and AGDDISEXP; ILW_Y_FINCO is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is a chairman, chief executive officer, chief financial officer or member of audit committee of the contagious firm, zero otherwise; ILW_Y_NOFINCO is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is not a chairman, chief executive officer, chief financial officer or member of audit committee of the contagious firm, zero otherwise; $Control_k$ is the set of control variables which have been shown in the literature to be determinants of earnings management as outlined in Section 4.5.3; time and firm subscripts are the same as in (E4.2) and suppressed for simplicity.

H2 predicts β_1 in (E4.6) and (E4.7) to be positive and β_2 to be insignificant.

4.6. RESULTS

4.6.1. Descriptive statistics and correlations

Table T4.1 reports some descriptive statistics of the sample. The means of MVE, TA, SALE and IB are all remarkably higher than even the 75^{th} percentile. Since those variables capture firm size, it suggests the sample comprises some very large firms and have very few small firms. Recall that the sample selection procedures would filter out firms which are delisted or do not provide enough information needed for this chapter (see Section 4.4) which are typically small firms. As a result, firms which are remained in the sample tends to be larger firms. Again, it is acknowledged that the sample does have some bias towards larger and survived firms. AGDAC, AGDCF, AGDPROD and AGDDISEXP are all approximately 10% because of the way aggressors are defined. An average board in the sample has 6.58 directors, of which

54.47% are non-executive. Board interlock is, although not prevalent, remarkably observable in the sample. While there are firms with no board link, the highest number of links is 9, leaving the average number of links at 0.8059[32]. Compared to, for example, Renneboog and Zhao (2011) who report the average number of interlock in UK listed firms of 4.02 over the period 1996-2007, the average board link reported in Table T4.1 is remarkably smaller. This might be the result of stricter regulations in the post-2003 in the UK with regard to how many board directorships a director could hold[33]. Note also that the definition of number of board link in this chapter is not the same as the number of interlocks. A firm might have two or more interlocks with a same firm but through different directors, in which case the number of board links as defined in this chapter is still one. Besides, the sample employed in this chapter excludes financial institutions and banks, which are typically large companies with many board connections (Burt, 1980). On average, 11.12% (10.49%, 10.57% and 10.99%) of sample firms have a board link with an accruals (sales, production, discretionary expenses, respectively) aggressor during the contagious period.

The correlations between the main variables are reported in Table T4.2. There is initial evidence that the indicators of aggressive earnings management (AGDAC, AGDCF, AGDPROD, AGDDISEXP) and the indicator of interlock with an aggressive earnings management firm (ILW_AGDAC, ILW_AGDCF, ILW_AGDPROD, ILW_AGDDISEXP) are positively correlated. Besides, there is no too high correlation between the explanatory variables that would cause a concern.

[32] Unreported results show that at director level, 90% of the directors serve on only one board during the sample period. Of the remained directors who serve on multiple boards, the majority serve only two boards (8.4%). Only three directors serve on five boards in a year, which is the maximum in the sample.

[33] From 2003, the Higgs report regulates that full-time executive directors should hold only one non-executive directorship (but not chairmanship) at another FTSE-100 company. There is, however, no maximum directorships a director could hold.

Table T4.1. Descriptive statistics (n = 2,365)

Variables	Mean	Standard deviation	Minimum	25th percentile	Median	75th percentile	Maximum
DAC	0.0041	0.1214	-0.4614	-0.0455	0.0083	0.0638	0.3828
DCF	-0.0276	0.1560	-0.4639	-0.1103	-0.0293	0.0428	0.5728
DPROD	-0.0210	0.2468	-0.9236	-0.1251	-0.0102	0.0982	0.7381
DDISEXP	0.0246	0.2698	-1.0443	-0.0698	0.0466	0.1651	0.7089
AGDAC	0.1011	0.3015	0.0000	0.0000	0.0000	0.0000	1.0000
AGDCF	0.1011	0.3015	0.0000	0.0000	0.0000	0.0000	1.0000
AGDPROD	0.1011	0.3015	0.0000	0.0000	0.0000	0.0000	1.0000
AGDDISEXP	0.1011	0.3015	0.0000	0.0000	0.0000	0.0000	1.0000
ILWAGDAC	0.1112	0.3145	0.0000	0.0000	0.0000	0.0000	1.0000
ILWAGDCF	0.1049	0.3064	0.0000	0.0000	0.0000	0.0000	1.0000
ILWAGDPROD	0.1057	0.3075	0.0000	0.0000	0.0000	0.0000	1.0000
ILWAGDDISEXP	0.1099	0.3129	0.0000	0.0000	0.0000	0.0000	1.0000
BOLINK	0.8059	1.1843	0.0000	0.0000	0.0000	1.0000	9.0000
BOSIZE	6.5822	2.1773	2.0000	5.0000	6.0000	8.0000	19.0000
BOIND	0.5447	0.1511	0.1667	0.4286	0.5556	0.6667	0.9231
AUCOMSIZE	3.2744	1.3009	1.0000	2.0000	3.0000	4.0000	17.0000
AUCOMIND	0.9400	0.1509	0.1667	1.0000	1.0000	1.0000	1.0000
DUALITY	0.0626	0.2423	0.0000	0.0000	0.0000	0.0000	1.0000
TOTCOMPEN	17.0128	89.0377	0.0000	0.0238	0.6834	2.8843	743.9283
MVE (£ million)	1,187	5,966	1	14	54	310	85,497
TA (£ million)	993	4,312	0	17	69	334	64,006
SALE (£ million)	837	4,017	0	13	54	320	134,634
IB (£ million)	76	447	-1,426	-1	2	18	6,204
MTB	3.1293	4.1061	0.1781	1.0416	1.8549	3.4249	28.3414
ROA	0.0027	0.2124	-0.9023	-0.0278	0.0482	0.1005	0.4922
DEBT	0.1441	0.1465	0.0000	0.0025	0.1111	0.2344	0.5952
NOA	0.4988	0.2356	-0.1338	0.3484	0.5449	0.6755	0.8975
RD	0.3319	2.0859	0.0000	0.0000	0.0000	0.0203	18.5968
CAP	0.3591	0.3307	0.0078	0.1043	0.2399	0.5419	1.4623
BOOKTAX	1.7615	9.1012	0.0002	0.0098	0.0318	0.1427	75.6739
ZSCORE	18.5874	39.3351	-112.1051	4.2458	12.6525	24.5762	230.7747
ESEO	0.2338	0.4234	0.0000	0.0000	0.0000	0.0000	1.0000
EAUDIT	0.4495	0.4975	0.0000	0.0000	0.0000	1.0000	1.0000
MA	0.0474	0.2124	0.0000	0.0000	0.0000	0.0000	1.0000

Notes: The table reports the mean, standard deviation, minimum, 25th, 50th (the median), 75th percentiles and maximum of selected variables. Definitions of variables are in Section 4.9.

Table T4.2. Correlations

Variable		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
AGDAC	1	0.02	*0.00*	*-0.02*	*-0.04*	*-0.04*	-0.10	-0.10	-0.08	-0.07	0.05	*0.02*	-0.15	*0.03*	0.07	-0.10	-0.11	*0.01*	-0.05	*0.02*	0.08	0.16	*0.02*	*0.04*
AGDCF	2	*0.00*	*0.00*	*-0.01*	*0.01*	-0.05	-0.14	-0.08	-0.07	-0.06	*0.01*	0.06	-0.19	0.07	-0.38	-0.09	-0.16	0.09	-0.09	0.05	0.20	0.09	*0.02*	0.35
AGDPROD	3	*-0.03*	*-0.02*	0.01	*0.02*	-0.05	*-0.02*	-0.06	*-0.03*	*-0.02*	*0.02*	*0.00*	*-0.03*	*0.00*	-0.08	-0.06	-0.09	*0.01*	-0.07	*0.02*	*0.04*	0.04	*0.02*	0.11
AGDDISEXP	4	-0.04	0.04	*0.04*	0.03	*-0.04*	*-0.01*	*-0.01*	*-0.02*	*0.01*	*0.00*	*-0.01*	*0.01*	-0.05	0.07	*0.03*	*0.02*	-0.13	*-0.03*	*-0.02*	*0.03*	*0.03*	*0.01*	*0.01*
ILWAGDAC	5	1.00																						
ILWAGDCF	6	0.34	1.00																					
ILWAGDPROD	7	0.15	0.37	1.00																				
ILWAGDDISEXP	8	0.10	0.18	0.50	1.00																			
aBOLINK	9	0.26	0.27	0.26	0.24	1.00																		
aBOSIZE	10	0.08	0.06	0.05	0.06	0.23	1.00																	
aBOIND	11	0.12	0.11	0.12	0.09	0.25	0.28	1.00																
aAUCOMSIZE	12	0.09	0.05	0.07	0.06	0.11	0.48	0.36	1.00															
aAUCOMIND	13	0.10	0.05	0.08	0.09	0.06	0.17	0.37	*-0.03*	1.00														
DUALITY	14	*-0.01*	*-0.01*	-0.05	-0.05	*0.00*	-0.06	-0.06	-0.06	-0.14	1.00													
aTOTCOMPEN	15	*0.01*	0.05	*0.03*	*0.01*	*-0.01*	-0.09	*-0.01*	*-0.04*	*0.00*	*0.01*	1.00												
aLn(MVE)$_{i,t-1}$	16	0.09	0.08	0.09	0.10	0.23	0.65	0.39	0.48	0.23	-0.08	-0.09	1.00											
aMTB$_{i,t-1}$	17	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.02*	*0.03*	*-0.03*	0.05	0.09	1.00										
aROA$_{i,t}$	18	*0.00*	*-0.02*	*-0.02*	*-0.04*	0.10	0.22	0.07	0.10	0.04	*0.01*	-0.22	0.34	0.05	1.00									
aDEBT$_{i,t-1}$	19	*0.03*	*0.02*	0.10	0.09	0.14	0.21	0.17	0.17	*0.03*	-0.08	-0.05	0.20	*-0.03*	0.09	1.00								
aNOA$_{i,t-1}$	20	*0.01*	*0.00*	0.06	0.06	*0.04*	*0.01*	*0.03*	0.04	*-0.01*	0.04	-0.10	0.04	-0.15	0.05	0.34	1.00							
aRD$_{i,t}$	21	*0.03*	*0.04*	*0.03*	*0.01*	*-0.01*	-0.04	*-0.04*	-0.05	*0.03*	*-0.01*	0.42	-0.06	0.04	-0.19	-0.08	-0.13	1.00						
aCAP$_{i,t}$	22	0.04	0.04	0.10	0.10	0.11	0.11	0.14	0.12	0.13	-0.06	-0.05	0.13	*-0.02*	0.15	0.22	0.15	-0.05	1.00					
aBOOKTAX$_{i,t}$	23	*0.04*	0.07	*0.03*	*0.03*	*-0.02*	-0.09	-0.05	-0.05	*0.00*	*-0.02*	0.60	-0.10	0.04	-0.24	-0.07	-0.05	0.34	-0.08	1.00				
ESEO$_{i,t}$	24	*-0.01*	*-0.01*	*-0.01*	*0.01*	-0.06	-0.13	-0.06	-0.09	-0.05	*0.03*	*0.04*	-0.24	*0.00*	-0.33	0.06	*0.03*	*0.00*	-0.10	*0.03*	1.00			
EAUDIT$_{i,t}$	25	-0.08	-0.08	-0.14	-0.17	-0.21	-0.33	-0.26	-0.20	-0.17	0.10	0.06	-0.49	*-0.02*	-0.16	-0.15	*-0.01*	*0.03*	-0.14	0.07	0.16	1.00		
EMA$_{i,t}$	26	*0.02*	*0.03*	*0.01*	*0.02*	*0.00*	*0.00*	*0.00*	*-0.01*	*0.01*	*-0.02*	*0.02*	*-0.03*	*-0.02*	*-0.03*	*-0.03*	*-0.04*	*0.01*	*-0.03*	*-0.01*	0.20	*0.04*	1.00	
EDISTRESS$_{i,t}$	27	*-0.01*	*-0.01*	-0.05	*-0.03*	-0.10	-0.16	-0.08	-0.07	*-0.04*	*-0.03*	0.13	-0.27	*0.03*	-0.59	-0.12	-0.19	0.12	-0.13	0.18	0.18	0.15	*-0.01*	1.00

Notes: The table reports Pearson correlation coefficients between selected variables. Definitions of variables are in Section 4.9. Values reported in *italic* indicate the corresponding coefficients are *not significant at 5% level.*

4.6.2. Main results

The results of testing *H1* are reported in Table T4.3. It could be observed that the control variables generally have the predicted sign. With regard to the contagion of aggressive accruals earnings management, the evidence is in support of the hypothesis *H1* with a significantly positive coefficient of AGDAC on ILW_AGDAC (0.5329, significant at 5% level). In terms of economic significance, the marginal effect of ILW_AGDAC is 3.29% while the unconditional probability of being an aggressive firm is only 10% suggesting interlock with an aggressive accruals earnings management firm during the contagious period increases the likelihood that the exposed firm is also an accruals aggressive firm by an economically significant magnitude. Similarly, it could also be observed that real earnings management is contagious via manipulation of production activities (coefficient of AGDPROD on ILW_AGDPROD is 0.3870, significant at 10% level) and discretionary expenses (coefficient of AGDDISEXP on ILW_AGDDISEXP is 0.4633, significant at 5% level), but not via sales manipulation (coefficient of AGDCF on ILW_AGDCF is 0.1127, statistically insignificant). In terms of economic magnitude, being linked with an aggressor which manipulates production activities (discretionary expenses) during the contagious period would increase the likelihood of the exposed firm also being an aggressive manipulator of production activities (discretionary expenses) by 3.69% (4.39%), which is remarkable given the unconditional probability of being an aggressor is 10% by definition. Overall, the evidence suggests that board interlock does spread aggressive earnings management practices from one firm to another. The evidence significantly adds to the existing knowledge on the contagion effect via board interlocks. While the contagion of restatements documented in Chiu et al. (2013) could be present even when the exposed and contagious firms apply completely different methods of managing earnings, the chapter shows that the interlocked directors would bring the particular earnings management choices (i.e.

accruals and real earnings management) to the exposed firms upon observing those aggressive practices at the contagious firms.

Table T4.4 reports the results of testing whether gender of the interlocked directors would affect the spread of aggressive earnings management. Looking at the spread of aggressive accruals earnings management, the coefficient of AGDAC on ILW_AGDAC_MALE is 0.5844 and is statistically significant at 5% level, while the coefficient on ILW_AGDAC_FEMALE is insignificant. Similar evidence is observed for production activities and discretionary expenses manipulation. The coefficient of AGDPROD (AGDDISEXP) on ILW_AGDPROD_MALE (ILW_AGDDISEXP_MALE) is 0.4598 (0.5745) and is significant at 10% (5%) level, while ILW_AGDPROD_FEMALE (ILW_AGDDISEXP_FEMALE) does not seem to statistically affect AGDPROD (AGDDISEXP). The evidence is in support of the hypothesis showing that male interlocked director is the main channel through which aggressive earnings management spreads across firms.

The results of examining the impact of age of the interlocked directors on the contagion effect are reported in Table T4.5. In the regression with AGDAC as the dependent variable, ILW_AGDAC is interacted with ILW_AGDAC_AGE (which captures the age of the interlocked director). The interaction term is statistically significant (0.0095, significant at 5% level) suggesting the older the interlocked director, the stronger the spread of aggressive accruals earnings management. Similar evidence is observed for the contagion of aggressive manipulation of production activities and discretionary expenses, but not for sales manipulation. The evidence, therefore, suggests that the older the interlocked directors are, the stronger the spread of aggressive earnings management.

Table T4.6 reports the results of the examination of the effect of the interlocked directors' nationality on the contagion effect. In the regression where AGDAC

(AGDPROD, AGDDISEXP) is the dependent variable, the coefficient on ILW_AGDAC_BRIT (ILW_AGDPROD_BRIT, ILW_AGDDISEXP_BRIT) is 0.5861 (0.5124, 0.5413), all are significant at 5% level. Meanwhile, the corresponding coefficients on ILW_AGDAC_NONBRIT, ILW_AGDPROD_NONBRIT, and ILW_AGDDISEXP_NONBRIT are all statistically insignificant. Therefore, hypothesis that in the UK context being British makes an interlocked director more able to spread aggressive earnings management behaviour could not be rejected.

Next, the chapter tests whether interlocked directors who hold financial-reporting-related positions would have an impact on the contagion effect and the results are reported in Table T4.7 and T4.8. In Table T4.7, it could be observed that the coefficients on the indicator of interlock with an aggressive firm manipulating accruals (production activities and discretionary expenses) via a director charged with financial-reporting-related responsibilities at the exposed firm, i.e. ILWAGDAC_FINEX (ILWAGDPROD_FINEX, ILWAGDDISEXP_FINEX) are significantly positive while the coefficients on the indicator of interlock with an aggressive firm via a director not charged with financial-reporting-related responsibilities at the exposed firm are all statistically insignificant. Similar evidence could be observed if the interlocked directors assume financial-reporting-related positions at the contagious firms as reported in Table T4.8. Overall, the evidence suggests that the contagion effect is mainly driven by directors who are charged with financial-reporting-related responsibilities.

In general, the evidence strongly suggests the existence of the contagion effect with respect to aggressive earnings management behaviour across the network of board directors. The contagion effect is stronger when the interlocked directors are male, older, British, or charged with duties which could influence financial reporting practices. Hence, based on the reported results, both hypotheses *H1* and *H2* could not be rejected.

Table T4.3. Aggressive earnings management and interlocked directors

Variables	Predicted sign	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
		Coefficient	**Chi-square**	**Coefficient**	**Chi-square**	**Coefficient**	**Chi-square**	**Coefficient**	**Chi-square**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	+/-	-3.1113	440.893***	-2.9892	582.284***	-2.4934	567.096***	-2.56	583.793***
$ILW\_Y_{i,t}$	+	0.5329	5.388**	0.1127	0.177	0.387	2.748*	0.4633	4.43**
$aBOLINK_{i,t}$	+/-	0.0299	0.151	0.0442	0.273	-0.1288	2.707*	-0.1812	5.406**
$aBOSIZE_{i,t}$	-	-0.0257	0.237	-0.1014	3.139*	0.0319	0.461	-0.0257	0.28
$aBOIND_{i,t}$	-	-0.6156	0.993	-0.6328	0.913	-1.2513	4.291**	-0.2017	0.113
$aAUCOMSIZE_{i,t}$	-	-0.0143	0.028	0.0278	0.099	-0.018	0.056	-0.0763	1.046
$aAUCOMIND_{i,t}$	-	-0.259	0.248	-0.2197	0.147	0.1738	0.103	0.4271	0.541
$DUALITY_{i,t}$	+	0.2707	1.11	0.1434	0.229	0.241	0.794	0.0259	0.008
$aTOTCOMPEN_{i,t}$	+	0.0002	0.096	-0.0005	0.454	-0.0006	0.561	0.0016	4.137**
$aLn(MVE)_{i,t-1}$	+/-	-0.1855	9.09***	-0.0757	1.422	0.0646	1.39	0.056	1.058
$aMTB_{i,t-1}$	+/-	0.001	0.007	0.0353	9.382***	-0.0032	0.074	-0.0366	7.828***
$aROA_{i,t}$	+/-	3.039	45.572***	-2.8144	38.588***	-0.2626	0.38	2.2268	22.61***
$aDEBT_{i,t-1}$	+/-	-1.2495	4.194**	-0.8519	1.846	-0.998	3.055*	0.7888	2.343
$aNOA_{i,t-1}$	-	-1.1384	14.301***						
$aRD_{i,t}$	+/-	-0.0041	0.036	0.0365	2.554	-0.0052	0.064	-0.0982	33.555***
$aCAP_{i,t}$	+/-	-0.048	0.029	-0.2712	0.742	-0.706	5.588**	-0.5772	4.049**
$aBOOKTAX_{i,t}$	+/-	0.0043	0.373	-0.0134	4.37**	0.0008	0.016	0.0005	0.005
$ESEO_{i,t}$	+	0.7099	17.474***	0.4907	7.412***	0.1168	0.445	0.3001	2.969*
$EAUDIT_{i,t}$	+	0.6653	14.888***						
$EMA_{i,t}$	+	-0.0982	0.096	0.0985	0.086	0.2943	0.979	0.0096	0.001
$EDISTRESS_{i,t}$	+	0.5423	5.352**	1.0388	23.96***	0.7253	11.207***	0.7094	9.278***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \sum \beta_k \, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 3 and 4), AGDCF (columns 5 and 6), AGDPROD (columns 7 and 8), AGDDISEXP (columns 9 and 10); $Control_k$ include the variables described in Section 4.5.3. Column (2) exhibits the expected sign of the explanatory variables (where the sign "+/-" indicates the existing literature is not conclusive regarding the relationship between that variable and the measures of earnings management). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.4. Aggressive earnings management and gender of interlocked directors

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1088	440.402***	-3.0083	577.864***	-2.4955	566.706***	-2.5586	583.716***
$ILW\_Y\_MALE_{i,t}$	0.5844	5.885**	0.2863	1.073	0.4598	3.418*	0.5745	5.846**
$ILW\_Y\_FEMALE_{i,t}$	0.1443	0.048	-1.3686	2.295	-0.0350	0.003	0.0039	0
$aBOLINK_{i,t}$	0.0237	0.093	0.0258	0.089	-0.1379	3.003*	-0.1876	5.741**
$aBOSIZE_{i,t}$	-0.0266	0.255	-0.1047	3.335*	0.0318	0.459	-0.0285	0.344
$aBOIND_{i,t}$	-0.6093	0.971	-0.6907	1.082	-1.2616	4.358**	-0.1983	0.109
$aAUCOMSIZE_{i,t}$	-0.0070	0.007	0.0314	0.125	-0.0150	0.039	-0.0772	1.067
$aAUCOMIND_{i,t}$	-0.2528	0.236	-0.1645	0.082	0.1880	0.12	0.4361	0.564
$DUALITY_{i,t}$	0.2675	1.083	0.1330	0.196	0.2397	0.785	0.0165	0.003
$aTOTCOMPEN_{i,t}$	0.0002	0.077	-0.0006	0.703	-0.0006	0.618	0.0016	4.121**
$aLn(MVE)_{i,t-1}$	-0.1866	9.176***	-0.0739	1.349	0.0654	1.418	0.0574	1.11
$aMTB_{i,t-1}$	0.0009	0.006	0.0353	9.211***	-0.0033	0.08	-0.0368	7.958***
$aROA_{i,t}$	3.0431	45.634***	-2.8738	39.83***	-0.2698	0.4	2.2201	22.41***
$aDEBT_{i,t-1}$	-1.2694	4.309**	-0.9287	2.174	-0.9931	3.019*	0.7935	2.377
$aNOA_{i,t-1}$	-1.1429	14.411***						
$aRD_{i,t}$	-0.0042	0.037	0.0365	2.576	-0.0053	0.066	-0.0988	33.958***
$aCAP_{i,t}$	-0.0365	0.017	-0.2357	0.558	-0.6958	5.414**	-0.5650	3.881**
$aBOOKTAX_{i,t}$	0.0047	0.434	-0.0136	4.492**	0.0010	0.023	0.0005	0.004
$ESEO_{i,t}$	0.7133	17.609***	0.5037	7.786***	0.1188	0.459	0.2951	2.867*
$EAUDIT_{i,t}$	0.6610	14.671***						
$EMA_{i,t}$	-0.1023	0.104	0.1140	0.116	0.2930	0.969	0.0090	0.001
$EDISTRESS_{i,t}$	0.5379	5.259**	1.0417	24.134***	0.7258	11.234***	0.7008	9.048***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.5. Aggressive earnings management and age of interlocked directors

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1056	443.004***	-3.0004	580.456***	-2.4968	574.213***	-2.5729	589.261***
$ILW\_Y_{i,t}$*$ILW\_Y\_AGE_{i,t}$	0.0095	5.485**	0.0036	0.589	0.0077	3.544*	0.0102	7.072***
$aBOLINK_{i,t}$	0.0276	0.127	0.0350	0.167	-0.1379	3.011*	-0.1940	6.076**
$aBOSIZE_{i,t}$	-0.0257	0.239	-0.1017	3.155*	0.0320	0.464	-0.0252	0.27
$aBOIND_{i,t}$	-0.6119	0.98	-0.6511	0.964	-1.2595	4.344**	-0.1980	0.109
$aAUCOMSIZE_{i,t}$	-0.0042	0.003	0.0276	0.097	-0.0151	0.04	-0.0767	1.05
$aAUCOMIND_{i,t}$	-0.2397	0.212	-0.2124	0.138	0.1885	0.121	0.4344	0.559
$DUALITY_{i,t}$	0.2711	1.114	0.1430	0.227	0.2397	0.785	0.0337	0.013
$aTOTCOMPEN_{i,t}$	0.0002	0.068	-0.0005	0.484	-0.0006	0.616	0.0016	4.182**
$aLn(MVE)_{i,t-1}$	-0.1876	9.285***	-0.0760	1.434	0.0645	1.383	0.0556	1.041
$aMTB_{i,t-1}$	0.0009	0.007	0.0354	9.377***	-0.0034	0.084	-0.0368	7.964***
$aROA_{i,t}$	3.0372	45.44***	-2.8167	38.762***	-0.2651	0.388	2.2459	22.927***
$aDEBT_{i,t-1}$	-1.2890	4.446**	-0.8412	1.808	-0.9937	3.025*	0.7967	2.397
$aNOA_{i,t-1}$	-1.1429	14.417***						
$aRD_{i,t}$	-0.0041	0.035	0.0368	2.599	-0.0049	0.058	-0.0978	33.285***
$aCAP_{i,t}$	-0.0362	0.016	-0.2708	0.742	-0.6978	5.465**	-0.5762	4.032**
$aBOOKTAX_{i,t}$	0.0050	0.489	-0.0135	4.444**	0.0010	0.022	0.0005	0.004
$ESEO_{i,t}$	0.7166	17.787***	0.4918	7.449***	0.1187	0.459	0.3008	2.98*
$EAUDIT_{i,t}$	0.6626	14.747***						
$EMA_{i,t}$	-0.1024	0.104	0.0962	0.082	0.2937	0.974	0.0131	0.002
$EDISTRESS_{i,t}$	0.5371	5.25**	1.0407	24.055***	0.7264	11.266***	0.7150	9.435***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.6. Aggressive earnings management and nationality of interlocked directors

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1094	440.508***	-3.0061	578.522***	-2.4966	566.763***	-2.5592	583.65***
$ILW\_Y\_BRIT_{i,t}$	0.5861	5.567**	0.3538	1.616	0.5124	4.242**	0.5413	5.531**
$ILW\_Y\_NONBRIT_{i,t}$	0.2970	0.339	-1.5371	3.131*	-0.2617	0.18	-0.0850	0.018
$aBOLINK_{i,t}$	0.0253	0.106	0.0259	0.09	-0.1398	3.107*	-0.1850	5.605**
$aBOSIZE_{i,t}$	-0.0256	0.235	-0.1067	3.464*	0.0339	0.52	-0.0262	0.292
$aBOIND_{i,t}$	-0.6017	0.946	-0.7112	1.146	-1.2697	4.409**	-0.2006	0.112
$aAUCOMSIZE_{i,t}$	-0.0121	0.02	0.0345	0.151	-0.0160	0.045	-0.0771	1.064
$aAUCOMIND_{i,t}$	-0.2647	0.258	-0.1629	0.081	0.1954	0.129	0.4329	0.556
$DUALITY_{i,t}$	0.2707	1.109	0.1263	0.177	0.2370	0.768	0.0214	0.005
$aTOTCOMPEN_{i,t}$	0.0002	0.089	-0.0006	0.761	-0.0006	0.657	0.0016	4.16**
$aLn(MVE)_{i,t-1}$	-0.1849	9.016***	-0.0742	1.36	0.0637	1.345	0.0563	1.069
$aMTB_{i,t-1}$	0.0010	0.008	0.0353	9.202***	-0.0030	0.063	-0.0369	7.908***
$aROA_{i,t}$	3.0477	45.694***	-2.8841	40.163***	-0.2824	0.437	2.2328	22.666***
$aDEBT_{i,t-1}$	-1.2616	4.262**	-0.9570	2.288	-1.0050	3.082*	0.8325	2.593
$aNOA_{i,t-1}$	-1.1431	14.399***						
$aRD_{i,t}$	-0.0042	0.037	0.0371	2.67	-0.0054	0.07	-0.0976	33.079***
$aCAP_{i,t}$	-0.0363	0.016	-0.1811	0.322	-0.6810	5.182**	-0.5692	3.932**
$aBOOKTAX_{i,t}$	0.0045	0.401	-0.0137	4.6**	0.0011	0.026	0.0006	0.006
$ESEO_{i,t}$	0.7102	17.483***	0.5046	7.807***	0.1208	0.475	0.2991	2.95*
$EAUDIT_{i,t}$	0.6632	14.785***						
$EMA_{i,t}$	-0.1041	0.107	0.1055	0.099	0.2952	0.983	0.0116	0.001
$EDISTRESS_{i,t}$	0.5416	5.332**	1.0358	23.871***	0.7238	11.178***	0.7074	9.234***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \sum \beta_k Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.7. Aggressive earnings management and positions of interlocked directors at the exposed firms

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1108	439.862***	-2.9896	582.228***	-2.4934	567.04***	-2.5599	583.81***
$ILW\_Y\_FINEX_{i,t}$	0.5378	5.024**	0.2148	0.601	0.3694	2.277	0.4534	3.792*
$ILW\_Y\_NOFINEX_{i,t}$	0.4917	0.6	-0.7159	0.759	0.5365	0.713	0.5311	0.927
$aBOLINK_{i,t}$	0.0295	0.146	0.0450	0.283	-0.1282	2.682	-0.1809	5.384**
$aBOSIZE_{i,t}$	-0.0255	0.233	-0.1012	3.124*	0.0318	0.458	-0.0258	0.282
$aBOIND_{i,t}$	-0.6126	0.978	-0.6245	0.887	-1.2486	4.271**	-0.2049	0.117
$aAUCOMSIZE_{i,t}$	-0.0144	0.029	0.0216	0.059	-0.0175	0.053	-0.0760	1.036
$aAUCOMIND_{i,t}$	-0.2600	0.25	-0.2273	0.158	0.1725	0.101	0.4274	0.542
$DUALITY_{i,t}$	0.2717	1.114	0.1399	0.218	0.2420	0.8	0.0259	0.008
$aTOTCOMPEN_{i,t}$	0.0002	0.096	-0.0005	0.541	-0.0006	0.562	0.0016	4.136**
$aLn(MVE)_{i,t-1}$	-0.1855	9.092***	-0.0699	1.205	0.0642	1.373	0.0560	1.057
$aMTB_{i,t-1}$	0.0010	0.007	0.0354	9.383***	-0.0031	0.069	-0.0366	7.822***
$aROA_{i,t}$	3.0393	45.571***	-2.8469	39.11***	-0.2618	0.378	2.2275	22.622***
$aDEBT_{i,t-1}$	-1.2494	4.193**	-0.8857	1.986	-0.9981	3.056*	0.7908	2.353
$aNOA_{i,t-1}$	-1.1381	14.291***						
$aRD_{i,t}$	-0.0041	0.036	0.0392	2.868*	-0.0052	0.064	-0.0983	33.556***
$aCAP_{i,t}$	-0.0475	0.028	-0.2755	0.764	-0.7078	5.616**	-0.5775	4.054**
$aBOOKTAX_{i,t}$	0.0044	0.374	-0.0136	4.49**	0.0008	0.016	0.0005	0.004
$ESEO_{i,t}$	0.7097	17.461***	0.4934	7.471***	0.1164	0.441	0.2989	2.938*
$EAUDIT_{i,t}$	0.6647	14.827***						
$EMA_{i,t}$	-0.0979	0.095	0.1035	0.096	0.2937	0.975	0.0100	0.001
$EDISTRESS_{i,t}$	0.5422	5.348**	1.0329	23.637***	0.7260	11.225***	0.7099	9.288***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \sum \beta_k Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.8. Aggressive earnings management and positions of interlocked directors at the contagious firms

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1127	440.109***	-2.9894	582.136***	-2.4939	566.859***	-2.5661	582.512***
$ILW\_Y\_FINCO_{i,t}$	0.5160	4.569**	0.0846	0.092	0.4084	2.819*	0.6142	7.068***
$ILW\_Y\_NOFINCO_{i,t}$	0.6580	1.292	0.4144	0.269	0.1774	0.055	-0.6424	0.728
$aBOLINK_{i,t}$	0.0293	0.144	0.0442	0.273	-0.1307	2.764*	-0.1986	6.292**
$aBOSIZE_{i,t}$	-0.0250	0.223	-0.1018	3.163*	0.0322	0.469	-0.0259	0.286
$aBOIND_{i,t}$	-0.6159	0.994	-0.6391	0.93	-1.2525	4.297**	-0.1658	0.076
$aAUCOMSIZE_{i,t}$	-0.0134	0.025	0.0287	0.105	-0.0179	0.056	-0.0714	0.923
$aAUCOMIND_{i,t}$	-0.2603	0.25	-0.2107	0.135	0.1723	0.101	0.4242	0.531
$DUALITY_{i,t}$	0.2708	1.111	0.1408	0.221	0.2420	0.801	0.0251	0.007
$aTOTCOMPEN_{i,t}$	0.0002	0.096	-0.0005	0.425	-0.0006	0.562	0.0016	4.085**
$aLn(MVE)_{i,t-1}$	-0.1856	9.097***	-0.0754	1.413	0.0635	1.337	0.0504	0.851
$aMTB_{i,t-1}$	0.0009	0.007	0.0354	9.426***	-0.0032	0.073	-0.0374	8.04***
$aROA_{i,t}$	3.0331	45.306***	-2.8208	38.697***	-0.2526	0.349	2.3017	23.812***
$aDEBT_{i,t-1}$	-1.2481	4.183**	-0.8549	1.86	-0.9809	2.919*	0.8786	2.875*
$aNOA_{i,t-1}$	-1.1429	14.364***						
$aRD_{i,t}$	-0.0042	0.037	0.0363	2.52	-0.0051	0.061	-0.0971	32.756***
$aCAP_{i,t}$	-0.0450	0.025	-0.2730	0.75	-0.7052	5.574**	-0.5961	4.304**
$aBOOKTAX_{i,t}$	0.0044	0.375	-0.0134	4.39**	0.0009	0.017	0.0007	0.008
$ESEO_{i,t}$	0.7091	17.42***	0.4907	7.413***	0.1191	0.462	0.3050	3.073*
$EAUDIT_{i,t}$	0.6687	14.923***						
$EMA_{i,t}$	-0.0960	0.092	0.1005	0.09	0.2954	0.986	-0.0038	0
$EDISTRESS_{i,t}$	0.5406	5.314**	1.0372	23.868***	0.7253	11.21***	0.7084	9.256***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

4.7. ADDITIONAL TESTS

4.7.1. An alternative explanation: Aggressive firms would target the same pool of directors

An aggressive firm might purposely appoint directors with reputation of being aggressive in financial reporting, or those who do not have the capability and expertise to detect earnings management (or those who do not even care to speak up if they discover earnings management). Hence the exposed firm might employ aggressive directors from the same pool of people as does the contagious firm, leading to the two sharing an interlock director rather than because the interlocked director bringing aggressive reporting practices from one firm to the other. This endogenous matching is difficult to be directly controlled for because of the lack of a theoretical model and data to capture the tendency of board directors to be aggressive or to tolerate aggressiveness (Chiu et al., 2013). Instead, the endogenous matching is indirectly controlled for by introducing two indicators as follows.

The first indicator, ILW_Y_NEW, is a dummy which is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is within the first year of his/her directorship at the exposed firm, zero otherwise. Equation (E4.2), (E4.3), (E4.4), (E4.5), (E4.6) and (E4.7) are then re-estimated with ILW_Y_NEW being added to the right hand side. If an exposed firm is an aggressive firm and only employs the director for his or her aggressive reputation, ILW_Y_NEW would be positive and statistically significant. If ILW_Y_NEW is insignificant when added into the regressions besides ILW_Y, and ILW_Y remains positive and statistically significant, it is evidence that endogenous matching has little incremental effect on board contagion effect. The results as reported in Table T4.9, T4.10, T4.11, T4.12, T4.13 and T4.14 tend to support the contagion effect over the endogenous director appointment matching as an alternative explanation.

Table T4.9. Aggressive earnings management and interlocked directors – Controlling for directors who are in the first year of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1115	440.793***	-2.9890	581.667***	-2.4920	566.329***	-2.5617	583.393***
$ILW\_Y_{i,t}$	0.5289	4.934**	0.1165	0.156	0.4945	4.171**	0.5229	5.08**
$ILW\_Y\_NEW_{i,t}$	0.0419	0.004	-0.0177	0.001	-0.9293	1.481	-0.4156	0.512
$aBOLINK_{i,t}$	0.0297	0.148	0.0444	0.274	-0.1284	2.688	-0.1789	5.258**
$aBOSIZE_{i,t}$	-0.0256	0.236	-0.1014	3.14*	0.0322	0.468	-0.0246	0.258
$aBOIND_{i,t}$	-0.6185	0.997	-0.6322	0.91	-1.2511	4.285**	-0.1946	0.106
$aAUCOMSIZE_{i,t}$	-0.0142	0.028	0.0277	0.098	-0.0187	0.061	-0.0763	1.043
$aAUCOMIND_{i,t}$	-0.2581	0.246	-0.2199	0.148	0.1862	0.118	0.4319	0.554
$DUALITY_{i,t}$	0.2707	1.11	0.1434	0.229	0.2332	0.743	0.0317	0.012
$aTOTCOMPEN_{i,t}$	0.0002	0.096	-0.0005	0.455	-0.0006	0.556	0.0016	4.138**
$aLn(MVE)_{i,t-1}$	-0.1855	9.087***	-0.0757	1.422	0.0644	1.381	0.0550	1.017
$aMTB_{i,t-1}$	0.0010	0.007	0.0353	9.383***	-0.0037	0.1	-0.0370	7.964***
$aROA_{i,t}$	3.0405	45.485***	-2.8147	38.569***	-0.2581	0.368	2.2280	22.675***
$aDEBT_{i,t-1}$	-1.2501	4.196**	-0.8518	1.846	-1.0045	3.08*	0.7749	2.252
$aNOA_{i,t-1}$	-1.1390	14.3***						
$aRD_{i,t}$	-0.0041	0.035	0.0365	2.555	-0.0044	0.046	-0.0986	33.681***
$aCAP_{i,t}$	-0.0483	0.029	-0.2716	0.742	-0.7175	5.73**	-0.5806	4.096**
$aBOOKTAX_{i,t}$	0.0043	0.373	-0.0134	4.37**	0.0007	0.01	0.0004	0.003
$ESEO_{i,t}$	0.7103	17.47***	0.4905	7.398***	0.1155	0.434	0.3026	3.016*
$EAUDIT_{i,t}$	0.6651	14.873***						
$EMA_{i,t}$	-0.0994	0.098	0.0987	0.086	0.2931	0.969	0.0184	0.003
$EDISTRESS_{i,t}$	0.5428	5.357**	1.0384	23.885***	0.7229	11.102***	0.7100	9.289***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \beta_2 ILW\_Y\_NEW + \sum \beta_k Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.10. Aggressive earnings management and gender of interlocked directors – Controlling for directors who are in the first year of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1087	440.166***	-3.0075	577.795***	-2.4945	565.861***	-2.5604	583.309***
$ILW\_Y\_MALE_{i,t}$	0.5856	5.429**	0.3360	1.209	0.5880	5.154**	0.6468	6.669***
$ILW\_Y\_FEMALE_{i,t}$	0.1442	0.048	-1.3690	2.297	0.0025	0	0.0455	0.008
$ILW\_Y\_NEW_{i,t}$	-0.0110	0	-0.2138	0.131	-0.9889	1.665	-0.4636	0.633
$aBOLINK_{i,t}$	0.0238	0.093	0.0274	0.101	-0.1395	3.059*	-0.1854	5.598**
$aBOSIZE_{i,t}$	-0.0267	0.255	-0.1055	3.375*	0.0321	0.465	-0.0274	0.318
$aBOIND_{i,t}$	-0.6085	0.963	-0.6848	1.061	-1.2636	4.365**	-0.1912	0.102
$aAUCOMSIZE_{i,t}$	-0.0070	0.007	0.0305	0.117	-0.0152	0.04	-0.0771	1.062
$aAUCOMIND_{i,t}$	-0.2530	0.236	-0.1648	0.082	0.2045	0.142	0.4426	0.581
$DUALITY_{i,t}$	0.2675	1.083	0.1329	0.196	0.2310	0.729	0.0231	0.006
$aTOTCOMPEN_{i,t}$	0.0002	0.077	-0.0006	0.72	-0.0006	0.625	0.0016	4.114**
$aLn(MVE)_{i,t-1}$	-0.1866	9.177***	-0.0735	1.337	0.0653	1.416	0.0562	1.063
$aMTB_{i,t-1}$	0.0009	0.006	0.0353	9.221***	-0.0040	0.112	-0.0373	8.126***
$aROA_{i,t}$	3.0427	45.495***	-2.8799	39.925***	-0.2658	0.388	2.2211	22.476***
$aDEBT_{i,t-1}$	-1.2693	4.308**	-0.9302	2.181	-1.0005	3.045*	0.7792	2.283
$aNOA_{i,t-1}$	-1.1428	14.397***						
$aRD_{i,t}$	-0.0042	0.037	0.0368	2.607	-0.0044	0.046	-0.0992	34.11***
$aCAP_{i,t}$	-0.0364	0.017	-0.2399	0.576	-0.7049	5.515**	-0.5672	3.91**
$aBOOKTAX_{i,t}$	0.0047	0.434	-0.0137	4.545**	0.0009	0.017	0.0004	0.003
$ESEO_{i,t}$	0.7132	17.584***	0.5020	7.726***	0.1177	0.449	0.2974	2.909*
$EAUDIT_{i,t}$	0.6611	14.67***						
$EMA_{i,t}$	-0.1020	0.103	0.1173	0.122	0.2920	0.96	0.0182	0.003
$EDISTRESS_{i,t}$	0.5377	5.251**	1.0379	23.892***	0.7238	11.139***	0.7014	9.056***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \beta_3 ILW\_Y\_NEW + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.11. Aggressive earnings management and age of interlocked directors – Controlling for directors who are in the first year of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1059	442.767***	-2.9999	580.281***	-2.4944	573.124***	-2.5737	589.229***
$ILW\_Y_{i,t}*ILW\_Y\_AGE_{i,t}$	0.0094	5.032**	0.0041	0.614	0.0098	5.254**	0.0114	8.053***
$ILW\_Y\_NEW_{i,t}$	0.0483	0.005	-0.1199	0.042	-0.9791	1.643	-0.4903	0.724
$aBOLINK_{i,t}$	0.0273	0.124	0.0359	0.175	-0.1392	3.054*	-0.1913	5.898**
$aBOSIZE_{i,t}$	-0.0257	0.237	-0.1021	3.175*	0.0322	0.469	-0.0241	0.247
$aBOIND_{i,t}$	-0.6151	0.985	-0.6479	0.953	-1.2617	4.353**	-0.1888	0.099
$aAUCOMSIZE_{i,t}$	-0.0043	0.003	0.0271	0.093	-0.0150	0.039	-0.0765	1.042
$aAUCOMIND_{i,t}$	-0.2389	0.211	-0.2128	0.138	0.2084	0.148	0.4431	0.581
$DUALITY_{i,t}$	0.2712	1.114	0.1430	0.227	0.2308	0.727	0.0397	0.018
$aTOTCOMPEN_{i,t}$	0.0002	0.067	-0.0005	0.492	-0.0006	0.626	0.0016	4.181**
$aLn(MVE)_{i,t-1}$	-0.1875	9.279***	-0.0758	1.427	0.0643	1.375	0.0543	0.994
$aMTB_{i,t-1}$	0.0009	0.007	0.0354	9.383***	-0.0041	0.119	-0.0373	8.154***
$aROA_{i,t}$	3.0390	45.364***	-2.8204	38.794***	-0.2635	0.383	2.2454	22.964***
$aDEBT_{i,t-1}$	-1.2894	4.448**	-0.8414	1.809	-0.9964	3.024*	0.7832	2.307
$aNOA_{i,t-1}$	-1.1435	14.42***						
$aRD_{i,t}$	-0.0040	0.033	0.0369	2.621	-0.0040	0.038	-0.0982	33.412***
$aCAP_{i,t}$	-0.0367	0.017	-0.2732	0.753	-0.7069	5.566**	-0.5788	4.069**
$aBOOKTAX_{i,t}$	0.0050	0.488	-0.0135	4.469**	0.0008	0.017	0.0004	0.003
$ESEO_{i,t}$	0.7170	17.789***	0.4907	7.41***	0.1176	0.448	0.3037	3.035*
$EAUDIT_{i,t}$	0.6624	14.733***						
$EMA_{i,t}$	-0.1038	0.107	0.0981	0.086	0.2919	0.959	0.0245	0.006
$EDISTRESS_{i,t}$	0.5376	5.256**	1.0385	23.894***	0.7233	11.141***	0.7149	9.425***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \beta_2 ILW\_Y\_NEW + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.12. Aggressive earnings management and nationality of interlocked directors – Controlling for directors who are in the first year of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1095	440.417***	-3.0055	578.452***	-2.4960	565.815***	-2.5613	583.18***
$ILW\_Y\_BRIT_{i,t}$	0.5827	5.148**	0.3928	1.646	0.6478	6.227**	0.6101	6.31**
$ILW\_Y\_NONBRIT_{i,t}$	0.2942	0.329	-1.5283	3.079*	-0.2206	0.127	-0.0466	0.006
$ILW\_Y\_NEW_{i,t}$	0.0349	0.003	-0.1744	0.086	-1.0260	1.788	-0.4531	0.604
$aBOLINK_{i,t}$	0.0251	0.104	0.0273	0.1	-0.1421	3.189*	-0.1831	5.477**
$aBOSIZE_{i,t}$	-0.0255	0.234	-0.1072	3.49*	0.0346	0.542	-0.0251	0.268
$aBOIND_{i,t}$	-0.6042	0.948	-0.7072	1.131	-1.2733	4.425**	-0.1928	0.103
$aAUCOMSIZE_{i,t}$	-0.0121	0.02	0.0336	0.143	-0.0161	0.045	-0.0769	1.058
$aAUCOMIND_{i,t}$	-0.2640	0.257	-0.1641	0.082	0.2167	0.159	0.4399	0.574
$DUALITY_{i,t}$	0.2707	1.109	0.1263	0.177	0.2276	0.707	0.0279	0.009
$aTOTCOMPEN_{i,t}$	0.0002	0.088	-0.0007	0.774	-0.0006	0.668	0.0016	4.16**
$aLn(MVE)_{i,t-1}$	-0.1849	9.014***	-0.0739	1.348	0.0630	1.316	0.0551	1.02
$aMTB_{i,t-1}$	0.0010	0.007	0.0353	9.216***	-0.0035	0.088	-0.0373	8.054***
$aROA_{i,t}$	3.0489	45.606***	-2.8888	40.226***	-0.2802	0.43	2.2342	22.738***
$aDEBT_{i,t-1}$	-1.2621	4.263**	-0.9590	2.297	-1.0162	3.128*	0.8191	2.499
$aNOA_{i,t-1}$	-1.1435	14.397***						
$aRD_{i,t}$	-0.0042	0.036	0.0373	2.699	-0.0045	0.049	-0.0979	33.206***
$aCAP_{i,t}$	-0.0366	0.017	-0.1844	0.333	-0.6901	5.276**	-0.5723	3.974**
$aBOOKTAX_{i,t}$	0.0045	0.401	-0.0138	4.646**	0.0009	0.019	0.0005	0.005
$ESEO_{i,t}$	0.7105	17.477***	0.5035	7.768***	0.1208	0.473	0.3022	3.009*
$EAUDIT_{i,t}$	0.6630	14.771***						
$EMA_{i,t}$	-0.1051	0.109	0.1084	0.105	0.2947	0.977	0.0219	0.005
$EDISTRESS_{i,t}$	0.5420	5.336**	1.0328	23.674***	0.7205	11.042***	0.7079	9.241***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \beta_3 ILW\_Y\_NEW + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.13. Aggressive earnings management and positions of interlocked directors at the exposed firms – Controlling for directors who are in the first year of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1110	439.769***	-2.9902	581.517***	-2.4920	566.296***	-2.5616	583.401***
$ILW\_Y\_FINEX_{i,t}$	0.5338	4.634**	0.1979	0.436	0.4833	3.607*	0.5156	4.419**
$ILW\_Y\_NOFINEX_{i,t}$	0.4874	0.584	-0.7481	0.777	0.5820	0.833	0.5701	1.062
$ILW\_Y\_NEW_{i,t}$	0.0423	0.004	0.0884	0.023	-0.9226	1.454	-0.4129	0.505
$aBOLINK_{i,t}$	0.0293	0.144	0.0440	0.269	-0.1280	2.67	-0.1787	5.244**
$aBOSIZE_{i,t}$	-0.0254	0.232	-0.1009	3.107*	0.0321	0.467	-0.0247	0.259
$aBOIND_{i,t}$	-0.6155	0.982	-0.6264	0.892	-1.2493	4.27**	-0.1971	0.108
$aAUCOMSIZE_{i,t}$	-0.0143	0.028	0.0219	0.06	-0.0185	0.059	-0.0761	1.036
$aAUCOMIND_{i,t}$	-0.2591	0.248	-0.2265	0.157	0.1851	0.117	0.4323	0.554
$DUALITY_{i,t}$	0.2718	1.115	0.1395	0.216	0.2339	0.747	0.0318	0.012
$aTOTCOMPEN_{i,t}$	0.0002	0.095	-0.0005	0.537	-0.0006	0.556	0.0016	4.137**
$aLn(MVE)_{i,t-1}$	-0.1855	9.088***	-0.0698	1.204	0.0641	1.369	0.0549	1.016
$aMTB_{i,t-1}$	0.0010	0.007	0.0354	9.383***	-0.0037	0.097	-0.0370	7.958***
$aROA_{i,t}$	3.0409	45.484***	-2.8462	39.083***	-0.2577	0.366	2.2286	22.683***
$aDEBT_{i,t-1}$	-1.2500	4.195**	-0.8876	1.994	-1.0051	3.083*	0.7764	2.258
$aNOA_{i,t-1}$	-1.1387	14.29***						
$aRD_{i,t}$	-0.0041	0.034	0.0392	2.863*	-0.0044	0.046	-0.0986	33.669***
$aCAP_{i,t}$	-0.0478	0.029	-0.2735	0.752	-0.7182	5.742**	-0.5808	4.099**
$aBOOKTAX_{i,t}$	0.0044	0.374	-0.0136	4.471**	0.0007	0.01	0.0004	0.003
$ESEO_{i,t}$	0.7101	17.456***	0.4946	7.492***	0.1152	0.431	0.3018	2.993*
$EAUDIT_{i,t}$	0.6645	14.811***						
$EMA_{i,t}$	-0.0991	0.097	0.1022	0.093	0.2926	0.966	0.0185	0.003
$EDISTRESS_{i,t}$	0.5426	5.353**	1.0341	23.661***	0.7233	11.111***	0.7104	9.296***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \beta_3 ILW\_Y\_NEW + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.14. Aggressive earnings management and positions of interlocked directors at the contagious firms – Controlling for directors who are in the first year of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1128	440.04***	-2.9892	581.51***	-2.4927	566.021***	-2.5682	582.011***
$ILW\_Y\_FINCO_{i,t}$	0.5137	4.296**	0.0895	0.087	0.5184	4.234**	0.6793	7.822***
$ILW\_Y\_NOFINCO_{i,t}$	0.6532	1.224	0.4201	0.268	0.2649	0.122	-0.5871	0.606
$ILW\_Y\_NEW_{i,t}$	0.0272	0.002	-0.0234	0.002	-0.9343	1.495	-0.4422	0.58
$aBOLINK_{i,t}$	0.0291	0.143	0.0444	0.275	-0.1303	2.749*	-0.1959	6.116**
$aBOSIZE_{i,t}$	-0.0249	0.223	-0.1019	3.164*	0.0326	0.48	-0.0245	0.257
$aBOIND_{i,t}$	-0.6177	0.994	-0.6383	0.926	-1.2529	4.293**	-0.1574	0.069
$aAUCOMSIZE_{i,t}$	-0.0134	0.025	0.0286	0.104	-0.0187	0.06	-0.0713	0.918
$aAUCOMIND_{i,t}$	-0.2597	0.249	-0.2109	0.136	0.1845	0.116	0.4294	0.544
$DUALITY_{i,t}$	0.2708	1.111	0.1409	0.221	0.2343	0.75	0.0323	0.012
$aTOTCOMPEN_{i,t}$	0.0002	0.096	-0.0005	0.425	-0.0006	0.557	0.0016	4.078**
$aLn(MVE)_{i,t-1}$	-0.1856	9.094***	-0.0754	1.411	0.0632	1.325	0.0492	0.81
$aMTB_{i,t-1}$	0.0009	0.007	0.0354	9.427***	-0.0037	0.1	-0.0378	8.18***
$aROA_{i,t}$	3.0342	45.177***	-2.8213	38.678***	-0.2464	0.333	2.3044	23.914***
$aDEBT_{i,t-1}$	-1.2485	4.184**	-0.8548	1.859	-0.9874	2.949*	0.8578	2.728*
$aNOA_{i,t-1}$	-1.1432	14.362***						
$aRD_{i,t}$	-0.0042	0.036	0.0363	2.522	-0.0043	0.043	-0.0974	32.891***
$aCAP_{i,t}$	-0.0452	0.026	-0.2735	0.752	-0.7169	5.719**	-0.6003	4.365**
$aBOOKTAX_{i,t}$	0.0044	0.375	-0.0134	4.392**	0.0007	0.011	0.0006	0.006
$ESEO_{i,t}$	0.7093	17.408***	0.4904	7.397***	0.1182	0.454	0.3081	3.133*
$EAUDIT_{i,t}$	0.6685	14.904***						
$EMA_{i,t}$	-0.0968	0.093	0.1008	0.09	0.2946	0.979	0.0062	0
$EDISTRESS_{i,t}$	0.5409	5.315**	1.0368	23.793***	0.7231	11.109***	0.7093	9.276***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \beta_3 ILW\_Y\_NEW + \sum \beta_k \, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Secondly, the second indicator is designed to identify interlocked directors who are relatively new at the exposed firm. In particular, ILW_Y_NEW2 is created as a dummy which is one if a firm has an interlock with a contagious firm during the contagious period and the interlocked director is within two years into his/her directorship at the exposed firm, zero otherwise. Table T4.15, T4.16, T4.17, T4.18, T4.19 and T4.20 report the results of re-estimating Equation (E4.2), (E4.3), (E4.4), (E4.5), (E4.6) and (E4.7) with ILW_Y_NEW2 being added to the right hand side. Again, the results support the explanation that the observed evidence is more likely to be the spread of aggressive earnings management through board interlocks rather than deliberate appointments of aggressive directors by the exposed firms.

4.7.2. Another alternative: Shared common characteristics

The contagious and exposed firms might share some common characteristics which make them both aggressive and cause them to have a common director. The control variables introduced in the main regressions are able to capture the characteristics which might suggest a higher likelihood of the exposed firms being aggressive, but they fail to capture the common characteristics of the pair (i.e. the exposed and contagious firms). This section introduces a set of dummies which capture the common characteristics of the pair which might suggest aggressive earnings management.

Table T4.15. Aggressive earnings management and interlocked directors – Controlling for directors who are in the first two years of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1066	439.893***	-2.9920	581.506***	-2.4917	566.805***	-2.5612	583.013***
$ILW\_Y_{i,t}$	0.3506	1.796	-0.1228	0.151	0.4618	3.665*	0.5343	5.417**
$ILW\_Y\_NEW2_{i,t}$	0.7948	3.066*	0.8685	2.758*	-0.7263	0.894	-0.5859	0.816
$aBOLINK_{i,t}$	0.0250	0.104	0.0392	0.212	-0.1274	2.655	-0.1785	5.256**
$aBOSIZE_{i,t}$	-0.0233	0.194	-0.1018	3.165*	0.0315	0.448	-0.0235	0.236
$aBOIND_{i,t}$	-0.6056	0.958	-0.6011	0.823	-1.2449	4.24**	-0.1954	0.106
$aAUCOMSIZE_{i,t}$	-0.0131	0.024	0.0237	0.072	-0.0168	0.049	-0.0752	1.016
$aAUCOMIND_{i,t}$	-0.2803	0.289	-0.2466	0.185	0.1812	0.111	0.4348	0.561
$DUALITY_{i,t}$	0.2834	1.216	0.1588	0.28	0.2357	0.759	0.0381	0.017
$aTOTCOMPEN_{i,t}$	0.0002	0.095	-0.0005	0.509	-0.0005	0.539	0.0016	4.197**
$aLn(MVE)_{i,t-1}$	-0.1848	8.96***	-0.0715	1.264	0.0635	1.343	0.0535	0.961
$aMTB_{i,t-1}$	0.0015	0.017	0.0361	9.759***	-0.0034	0.083	-0.0361	7.542***
$aROA_{i,t}$	3.0686	45.993***	-2.8318	38.927***	-0.2565	0.363	2.2178	22.434***
$aDEBT_{i,t-1}$	-1.3039	4.519**	-0.8584	1.865	-0.9971	3.044*	0.7816	2.294
$aNOA_{i,t-1}$	-1.1037	13.293***						
$aRD_{i,t}$	-0.0032	0.021	0.0351	2.35	-0.0046	0.05	-0.0985	33.68***
$aCAP_{i,t}$	-0.0516	0.033	-0.2385	0.57	-0.7151	5.704**	-0.5797	4.084**
$aBOOKTAX_{i,t}$	0.0039	0.297	-0.0136	4.531**	0.0009	0.02	0.0005	0.004
$ESEO_{i,t}$	0.7102	17.439***	0.4895	7.34***	0.1152	0.433	0.2987	2.944*
$EAUDIT_{i,t}$	0.6534	14.322***						
$EMA_{i,t}$	-0.0952	0.09	0.1209	0.13	0.2909	0.956	0.0267	0.007
$EDISTRESS_{i,t}$	0.5479	5.434**	1.0421	24.054***	0.7258	11.208***	0.7151	9.428***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \beta_3 ILW\_Y\_NEW2 + \sum \beta_k Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.16. Aggressive earnings management and gender of interlocked directors – Controlling for directors who are in the first two years of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1055	439.614***	-3.0095	577.201***	-2.4939	566.438***	-2.5597	582.937***
$ILW\_Y\_MALE_{i,t}$	0.3858	1.896	0.0737	0.051	0.5533	4.593**	0.6540	6.985***
$ILW\_Y\_FEMALE_{i,t}$	0.1536	0.055	-1.4296	2.571	-0.0190	0.001	0.0579	0.013
$ILW\_Y\_NEW2_{i,t}$	0.7608	2.689	0.7641	2.108	-0.7939	1.06	-0.6199	0.905
$aBOLINK_{i,t}$	0.0220	0.079	0.0236	0.074	-0.1379	3.008*	-0.1849	5.593**
$aBOSIZE_{i,t}$	-0.0238	0.203	-0.1051	3.357*	0.0313	0.444	-0.0263	0.292
$aBOIND_{i,t}$	-0.6027	0.948	-0.6516	0.962	-1.2560	4.311**	-0.1918	0.102
$aAUCOMSIZE_{i,t}$	-0.0095	0.012	0.0270	0.092	-0.0132	0.03	-0.0763	1.04
$aAUCOMIND_{i,t}$	-0.2765	0.281	-0.1943	0.114	0.1987	0.134	0.4460	0.589
$DUALITY_{i,t}$	0.2814	1.198	0.1468	0.238	0.2336	0.745	0.0292	0.01
$aTOTCOMPEN_{i,t}$	0.0002	0.084	-0.0006	0.736	-0.0006	0.602	0.0016	4.184**
$aLn(MVE)_{i,t-1}$	-0.1853	9.004***	-0.0707	1.231	0.0643	1.371	0.0544	0.994
$aMTB_{i,t-1}$	0.0014	0.016	0.0359	9.523***	-0.0036	0.091	-0.0363	7.652***
$aROA_{i,t}$	3.0696	46.008***	-2.8816	39.945***	-0.2644	0.384	2.2096	22.201***
$aDEBT_{i,t-1}$	-1.3120	4.565**	-0.9329	2.183	-0.9916	3.002*	0.7884	2.34
$aNOA_{i,t-1}$	-1.1073	13.367***						
$aRD_{i,t}$	-0.0033	0.022	0.0351	2.362	-0.0047	0.051	-0.0992	34.138***
$aCAP_{i,t}$	-0.0457	0.026	-0.2111	0.446	-0.7038	5.51**	-0.5675	3.916**
$aBOOKTAX_{i,t}$	0.0041	0.326	-0.0138	4.622**	0.0012	0.031	0.0005	0.004
$ESEO_{i,t}$	0.7118	17.5***	0.5036	7.743***	0.1169	0.445	0.2927	2.82*
$EAUDIT_{i,t}$	0.6518	14.233***						
$EMA_{i,t}$	-0.0975	0.094	0.1289	0.148	0.2892	0.943	0.0266	0.007
$EDISTRESS_{i,t}$	0.5455	5.384**	1.0430	24.136***	0.7266	11.245***	0.7067	9.203***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \beta_4 ILW\_Y\_NEW2 + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.17. Aggressive earnings management and age of interlocked directors – Controlling for directors who are in the first two years of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1034	442.317***	-3.0028	580.147***	-2.4943	573.602***	-2.5726	588.442***
$ILW\_Y_{i,t}$*$ILW\_Y\_AGE_{i,t}$	0.0063	1.848	0.0002	0.001	0.0091	4.648**	0.0115	8.353***
$ILW\_Y\_NEW2_{i,t}$	0.7930	3.06*	0.7546	2.172	-0.7697	1.005	-0.6383	0.987
$aBOLINK_{i,t}$	0.0234	0.09	0.0319	0.137	-0.1374	2.994*	-0.1908	5.893**
$aBOSIZE_{i,t}$	-0.0233	0.194	-0.1014	3.14*	0.0314	0.447	-0.0231	0.226
$aBOIND_{i,t}$	-0.6020	0.946	-0.6166	0.864	-1.2546	4.302**	-0.1910	0.101
$aAUCOMSIZE_{i,t}$	-0.0069	0.007	0.0232	0.068	-0.0131	0.03	-0.0753	1.014
$aAUCOMIND_{i,t}$	-0.2690	0.266	-0.2440	0.181	0.2014	0.138	0.4470	0.591
$DUALITY_{i,t}$	0.2838	1.219	0.1589	0.28	0.2336	0.745	0.0467	0.025
$aTOTCOMPEN_{i,t}$	0.0002	0.074	-0.0005	0.508	-0.0006	0.601	0.0016	4.245**
$aLn(MVE)_{i,t-1}$	-0.1861	9.083***	-0.0728	1.311	0.0634	1.334	0.0528	0.937
$aMTB_{i,t-1}$	0.0014	0.016	0.0360	9.732***	-0.0037	0.097	-0.0363	7.658***
$aROA_{i,t}$	3.0673	45.889***	-2.8230	38.802***	-0.2607	0.375	2.2334	22.671***
$aDEBT_{i,t-1}$	-1.3304	4.697**	-0.8363	1.78	-0.9899	2.994*	0.7931	2.368
$aNOA_{i,t-1}$	-1.1064	13.351***						
$aRD_{i,t}$	-0.0032	0.021	0.0352	2.374	-0.0043	0.043	-0.0981	33.371***
$aCAP_{i,t}$	-0.0448	0.025	-0.2478	0.618	-0.7054	5.555**	-0.5774	4.05**
$aBOOKTAX_{i,t}$	0.0043	0.364	-0.0137	4.609**	0.0011	0.029	0.0005	0.004
$ESEO_{i,t}$	0.7143	17.628***	0.4889	7.328***	0.1173	0.448	0.2992	2.951*
$EAUDIT_{i,t}$	0.6520	14.249***						
$EMA_{i,t}$	-0.0977	0.095	0.1120	0.112	0.2905	0.952	0.0338	0.011
$EDISTRESS_{i,t}$	0.5450	5.376**	1.0431	24.105***	0.7264	11.255***	0.7201	9.573***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \beta_3 ILW\_Y\_NEW2 + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.18. Aggressive earnings management and nationality of interlocked directors – Controlling for directors who are in the first two years of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1054	439.661***	-3.0058	578.354***	-2.4952	566.468***	-2.5606	582.813***
$ILW\_Y\_BRIT_{i,t}$	0.3980	2.005	0.1564	0.226	0.6082	5.552**	0.6235	6.718***
$ILW\_Y\_NONBRIT_{i,t}$	0.1562	0.089	-1.5737	3.34*	-0.2334	0.143	-0.0460	0.005
$ILW\_Y\_NEW2_{i,t}$	0.7823	2.964*	0.6908	1.687	-0.8183	1.125	-0.6316	0.943
$aBOLINK_{i,t}$	0.0213	0.074	0.0234	0.073	-0.1398	3.113*	-0.1826	5.471**
$aBOSIZE_{i,t}$	-0.0234	0.195	-0.1065	3.455*	0.0335	0.508	-0.0240	0.246
$aBOIND_{i,t}$	-0.5930	0.916	-0.6778	1.04	-1.2639	4.359**	-0.1941	0.105
$aAUCOMSIZE_{i,t}$	-0.0115	0.018	0.0308	0.12	-0.0142	0.035	-0.0757	1.026
$aAUCOMIND_{i,t}$	-0.2858	0.3	-0.1887	0.108	0.2061	0.143	0.4429	0.581
$DUALITY_{i,t}$	0.2829	1.211	0.1410	0.22	0.2304	0.725	0.0343	0.014
$aTOTCOMPEN_{i,t}$	0.0002	0.088	-0.0007	0.787	-0.0006	0.641	0.0016	4.228**
$aLn(MVE)_{i,t-1}$	-0.1842	8.896***	-0.0711	1.242	0.0624	1.29	0.0535	0.962
$aMTB_{i,t-1}$	0.0015	0.017	0.0359	9.543***	-0.0031	0.068	-0.0363	7.594***
$aROA_{i,t}$	3.0755	46.081***	-2.8922	40.285***	-0.2776	0.422	2.2226	22.464***
$aDEBT_{i,t-1}$	-1.3140	4.575**	-0.9453	2.225	-1.0057	3.076*	0.8265	2.548
$aNOA_{i,t-1}$	-1.1081	13.38***						
$aRD_{i,t}$	-0.0033	0.023	0.0360	2.496	-0.0048	0.054	-0.0978	33.186***
$aCAP_{i,t}$	-0.0414	0.021	-0.1629	0.261	-0.6884	5.265**	-0.5707	3.952**
$aBOOKTAX_{i,t}$	0.0040	0.317	-0.0139	4.713**	0.0012	0.035	0.0006	0.006
$ESEO_{i,t}$	0.7101	17.43***	0.5004	7.649***	0.1200	0.468	0.2980	2.93*
$EAUDIT_{i,t}$	0.6524	14.277***						
$EMA_{i,t}$	-0.1002	0.1	0.1220	0.132	0.2916	0.958	0.0309	0.009
$EDISTRESS_{i,t}$	0.5472	5.416**	1.0381	23.929***	0.7243	11.177***	0.7134	9.392***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \beta_4 ILW\_Y\_NEW2 + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.19. Aggressive earnings management and positions of interlocked directors at the exposed firms – Controlling for directors who are in the first two years of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1074	438.912***	-2.9925	581.368***	-2.4917	566.74***	-2.5612	583.035***
$ILW\_Y\_FINEX_{i,t}$	0.3413	1.539	-0.0189	0.003	0.4453	3.107*	0.5267	4.718**
$ILW\_Y\_NOFINEX_{i,t}$	0.4156	0.425	-0.9359	1.254	0.5987	0.877	0.5848	1.117
$ILW\_Y\_NEW2_{i,t}$	0.8004	3.072*	0.8649	2.718*	-0.7231	0.887	-0.5840	0.81
$aBOLINK_{i,t}$	0.0255	0.108	0.0402	0.221	-0.1266	2.626	-0.1782	5.241**
$aBOSIZE_{i,t}$	-0.0236	0.199	-0.1017	3.158*	0.0314	0.446	-0.0236	0.237
$aBOIND_{i,t}$	-0.6100	0.967	-0.5910	0.793	-1.2425	4.222**	-0.1981	0.109
$aAUCOMSIZE_{i,t}$	-0.0130	0.023	0.0172	0.037	-0.0164	0.047	-0.0750	1.009
$aAUCOMIND_{i,t}$	-0.2788	0.286	-0.2540	0.196	0.1798	0.11	0.4352	0.562
$DUALITY_{i,t}$	0.2820	1.201	0.1552	0.267	0.2366	0.765	0.0382	0.017
$aTOTCOMPEN_{i,t}$	0.0002	0.096	-0.0006	0.599	-0.0005	0.54	0.0016	4.196**
$aLn(MVE)_{i,t-1}$	-0.1848	8.958***	-0.0659	1.069	0.0631	1.326	0.0535	0.961
$aMTB_{i,t-1}$	0.0015	0.017	0.0361	9.77***	-0.0033	0.078	-0.0361	7.54***
$aROA_{i,t}$	3.0683	45.988***	-2.8636	39.433***	-0.2558	0.361	2.2185	22.444***
$aDEBT_{i,t-1}$	-1.3047	4.524**	-0.8901	1.998	-0.9980	3.049*	0.7831	2.301
$aNOA_{i,t-1}$	-1.1039	13.295***						
$aRD_{i,t}$	-0.0032	0.022	0.0378	2.667	-0.0046	0.05	-0.0986	33.669***
$aCAP_{i,t}$	-0.0523	0.034	-0.2400	0.576	-0.7166	5.727**	-0.5799	4.087**
$aBOOKTAX_{i,t}$	0.0039	0.295	-0.0138	4.662**	0.0009	0.02	0.0005	0.004
$ESEO_{i,t}$	0.7104	17.45***	0.4923	7.405***	0.1147	0.429	0.2979	2.922*
$EAUDIT_{i,t}$	0.6543	14.329***						
$EMA_{i,t}$	-0.0959	0.091	0.1287	0.148	0.2902	0.951	0.0268	0.007
$EDISTRESS_{i,t}$	0.5482	5.439**	1.0357	23.704***	0.7263	11.221***	0.7156	9.436***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \beta_4 ILW\_Y\_NEW2 + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.20. Aggressive earnings management and positions of interlocked directors at the contagious firms – Controlling for directors who are in the first two years of service

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1085	439.088***	-2.9920	581.375***	-2.4921	566.608***	-2.5673	581.683***
$ILW\_Y\_FINCO_{i,t}$	0.3251	1.401	-0.1452	0.201	0.4825	3.706*	0.6964	8.357***
$ILW\_Y\_NOFINCO_{i,t}$	0.5224	0.787	0.1410	0.029	0.2576	0.116	-0.5950	0.621
$ILW\_Y\_NEW2_{i,t}$	0.8027	3.116*	0.8616	2.714*	-0.7248	0.891	-0.6428	0.979
$aBOLINK_{i,t}$	0.0241	0.096	0.0391	0.21	-0.1291	2.71*	-0.1961	6.152**
$aBOSIZE_{i,t}$	-0.0224	0.18	-0.1019	3.173*	0.0318	0.456	-0.0235	0.235
$aBOIND_{i,t}$	-0.6049	0.955	-0.6066	0.837	-1.2454	4.241**	-0.1540	0.066
$aAUCOMSIZE_{i,t}$	-0.0120	0.02	0.0244	0.076	-0.0167	0.049	-0.0699	0.885
$aAUCOMIND_{i,t}$	-0.2825	0.293	-0.2387	0.173	0.1794	0.109	0.4316	0.549
$DUALITY_{i,t}$	0.2839	1.22	0.1573	0.274	0.2367	0.765	0.0388	0.017
$aTOTCOMPEN_{i,t}$	0.0002	0.094	-0.0005	0.484	-0.0005	0.54	0.0016	4.148**
$aLn(MVE)_{i,t-1}$	-0.1849	8.963***	-0.0715	1.264	0.0625	1.291	0.0473	0.746
$aMTB_{i,t-1}$	0.0014	0.016	0.0361	9.794***	-0.0034	0.083	-0.0370	7.801***
$aROA_{i,t}$	3.0609	45.703***	-2.8381	39.01***	-0.2469	0.334	2.2922	23.644***
$aDEBT_{i,t-1}$	-1.3027	4.508**	-0.8602	1.873	-0.9810	2.917*	0.8695	2.809*
$aNOA_{i,t-1}$	-1.1094	13.395***						
$aRD_{i,t}$	-0.0033	0.022	0.0349	2.336	-0.0045	0.048	-0.0974	32.875***
$aCAP_{i,t}$	-0.0473	0.028	-0.2397	0.576	-0.7138	5.682**	-0.5980	4.333**
$aBOOKTAX_{i,t}$	0.0039	0.3	-0.0137	4.546**	0.0010	0.022	0.0006	0.007
$ESEO_{i,t}$	0.7091	17.374***	0.4889	7.325***	0.1175	0.449	0.3038	3.051*
$EAUDIT_{i,t}$	0.6580	14.412***						
$EMA_{i,t}$	-0.0920	0.084	0.1231	0.134	0.2910	0.956	0.0091	0.001
$EDISTRESS_{i,t}$	0.5459	5.394**	1.0402	23.94***	0.7257	11.209***	0.7145	9.419***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \beta_4 ILW\_Y\_NEW2 + \sum \beta_k \, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

4.7.2.1. Similar general context of earnings management

Using ESCORE as developed in Chapter 2, this section first introduces ESEX_Y_PAIR, a dummy that turns on if ESCORE of the contagious firm is equal to ESCORE of the exposed firm. If the two firms have the same ESCORE, it could be argued that they both have a similar context to manage earnings aggressively. If the shared common characteristics could drive the spread of aggressive earnings management, the coefficient on ESEX_Y_PAIR would be significant and it would subsume the significance of the coefficient on ILW_Y. If, in contrast, the coefficient on ILW_Y remains significantly positive and the coefficient on ESEX_Y_PAIR is not significant, the evidence would suggest that the contagion of aggressive earnings management is mainly driven by the network of director rather than the shared characteristics of the exposed and contagious firms. Table T4.21, T4.22, T4.23, T4.24, T4.25 and T4.26 report the results of re-estimating Equation (E4.2), (E4.3), (E4.4), (E4.5), (E4.6) and (E4.7) with ESEX_Y_PAIR being added to the right hand side. The results indicate that the main conclusions of the chapter do not change qualitatively after controlling for the common context of earnings management shared by the exposed and contagious firms.

The second specification introduces ESSI_Y_PAIR which allows for the pair to have similar contexts of earnings management. ESSI_Y_PAIR is designed to be equal to one if ESCORE of the contagious firm is equal to, or larger or smaller than ESCORE of the exposed firm but not more than one unit, zero otherwise. ESSI_Y_PAIR would allow for more or less similar contexts of earnings management between the exposed and contagious firms to be controlled for. Equation (E4.2), (E4.3), (E4.4), (E4.5), (E4.6) and (E4.7) are then re-estimated with ESSI_Y_PAIR being added to the right hand side. The results, as reported in Table T4.27, T4.28, T4.29, T4.30, T4.31 and T4.32, confirm that controlling for the common characteristics shared by the exposed and contagious firms using this specification would not qualitatively change any of the main conclusions of the chapter.

Table T4.21. Aggressive earnings management and interlocked directors – Controlling for the pair having the same ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1118	439.611***	-2.9893	582.639***	-2.4937	567.009***	-2.5599	583.777***
$ILW\_Y_{i,t}$	0.3168	1.352	0.1675	0.361	0.3337	1.673	0.4425	3.203*
$ESEX\_Y\_PAIR_{i,t}$	0.7434	2.968*	-0.5225	0.382	0.2616	0.273	0.0851	0.036
$aBOLINK_{i,t}$	0.0215	0.076	0.0448	0.281	-0.1290	2.708*	-0.1813	5.409**
$aBOSIZE_{i,t}$	-0.0279	0.279	-0.1011	3.127*	0.0321	0.465	-0.0257	0.282
$aBOIND_{i,t}$	-0.6206	1.002	-0.6306	0.907	-1.2440	4.238**	-0.2008	0.112
$aAUCOMSIZE_{i,t}$	-0.0031	0.001	0.0278	0.098	-0.0182	0.058	-0.0760	1.035
$aAUCOMIND_{i,t}$	-0.2576	0.244	-0.2253	0.155	0.1709	0.099	0.4252	0.536
$DUALITY_{i,t}$	0.2796	1.189	0.1506	0.252	0.2410	0.794	0.0256	0.008
$aTOTCOMPEN_{i,t}$	0.0002	0.046	-0.0005	0.488	-0.0006	0.559	0.0016	4.127**
$aLn(MVE)_{i,t-1}$	-0.1829	8.792***	-0.0740	1.359	0.0645	1.383	0.0561	1.06
$aMTB_{i,t-1}$	0.0005	0.002	0.0359	9.655***	-0.0033	0.076	-0.0366	7.827***
$aROA_{i,t}$	2.9923	44.113***	-2.8139	38.553***	-0.2665	0.391	2.2262	22.588***
$aDEBT_{i,t-1}$	-1.2826	4.397**	-0.8420	1.802	-1.0028	3.082*	0.7863	2.327
$aNOA_{i,t-1}$	-1.1389	14.233***						
$aRD_{i,t}$	-0.0051	0.054	0.0364	2.529	-0.0052	0.065	-0.0983	33.593***
$aCAP_{i,t}$	-0.0208	0.005	-0.2713	0.743	-0.7066	5.59**	-0.5756	4.021**
$aBOOKTAX_{i,t}$	0.0051	0.503	-0.0134	4.393**	0.0009	0.021	0.0005	0.005
$ESEO_{i,t}$	0.7210	17.972***	0.4878	7.319***	0.1166	0.443	0.3007	2.982*
$EAUDIT_{i,t}$	0.6652	14.885***						
$EMA_{i,t}$	-0.0913	0.083	0.0975	0.084	0.2973	0.999	0.0106	0.001
$EDISTRESS_{i,t}$	0.5365	5.22**	1.0445	24.191***	0.7257	11.216***	0.7081	9.237***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \beta_2 ESEX\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.22. Aggressive earnings management and gender of interlocked directors – Controlling for the pair having the same ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1104	439.338***	-3.0095	578.205***	-2.4956	566.642***	-2.5585	583.723***
$ILW\_Y\_MALE_{i,t}$	0.3642	1.622	0.3550	1.529	0.4091	2.228	0.5495	4.408**
$ILW\_Y\_FEMALE_{i,t}$	0.0164	0.001	-1.3561	2.231	-0.0672	0.012	-0.0264	0.003
$ESEX\_Y\_PAIR_{i,t}$	0.7212	2.774*	-0.6349	0.551	0.2365	0.222	0.1049	0.055
$aBOLINK_{i,t}$	0.0168	0.045	0.0261	0.092	-0.1378	2.992*	-0.1877	5.747**
$aBOSIZE_{i,t}$	-0.0285	0.291	-0.1045	3.322*	0.0320	0.462	-0.0286	0.347
$aBOIND_{i,t}$	-0.6142	0.98	-0.6906	1.082	-1.2541	4.303**	-0.1965	0.107
$aAUCOMSIZE_{i,t}$	0.0021	0.001	0.0314	0.125	-0.0152	0.04	-0.0768	1.054
$aAUCOMIND_{i,t}$	-0.2536	0.236	-0.1694	0.087	0.1849	0.116	0.4335	0.557
$DUALITY_{i,t}$	0.2769	1.165	0.1420	0.223	0.2398	0.785	0.0159	0.003
$aTOTCOMPEN_{i,t}$	0.0001	0.037	-0.0006	0.765	-0.0006	0.611	0.0016	4.106**
$aLn(MVE)_{i,t-1}$	-0.1838	8.865***	-0.0718	1.274	0.0652	1.408	0.0574	1.11
$aMTB_{i,t-1}$	0.0005	0.002	0.0359	9.526***	-0.0034	0.083	-0.0369	7.963***
$aROA_{i,t}$	2.9972	44.201***	-2.8752	39.838***	-0.2721	0.407	2.2194	22.388***
$aDEBT_{i,t-1}$	-1.2972	4.481**	-0.9186	2.124	-0.9973	3.043*	0.7904	2.357
$aNOA_{i,t-1}$	-1.1421	14.314***						
$aRD_{i,t}$	-0.0051	0.054	0.0365	2.559	-0.0053	0.066	-0.0989	34.013***
$aCAP_{i,t}$	-0.0120	0.002	-0.2334	0.547	-0.6965	5.42**	-0.5631	3.851**
$aBOOKTAX_{i,t}$	0.0054	0.552	-0.0136	4.529**	0.0011	0.028	0.0005	0.005
$ESEO_{i,t}$	0.7231	18.054***	0.5012	7.701***	0.1187	0.459	0.2958	2.881*
$EAUDIT_{i,t}$	0.6626	14.749***						
$EMA_{i,t}$	-0.0938	0.088	0.1141	0.116	0.2956	0.986	0.0103	0.001
$EDISTRESS_{i,t}$	0.5336	5.161**	1.0495	24.455***	0.7263	11.243***	0.6990	8.991***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \beta_3 ESEX\_Y\_PAIR + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.23. Aggressive earnings management and age of interlocked directors – Controlling for the pair having the same ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1087	441.851***	-3.0013	580.671***	-2.4974	574.246***	-2.5728	589.226***
$ILW\_Y_{i,t}*ILW\_Y\_AGE_{i,t}$	0.0056	1.367	0.0048	0.96	0.0070	2.369	0.0103	5.807**
$ESEX\_Y\_PAIR_{i,t}$	0.7405	2.931*	-0.6196	0.529	0.2184	0.191	-0.0149	0.001
$aBOLINK_{i,t}$	0.0199	0.065	0.0349	0.166	-0.1377	2.996*	-0.1940	6.075**
$aBOSIZE_{i,t}$	-0.0278	0.277	-0.1015	3.15*	0.0322	0.468	-0.0252	0.27
$aBOIND_{i,t}$	-0.6161	0.986	-0.6513	0.965	-1.2524	4.291**	-0.1982	0.109
$aAUCOMSIZE_{i,t}$	0.0026	0.001	0.0277	0.097	-0.0156	0.042	-0.0768	1.051
$aAUCOMIND_{i,t}$	-0.2475	0.225	-0.2166	0.143	0.1841	0.115	0.4350	0.56
$DUALITY_{i,t}$	0.2798	1.191	0.1513	0.254	0.2399	0.786	0.0338	0.013
$aTOTCOMPEN_{i,t}$	0.0001	0.035	-0.0005	0.534	-0.0006	0.607	0.0016	4.183**
$aLn(MVE)_{i,t-1}$	-0.1842	8.911***	-0.0739	1.356	0.0644	1.376	0.0556	1.041
$aMTB_{i,t-1}$	0.0005	0.002	0.0360	9.7***	-0.0035	0.087	-0.0368	7.965***
$aROA_{i,t}$	2.9924	44.088***	-2.8192	38.807***	-0.2664	0.391	2.2459	22.928***
$aDEBT_{i,t-1}$	-1.3065	4.554**	-0.8313	1.763	-0.9984	3.052*	0.7973	2.398
$aNOA_{i,t-1}$	-1.1411	14.292***						
$aRD_{i,t}$	-0.0050	0.053	0.0367	2.586	-0.0050	0.058	-0.0978	33.262***
$aCAP_{i,t}$	-0.0128	0.002	-0.2690	0.732	-0.6992	5.481**	-0.5764	4.033**
$aBOOKTAX_{i,t}$	0.0055	0.58	-0.0135	4.472**	0.0010	0.025	0.0005	0.004
$ESEO_{i,t}$	0.7248	18.158***	0.4888	7.354***	0.1185	0.457	0.3007	2.977*
$EAUDIT_{i,t}$	0.6640	14.819***						
$EMA_{i,t}$	-0.0936	0.087	0.0960	0.082	0.2961	0.989	0.0130	0.002
$EDISTRESS_{i,t}$	0.5340	5.172**	1.0478	24.354***	0.7271	11.282***	0.7152	9.434***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \beta_2 ESEX\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.24. Aggressive earnings management and nationality of interlocked directors – Controlling for the pair having the same ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1105	439.324***	-3.0071	579.002***	-2.4966	566.72***	-2.5592	583.651***
$ILW\_Y\_BRIT_{i,t}$	0.3619	1.525	0.4361	2.265	0.4717	2.916*	0.5308	4.193**
$ILW\_Y\_NONBRIT_{i,t}$	0.1417	0.073	-1.5292	3.079*	-0.2767	0.201	-0.0911	0.021
$ESEX\_Y\_PAIR_{i,t}$	0.7283	2.831*	-0.7213	0.709	0.1802	0.127	0.0399	0.008
$aBOLINK_{i,t}$	0.0179	0.052	0.0264	0.094	-0.1396	3.095*	-0.1850	5.604**
$aBOSIZE_{i,t}$	-0.0276	0.274	-0.1067	3.464*	0.0339	0.519	-0.0263	0.293
$aBOIND_{i,t}$	-0.6085	0.96	-0.7126	1.151	-1.2633	4.36**	-0.2002	0.111
$aAUCOMSIZE_{i,t}$	-0.0018	0	0.0348	0.154	-0.0162	0.045	-0.0769	1.058
$aAUCOMIND_{i,t}$	-0.2628	0.253	-0.1679	0.086	0.1925	0.125	0.4319	0.553
$DUALITY_{i,t}$	0.2801	1.192	0.1359	0.204	0.2372	0.768	0.0213	0.005
$aTOTCOMPEN_{i,t}$	0.0002	0.044	-0.0007	0.835	-0.0006	0.65	0.0016	4.155**
$aLn(MVE)_{i,t-1}$	-0.1827	8.762***	-0.0719	1.278	0.0636	1.341	0.0563	1.069
$aMTB_{i,t-1}$	0.0005	0.002	0.0359	9.561***	-0.0030	0.066	-0.0369	7.909***
$aROA_{i,t}$	3.0000	44.209***	-2.8871	40.213***	-0.2835	0.44	2.2326	22.66***
$aDEBT_{i,t-1}$	-1.2905	4.441**	-0.9471	2.237	-1.0078	3.098*	0.8311	2.581
$aNOA_{i,t-1}$	-1.1424	14.305***						
$aRD_{i,t}$	-0.0051	0.055	0.0370	2.639	-0.0054	0.07	-0.0976	33.089***
$aCAP_{i,t}$	-0.0125	0.002	-0.1743	0.298	-0.6821	5.194**	-0.5686	3.921**
$aBOOKTAX_{i,t}$	0.0052	0.524	-0.0138	4.648**	0.0011	0.03	0.0006	0.007
$ESEO_{i,t}$	0.7210	17.968***	0.5015	7.704***	0.1205	0.472	0.2993	2.955*
$EAUDIT_{i,t}$	0.6635	14.801***						
$EMA_{i,t}$	-0.0959	0.091	0.1049	0.098	0.2971	0.995	0.0120	0.001
$EDISTRESS_{i,t}$	0.5362	5.209**	1.0440	24.223***	0.7243	11.19***	0.7068	9.212***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \beta_3 ESEX\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.25. Aggressive earnings management and positions of interlocked directors at the exposed firms – Controlling for the pair having the same ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1108	438.841***	-2.9896	582.612***	-2.4937	566.938***	-2.5598	583.796***
$ILW\_Y\_FINEX_{i,t}$	0.3266	1.364	0.2577	0.81	0.3104	1.308	0.4324	2.791*
$ILW\_Y\_NOFINEX_{i,t}$	0.2240	0.112	-0.6415	0.591	0.5072	0.633	0.5107	0.825
$ESEX\_Y\_PAIR_{i,t}$	0.7473	2.985*	-0.4483	0.277	0.2739	0.297	0.0855	0.036
$aBOLINK_{i,t}$	0.0205	0.069	0.0454	0.288	-0.1281	2.676	-0.1809	5.386**
$aBOSIZE_{i,t}$	-0.0275	0.27	-0.1011	3.125*	0.0320	0.462	-0.0258	0.284
$aBOIND_{i,t}$	-0.6135	0.974	-0.6241	0.886	-1.2408	4.214**	-0.2041	0.116
$aAUCOMSIZE_{i,t}$	-0.0033	0.002	0.0220	0.061	-0.0178	0.055	-0.0756	1.026
$aAUCOMIND_{i,t}$	-0.2600	0.248	-0.2288	0.16	0.1692	0.097	0.4254	0.537
$DUALITY_{i,t}$	0.2821	1.205	0.1460	0.237	0.2421	0.801	0.0256	0.008
$aTOTCOMPEN_{i,t}$	0.0002	0.045	-0.0006	0.56	-0.0006	0.56	0.0016	4.126**
$aLn(MVE)_{i,t-1}$	-0.1829	8.795***	-0.0687	1.165	0.0641	1.364	0.0560	1.058
$aMTB_{i,t-1}$	0.0005	0.002	0.0359	9.619***	-0.0031	0.071	-0.0366	7.821***
$aROA_{i,t}$	2.9928	44.116***	-2.8465	39.077***	-0.2658	0.389	2.2269	22.599***
$aDEBT_{i,t-1}$	-1.2826	4.397**	-0.8762	1.942	-1.0030	3.084*	0.7883	2.336
$aNOA_{i,t-1}$	-1.1381	14.21***						
$aRD_{i,t}$	-0.0051	0.053	0.0388	2.81*	-0.0052	0.064	-0.0984	33.593***
$aCAP_{i,t}$	-0.0192	0.005	-0.2751	0.762	-0.7090	5.626**	-0.5759	4.025**
$aBOOKTAX_{i,t}$	0.0051	0.505	-0.0136	4.52**	0.0009	0.021	0.0005	0.005
$ESEO_{i,t}$	0.7208	17.955***	0.4907	7.386***	0.1160	0.439	0.2995	2.951*
$EAUDIT_{i,t}$	0.6639	14.797***						
$EMA_{i,t}$	-0.0900	0.081	0.1016	0.092	0.2967	0.995	0.0109	0.001
$EDISTRESS_{i,t}$	0.5361	5.212**	1.0373	23.808***	0.7265	11.237***	0.7086	9.247***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \beta_3 ESEX\_Y\_PAIR + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.26. Aggressive earnings management and positions of interlocked directors at the contagious firms – Controlling for the pair having the same ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1131	438.808***	-2.9896	582.454***	-2.4941	566.768***	-2.5660	582.497***
$ILW\_Y\_FINCO_{i,t}$	0.3016	1.144	0.1375	0.229	0.3546	1.737	0.5979	5.375**
$ILW\_Y\_NOFINCO_{i,t}$	0.4339	0.508	0.5124	0.412	0.1504	0.039	-0.6579	0.746
$ESEX\_Y\_PAIR_{i,t}$	0.7425	2.959*	-0.5536	0.421	0.2513	0.251	0.0647	0.021
$aBOLINK_{i,t}$	0.0209	0.072	0.0450	0.284	-0.1306	2.757*	-0.1986	6.29**
$aBOSIZE_{i,t}$	-0.0272	0.265	-0.1017	3.159*	0.0323	0.473	-0.0259	0.287
$aBOIND_{i,t}$	-0.6206	1.002	-0.6374	0.925	-1.2456	4.247**	-0.1649	0.075
$aAUCOMSIZE_{i,t}$	-0.0024	0.001	0.0287	0.105	-0.0182	0.058	-0.0711	0.915
$aAUCOMIND_{i,t}$	-0.2588	0.246	-0.2162	0.142	0.1698	0.098	0.4230	0.528
$DUALITY_{i,t}$	0.2795	1.188	0.1476	0.242	0.2419	0.799	0.0247	0.007
$aTOTCOMPEN_{i,t}$	0.0002	0.046	-0.0005	0.456	-0.0006	0.56	0.0016	4.078**
$aLn(MVE)_{i,t-1}$	-0.1830	8.793***	-0.0734	1.34	0.0636	1.338	0.0505	0.852
$aMTB_{i,t-1}$	0.0005	0.002	0.0360	9.721***	-0.0033	0.076	-0.0374	8.046***
$aROA_{i,t}$	2.9868	43.843***	-2.8211	38.682***	-0.2574	0.363	2.3012	23.8***
$aDEBT_{i,t-1}$	-1.2805	4.381**	-0.8466	1.821	-0.9877	2.958*	0.8760	2.854*
$aNOA_{i,t-1}$	-1.1429	14.285***						
$aRD_{i,t}$	-0.0051	0.055	0.0361	2.495	-0.0051	0.062	-0.0972	32.784***
$aCAP_{i,t}$	-0.0185	0.004	-0.2736	0.754	-0.7061	5.581**	-0.5950	4.284**
$aBOOKTAX_{i,t}$	0.0051	0.504	-0.0135	4.414**	0.0010	0.021	0.0007	0.009
$ESEO_{i,t}$	0.7204	17.932***	0.4876	7.314***	0.1186	0.458	0.3054	3.082*
$EAUDIT_{i,t}$	0.6684	14.907***						
$EMA_{i,t}$	-0.0893	0.079	0.0997	0.088	0.2981	1.004	-0.0032	0
$EDISTRESS_{i,t}$	0.5351	5.189**	1.0433	24.117***	0.7257	11.22***	0.7073	9.22***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \beta_3 ESEX\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$ where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.27. Aggressive earnings management and interlocked directors – Controlling for the pair having similar ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1127	440.939***	-2.9897	581.812***	-2.4934	566.943***	-2.5586	583.694***
$ILW\_Y_{i,t}$	0.6128	4.398**	0.0201	0.004	0.3853	1.451	0.3130	0.83
$ESSI\_Y\_PAIR_{i,t}$	-0.1740	0.185	0.2454	0.249	0.0034	0	0.2403	0.346
$aBOLINK_{i,t}$	0.0318	0.17	0.0446	0.278	-0.1289	2.706*	-0.1818	5.439**
$aBOSIZE_{i,t}$	-0.0256	0.236	-0.1022	3.182*	0.0319	0.46	-0.0261	0.289
$aBOIND_{i,t}$	-0.6216	1.013	-0.6307	0.907	-1.2511	4.282**	-0.1950	0.106
$aAUCOMSIZE_{i,t}$	-0.0157	0.034	0.0282	0.101	-0.0180	0.056	-0.0763	1.044
$aAUCOMIND_{i,t}$	-0.2550	0.24	-0.2236	0.153	0.1737	0.103	0.4177	0.517
$DUALITY_{i,t}$	0.2719	1.118	0.1423	0.225	0.2410	0.794	0.0245	0.007
$aTOTCOMPEN_{i,t}$	0.0002	0.111	-0.0005	0.487	-0.0006	0.561	0.0016	4.135**
$aLn(MVE)_{i,t-1}$	-0.1850	9.048***	-0.0765	1.448	0.0646	1.39	0.0549	1.014
$aMTB_{i,t-1}$	0.0011	0.009	0.0353	9.348***	-0.0032	0.074	-0.0364	7.751***
$aROA_{i,t}$	3.0506	45.686***	-2.8207	38.722***	-0.2628	0.38	2.2175	22.352***
$aDEBT_{i,t-1}$	-1.2519	4.206**	-0.8620	1.887	-0.9980	3.054*	0.7962	2.381
$aNOA_{i,t-1}$	-1.1302	14.048***						
$aRD_{i,t}$	-0.0041	0.035	0.0364	2.54	-0.0052	0.064	-0.0982	33.488***
$aCAP_{i,t}$	-0.0538	0.036	-0.2685	0.725	-0.7059	5.581**	-0.5647	3.855**
$aBOOKTAX_{i,t}$	0.0041	0.336	-0.0134	4.346**	0.0008	0.016	0.0006	0.007
$ESEO_{i,t}$	0.7078	17.354***	0.4906	7.406***	0.1168	0.445	0.2986	2.945*
$EAUDIT_{i,t}$	0.6681	14.98***						
$EMA_{i,t}$	-0.1007	0.101	0.0995	0.088	0.2944	0.979	0.0218	0.005
$EDISTRESS_{i,t}$	0.5436	5.373**	1.0349	23.721***	0.7253	11.205***	0.7057	9.18***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \beta_2 ESSI\_Y\_PAIR + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.28. Aggressive earnings management and gender of interlocked directors – Controlling for the pair having similar ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1101	440.52***	-3.0085	577.643***	-2.4955	566.527***	-2.5572	583.665***
$ILW\_Y\_MALE_{i,t}$	0.6797	4.962**	0.2127	0.399	0.4599	1.924	0.4205	1.403
$ILW\_Y\_FEMALE_{i,t}$	0.2102	0.098	-1.4187	2.434	-0.0349	0.003	-0.1567	0.076
$ESSI\_Y\_PAIR_{i,t}$	-0.2005	0.243	0.1931	0.157	-0.0002	0	0.2468	0.363
$aBOLINK_{i,t}$	0.0255	0.107	0.0262	0.092	-0.1379	3.001*	-0.1882	5.776**
$aBOSIZE_{i,t}$	-0.0266	0.254	-0.1053	3.363*	0.0318	0.458	-0.0291	0.357
$aBOIND_{i,t}$	-0.6163	0.995	-0.6862	1.068	-1.2616	4.349**	-0.1892	0.099
$aAUCOMSIZE_{i,t}$	-0.0079	0.009	0.0317	0.128	-0.0150	0.039	-0.0773	1.069
$aAUCOMIND_{i,t}$	-0.2469	0.225	-0.1693	0.087	0.1880	0.12	0.4249	0.535
$DUALITY_{i,t}$	0.2687	1.092	0.1322	0.193	0.2397	0.785	0.0146	0.002
$aTOTCOMPEN_{i,t}$	0.0002	0.091	-0.0006	0.733	-0.0006	0.617	0.0016	4.12**
$aLn(MVE)_{i,t-1}$	-0.1862	9.144***	-0.0746	1.374	0.0654	1.418	0.0562	1.064
$aMTB_{i,t-1}$	0.0010	0.008	0.0353	9.197***	-0.0033	0.08	-0.0367	7.881***
$aROA_{i,t}$	3.0565	45.788***	-2.8776	39.905***	-0.2698	0.399	2.2108	22.158***
$aDEBT_{i,t-1}$	-1.2730	4.329**	-0.9360	2.204	-0.9931	3.019*	0.8012	2.418
$aNOA_{i,t-1}$	-1.1341	14.152***						
$aRD_{i,t}$	-0.0041	0.035	0.0365	2.565	-0.0053	0.066	-0.0988	33.935***
$aCAP_{i,t}$	-0.0433	0.023	-0.2347	0.553	-0.6958	5.41**	-0.5520	3.684*
$aBOOKTAX_{i,t}$	0.0045	0.393	-0.0136	4.461**	0.0010	0.023	0.0006	0.007
$ESEO_{i,t}$	0.7111	17.487***	0.5034	7.771***	0.1188	0.459	0.2933	2.836*
$EAUDIT_{i,t}$	0.6637	14.76***						
$EMA_{i,t}$	-0.1056	0.11	0.1156	0.119	0.2930	0.968	0.0225	0.005
$EDISTRESS_{i,t}$	0.5387	5.271**	1.0383	23.919***	0.7258	11.231***	0.6969	8.946***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \beta_3 ESSI\_Y\_PAIR + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.29. Aggressive earnings management and age of interlocked directors – Controlling for the pair having similar ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1058	443.121***	-3.0008	580.315***	-2.4965	572.6***	-2.5730	589.435***
$ILW\_Y_{i,t}*ILW\_Y\_AGE_{i,t}$	0.0108	4.421**	0.0028	0.24	0.0079	2.214	0.0096	3.048*
$ESSI\_Y\_PAIR_{i,t}$	-0.1619	0.16	0.1344	0.08	-0.0183	0.002	0.0579	0.024
$aBOLINK_{i,t}$	0.0293	0.143	0.0356	0.172	-0.1378	3.007*	-0.1942	6.083**
$aBOSIZE_{i,t}$	-0.0257	0.239	-0.1020	3.171*	0.0321	0.465	-0.0253	0.272
$aBOIND_{i,t}$	-0.6183	1.001	-0.6482	0.956	-1.2608	4.344**	-0.1959	0.106
$aAUCOMSIZE_{i,t}$	-0.0040	0.002	0.0276	0.097	-0.0150	0.039	-0.0768	1.052
$aAUCOMIND_{i,t}$	-0.2320	0.199	-0.2166	0.143	0.1892	0.122	0.4302	0.547
$DUALITY_{i,t}$	0.2724	1.124	0.1430	0.227	0.2396	0.784	0.0330	0.013
$aTOTCOMPEN_{i,t}$	0.0002	0.075	-0.0005	0.497	-0.0006	0.616	0.0016	4.181**
$aLn(MVE)_{i,t-1}$	-0.1875	9.284***	-0.0766	1.452	0.0645	1.384	0.0552	1.026
$aMTB_{i,t-1}$	0.0010	0.008	0.0354	9.366***	-0.0034	0.085	-0.0367	7.928***
$aROA_{i,t}$	3.0472	45.529***	-2.8179	38.78***	-0.2646	0.386	2.2443	22.875***
$aDEBT_{i,t-1}$	-1.2947	4.479**	-0.8443	1.82	-0.9937	3.025*	0.7975	2.4
$aNOA_{i,t-1}$	-1.1366	14.232***						
$aRD_{i,t}$	-0.0040	0.033	0.0366	2.58	-0.0049	0.058	-0.0978	33.275***
$aCAP_{i,t}$	-0.0409	0.021	-0.2709	0.741	-0.6980	5.468**	-0.5734	3.979**
$aBOOKTAX_{i,t}$	0.0049	0.467	-0.0135	4.434**	0.0010	0.022	0.0005	0.005
$ESEO_{i,t}$	0.7155	17.726***	0.4913	7.43***	0.1187	0.458	0.3002	2.969*
$EAUDIT_{i,t}$	0.6644	14.807***						
$EMA_{i,t}$	-0.1051	0.11	0.0959	0.082	0.2933	0.97	0.0158	0.002
$EDISTRESS_{i,t}$	0.5372	5.25**	1.0384	23.899***	0.7261	11.252***	0.7143	9.414***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \beta_2 ESSI\_Y\_PAIR + \sum \beta_k \, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.30. Aggressive earnings management and nationality of interlocked directors – Controlling for the pair having similar ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1108	440.633***	-3.0063	578.359***	-2.4965	566.668***	-2.5581	583.546***
$ILW\_Y\_BRIT_{i,t}$	0.6838	4.746**	0.2980	0.766	0.5193	2.436	0.4139	1.348
$ILW\_Y\_NONBRIT_{i,t}$	0.3650	0.479	-1.5713	3.224*	-0.2554	0.155	-0.1832	0.076
$ESSI\_Y\_PAIR_{i,t}$	-0.2011	0.243	0.1433	0.085	-0.0131	0.001	0.1969	0.229
$aBOLINK_{i,t}$	0.0270	0.121	0.0262	0.092	-0.1397	3.103*	-0.1852	5.616**
$aBOSIZE_{i,t}$	-0.0256	0.234	-0.1070	3.478*	0.0340	0.521	-0.0266	0.3
$aBOIND_{i,t}$	-0.6084	0.968	-0.7069	1.132	-1.2707	4.405**	-0.1940	0.105
$aAUCOMSIZE_{i,t}$	-0.0134	0.025	0.0346	0.152	-0.0160	0.045	-0.0770	1.062
$aAUCOMIND_{i,t}$	-0.2598	0.249	-0.1664	0.084	0.1956	0.13	0.4240	0.533
$DUALITY_{i,t}$	0.2718	1.117	0.1258	0.175	0.2370	0.767	0.0204	0.005
$aTOTCOMPEN_{i,t}$	0.0002	0.104	-0.0007	0.783	-0.0006	0.656	0.0016	4.155**
$aLn(MVE)_{i,t-1}$	-0.1842	8.955***	-0.0749	1.382	0.0637	1.345	0.0554	1.03
$aMTB_{i,t-1}$	0.0011	0.009	0.0353	9.191***	-0.0030	0.063	-0.0368	7.85***
$aROA_{i,t}$	3.0621	45.841***	-2.8866	40.209***	-0.2819	0.435	2.2254	22.462***
$aDEBT_{i,t-1}$	-1.2653	4.281**	-0.9632	2.313	-1.0052	3.084*	0.8372	2.617
$aNOA_{i,t-1}$	-1.1344	14.143***						
$aRD_{i,t}$	-0.0041	0.036	0.0371	2.664	-0.0054	0.07	-0.0976	33.049***
$aCAP_{i,t}$	-0.0420	0.022	-0.1817	0.324	-0.6812	5.183**	-0.5597	3.785*
$aBOOKTAX_{i,t}$	0.0043	0.361	-0.0137	4.575**	0.0011	0.026	0.0007	0.008
$ESEO_{i,t}$	0.7079	17.354***	0.5044	7.797***	0.1208	0.475	0.2975	2.921*
$EAUDIT_{i,t}$	0.6662	14.888***						
$EMA_{i,t}$	-0.1075	0.114	0.1071	0.102	0.2949	0.979	0.0221	0.005
$EDISTRESS_{i,t}$	0.5430	5.354**	1.0333	23.7***	0.7237	11.172***	0.7047	9.161***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \beta_3 ESSI\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$ where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.31. Aggressive earnings management and positions of interlocked directors at the exposed firms – Controlling for the pair having similar ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1124	439.791***	-2.9904	581.862***	-2.4934	566.897***	-2.5584	583.649***
$ILW\_Y\_FINEX_{i,t}$	0.6157	4.257**	0.1008	0.091	0.3674	1.251	0.3019	0.733
$ILW\_Y\_NOFINEX_{i,t}$	0.5845	0.766	-0.8877	1.038	0.5345	0.634	0.3850	0.399
$ESSI\_Y\_PAIR_{i,t}$	-0.1731	0.182	0.3159	0.409	0.0039	0	0.2411	0.348
$aBOLINK_{i,t}$	0.0315	0.167	0.0455	0.289	-0.1282	2.681	-0.1814	5.413**
$aBOSIZE_{i,t}$	-0.0255	0.233	-0.1021	3.174*	0.0318	0.457	-0.0262	0.291
$aBOIND_{i,t}$	-0.6195	1.001	-0.6188	0.871	-1.2484	4.262**	-0.1986	0.109
$aAUCOMSIZE_{i,t}$	-0.0157	0.034	0.0215	0.058	-0.0175	0.053	-0.0759	1.033
$aAUCOMIND_{i,t}$	-0.2557	0.242	-0.2356	0.169	0.1725	0.101	0.4179	0.518
$DUALITY_{i,t}$	0.2725	1.12	0.1385	0.213	0.2420	0.8	0.0244	0.007
$aTOTCOMPEN_{i,t}$	0.0002	0.11	-0.0006	0.6	-0.0006	0.562	0.0016	4.134**
$aLn(MVE)_{i,t-1}$	-0.1850	9.049***	-0.0704	1.22	0.0642	1.373	0.0549	1.013
$aMTB_{i,t-1}$	0.0011	0.009	0.0354	9.355***	-0.0031	0.069	-0.0364	7.745***
$aROA_{i,t}$	3.0508	45.685***	-2.8572	39.309***	-0.2619	0.378	2.2180	22.359***
$aDEBT_{i,t-1}$	-1.2517	4.205**	-0.9012	2.051	-0.9980	3.055*	0.7983	2.391
$aNOA_{i,t-1}$	-1.1300	14.044***						
$aRD_{i,t}$	-0.0041	0.035	0.0393	2.88*	-0.0052	0.064	-0.0983	33.492***
$aCAP_{i,t}$	-0.0535	0.036	-0.2724	0.745	-0.7077	5.609**	-0.5650	3.859**
$aBOOKTAX_{i,t}$	0.0041	0.337	-0.0135	4.448**	0.0008	0.016	0.0006	0.007
$ESEO_{i,t}$	0.7077	17.344***	0.4935	7.467***	0.1164	0.442	0.2973	2.91*
$EAUDIT_{i,t}$	0.6676	14.924***						
$EMA_{i,t}$	-0.1005	0.1	0.1053	0.099	0.2938	0.974	0.0221	0.005
$EDISTRESS_{i,t}$	0.5435	5.37**	1.0277	23.327***	0.7260	11.223***	0.7062	9.191***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \beta_3 ESSI\_Y\_PAIR + \sum \beta_k Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.32. Aggressive earnings management and positions of interlocked directors at the contagious firms – Controlling for the pair having similar ESCORE

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1140	440.186***	-2.9897	581.743***	-2.4938	566.721***	-2.5648	582.248***
$ILW\_Y\_FINCO_{i,t}$	0.5957	3.882**	0.0025	0	0.4166	1.546	0.4917	1.933
$ILW\_Y\_NOFINCO_{i,t}$	0.7331	1.477	0.2918	0.117	0.1818	0.057	-0.7469	0.898
$ESSI\_Y\_PAIR_{i,t}$	-0.1725	0.181	0.2277	0.212	-0.0150	0.001	0.1917	0.219
$aBOLINK_{i,t}$	0.0311	0.163	0.0445	0.276	-0.1306	2.763*	-0.1985	6.288**
$aBOSIZE_{i,t}$	-0.0249	0.222	-0.1025	3.199*	0.0323	0.47	-0.0262	0.293
$aBOIND_{i,t}$	-0.6220	1.014	-0.6363	0.922	-1.2534	4.296**	-0.1607	0.072
$aAUCOMSIZE_{i,t}$	-0.0148	0.03	0.0289	0.107	-0.0179	0.056	-0.0717	0.929
$aAUCOMIND_{i,t}$	-0.2562	0.243	-0.2155	0.141	0.1725	0.101	0.4180	0.516
$DUALITY_{i,t}$	0.2720	1.12	0.1401	0.218	0.2420	0.8	0.0244	0.007
$aTOTCOMPEN_{i,t}$	0.0002	0.111	-0.0005	0.457	-0.0006	0.561	0.0016	4.081**
$aLn(MVE)_{i,t-1}$	-0.1852	9.055***	-0.0761	1.437	0.0635	1.336	0.0498	0.828
$aMTB_{i,t-1}$	0.0010	0.008	0.0354	9.387***	-0.0032	0.074	-0.0373	7.989***
$aROA_{i,t}$	3.0449	45.423***	-2.8261	38.805***	-0.2517	0.346	2.2915	23.54***
$aDEBT_{i,t-1}$	-1.2504	4.195**	-0.8635	1.894	-0.9806	2.918*	0.8793	2.877*
$aNOA_{i,t-1}$	-1.1346	14.107***						
$aRD_{i,t}$	-0.0041	0.036	0.0362	2.511	-0.0051	0.061	-0.0971	32.732***
$aCAP_{i,t}$	-0.0508	0.032	-0.2702	0.734	-0.7055	5.574**	-0.5864	4.145**
$aBOOKTAX_{i,t}$	0.0041	0.338	-0.0134	4.366**	0.0008	0.017	0.0008	0.01
$ESEO_{i,t}$	0.7070	17.3***	0.4906	7.407***	0.1191	0.462	0.3037	3.05*
$EAUDIT_{i,t}$	0.6713	15.012***						
$EMA_{i,t}$	-0.0986	0.096	0.1009	0.09	0.2951	0.984	0.0054	0
$EDISTRESS_{i,t}$	0.5419	5.336**	1.0337	23.646***	0.7252	11.204***	0.7049	9.163***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \beta_3 ESSI\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

4.7.2.2. *Individual contexts of earnings management*

Using the aggregate ESCORE as in the previous sub-section is, however, not ideal because the pair might have similar context of earnings management, but the particular causes of such context might be different. This section, therefore, also uses fifteen individual components of ESCORE separately. For illustration, EDEBT_Y_PAIR is created as a dummy which is one if both the exposed and contagious firms have EDEBT[34] of one, zero otherwise. The same procedures are applied to the other fourteen components of ESCORE to create ESEO_Y_PAIR, EDDEBT_Y_PAIR, EMA_Y_PAIR, EOV_Y_PAIR, EROA_Y_PAIR, EDROA_Y_PAIR, EDIV_Y_PAIR, EDISTRESS_Y_PAIR, ESIZE_Y_PAIR, ECYCLE_Y_PAIR, EAUDIT_Y_PAIR, EBLOAT_Y_PAIR, ECAP_Y_PAIR and EBT_Y_PAIR. Equation (E4.2), (E4.3), (E4.4), (E4.5), (E4.6) and (E4.7) are then re-estimated with the above fifteen pair dummy controls being added to the right hand side. If the contagious and exposed firms do not share a characteristic in any year during the sample period (i.e. the pair dummy is zero throughout), the corresponding dummy is dropped from the regression to avoid perfect multi-collinearity. As shown in Table T4.33, T4.34, T4.35, T4.36, T4.37 and T4.38, none of the main conclusions of the chapter change qualitatively using after controlling for the individual contexts of earnings management shared by the exposed and contagious firms.

[34] Please refer to Section 2.4 in Chapter 2 for detailed explanations of the construction of these variables.

Table T4.33. Aggressive earnings management and interlocked directors – Controlling for the pair having similar individual signals of earnings management

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1407	427.758***	-3.0113	568.097***	-2.5058	566.68***	-2.5610	575.6***
$ILW\_Y_{i,t}$	0.6273	4.637**	0.3205	1.073	0.5516	4.749**	0.5381	4.651**
$EDEBT\_Y\_PAIR_{i,t}$	0.3152	0.232	0.9190	1.055	-13.4832	0	-13.2231	0
$EDDEBT\_Y\_PAIR_{i,t}$	-14.5858	0.001	-13.4335	0.001	-0.3958	0.364	-2.0352	3.81*
$ESEO\_Y\_PAIR_{i,t}$	0.5775	0.321	0.7643	0.701	-14.0661	0	0.6520	0.871
$EMA\_Y\_PAIR_{i,t}$	-14.4562	0	-0.6032	0	-14.0225	0		
$EOV\_Y\_PAIR_{i,t}$	0.3205	0.238	-2.1243	1.864	0.9558	1.297	1.1490	1.724
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-14.3182	0						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.5453	1.631	-1.9405	3.419*	14.6854	0	28.3291	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-13.8988	0
$ECYCLE\_Y\_PAIR_{i,t}$					-13.5699	0		
$EAUDIT\_Y\_PAIR_{i,t}$	-0.6966	1.654						
$EBLOAT\_Y\_PAIR_{i,t}$	-1.3049	0.74						
$ECAP\_Y\_PAIR_{i,t}$	-1.9452	1.94	-12.8886	0	-13.0494	0	-0.3538	0.082
$EBT\_Y\_PAIR_{i,t}$	1.8123	2.856*	0.9960	1.412	-14.2123	0	-11.7365	0
$aBOLINK_{i,t}$	0.0361	0.211	0.0274	0.101	-0.1205	2.364	-0.1856	5.467**
$aBOSIZE_{i,t}$	-0.0302	0.32	-0.1023	3.161*	0.0361	0.584	-0.0300	0.38
$aBOIND_{i,t}$	-0.5589	0.809	-0.7006	1.111	-1.3259	4.75**	-0.2396	0.156
$aAUCOMSIZE_{i,t}$	-0.0154	0.032	0.0270	0.091	-0.0220	0.082	-0.0743	0.984
$aAUCOMIND_{i,t}$	-0.2147	0.168	-0.1158	0.04	0.2006	0.137	0.4753	0.66
$DUALITY_{i,t}$	0.3081	1.431	0.1346	0.198	0.2244	0.686	0.0124	0.002
$aTOTCOMPEN_{i,t}$	0.0000	0.003	-0.0003	0.169	-0.0006	0.553	0.0014	3.146*
$aLn(MVE)_{i,t-1}$	-0.1850	8.868***	-0.0720	1.26	0.0592	1.161	0.0604	1.204
$aMTB_{i,t-1}$	0.0023	0.04	0.0388	11.052***	-0.0025	0.044	-0.0378	8.079***

Table T4.33. (continued)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
$aROA_{i,t}$	3.1292	46.851***	-2.6922	34.91***	-0.2830	0.441	2.2653	23.072***
$aDEBT_{i,t-1}$	-1.2201	3.922**	-0.8161	1.695	-1.0201	3.163*	0.8545	2.705
$aNOA_{i,t-1}$	-1.1248	13.744***						
$aRD_{i,t}$	-0.0084	0.153	0.0344	2.231	-0.0046	0.05	-0.1015	35.202***
$aCAP_{i,t}$	-0.0619	0.046	-0.3208	1.015	-0.7150	5.619**	-0.5861	4.067**
$aBOOKTAX_{i,t}$	0.0053	0.533	-0.0142	4.942**	0.0007	0.013	0.0007	0.009
$ESEO_{i,t}$	0.7183	17.279***	0.5083	7.766***	0.1603	0.832	0.2880	2.615
$EAUDIT_{i,t}$	0.7066	15.818***						
$EMA_{i,t}$	-0.0784	0.06	0.0721	0.046	0.3071	1.057	0.0286	0.007
$EDISTRESS_{i,t}$	0.4870	4.06**	1.1080	26.574***	0.7153	10.9***	0.6641	7.855***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \beta_2 EDEBT\_Y\_PAIR + \beta_3 EDDEBT\_Y\_PAIR + \beta_4 ESEO\_Y\_PAIR + \beta_5 EMA\_Y\_PAIR + \beta_6 EOV\_Y\_PAIR + \beta_7 EROA\_Y\_PAIR + \beta_8 EDROA\_Y\_PAIR + \beta_9 EDIV\_Y\_PAIR + \beta_{10} EDISTRESS\_Y\_PAIR + \beta_{11} ESIZE\_Y\_PAIR + \beta_{12} ECYCLE\_Y\_PAIR + \beta_{13} EAUDIT\_Y\_PAIR + \beta_{14} EBLOAT\_Y\_PAIR + \beta_{15} ECAP\_Y\_PAIR + \beta_{16} EBT\_Y\_PAIR + \sum \beta_k\ Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.34. Aggressive earnings management and gender of interlocked directors – Controlling for the pair having similar individual signals of earnings management

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1407	427.564***	-3.0326	563.934***	-2.5080	566.274***	-2.5593	575.325***
$ILW\_Y\_MALE_{i,t}$	0.7007	5.183**	0.5420	2.932*	0.6386	5.709**	0.6710	6.363**
$ILW\_Y\_FEMALE_{i,t}$	0.2228	0.105	-1.3894	1.993	0.0491	0.006	0.0066	0
$EDEBT\_Y\_PAIR_{i,t}$	0.2509	0.144	0.7211	0.642	-13.5493	0	-13.8233	0
$EDDEBT\_Y\_PAIR_{i,t}$	-14.5381	0.001	-13.5606	0.001	-0.4169	0.404	-2.1068	4.04**
$ESEO\_Y\_PAIR_{i,t}$	0.5909	0.329	0.8626	0.871	-13.9258	0	0.7312	1.061
$EMA\_Y\_PAIR_{i,t}$	-14.4724	0	-0.6419	0	-14.0687	0		
$EOV\_Y\_PAIR_{i,t}$	0.3073	0.218	-2.2227	2.034	0.9988	1.407	1.1931	1.83
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-13.9169	0						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.3657	1.2	-2.0622	3.783*	14.5138	0	29.5278	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-14.9602	0
$ECYCLE\_Y\_PAIR_{i,t}$					-13.6220	0		
$EAUDIT\_Y\_PAIR_{i,t}$	-0.7360	1.824						
$EBLOAT\_Y\_PAIR_{i,t}$	-1.2221	0.649						
$ECAP\_Y\_PAIR_{i,t}$	-1.8582	1.765	-13.0187	0	-13.1404	0	-0.4599	0.141
$EBT\_Y\_PAIR_{i,t}$	1.9699	3.179*	1.0370	1.571	-14.2721	0	-12.4030	0
$aBOLINK_{i,t}$	0.0292	0.134	0.0057	0.004	-0.1308	2.696	-0.1918	5.797**
$aBOSIZE_{i,t}$	-0.0316	0.349	-0.1066	3.412*	0.0362	0.587	-0.0339	0.48
$aBOIND_{i,t}$	-0.5480	0.776	-0.7414	1.24	-1.3487	4.9**	-0.2462	0.165
$aAUCOMSIZE_{i,t}$	-0.0079	0.008	0.0272	0.092	-0.0176	0.053	-0.0754	1.007
$aAUCOMIND_{i,t}$	-0.2091	0.159	-0.0749	0.017	0.2234	0.169	0.4912	0.704
$DUALITY_{i,t}$	0.3052	1.404	0.1181	0.151	0.2231	0.678	-0.0007	0
$aTOTCOMPEN_{i,t}$	-0.0001	0.005	-0.0004	0.328	-0.0006	0.622	0.0014	3.179*
$aLn(MVE)_{i,t-1}$	-0.1862	8.96***	-0.0665	1.072	0.0603	1.199	0.0626	1.296
$aMTB_{i,t-1}$	0.0023	0.04	0.0389	10.995***	-0.0025	0.044	-0.0385	8.404***

Table T4.34. (continued)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
$aROA_{i,t}$	3.1287	46.748***	-2.7428	35.907***	-0.2970	0.483	2.2615	22.947***
$aDEBT_{i,t-1}$	-1.2331	3.995**	-0.9244	2.147	-1.0137	3.115*	0.8625	2.761*
$aNOA_{i,t-1}$	-1.1298	13.858***						
$aRD_{i,t}$	-0.0083	0.147	0.0351	2.33	-0.0047	0.051	-0.1023	35.667***
$aCAP_{i,t}$	-0.0477	0.027	-0.2887	0.816	-0.7017	5.393**	-0.5721	3.871**
$aBOOKTAX_{i,t}$	0.0054	0.564	-0.0146	5.227**	0.0009	0.021	0.0007	0.008
$ESEO_{i,t}$	0.7199	17.356***	0.5258	8.264***	0.1615	0.843	0.2809	2.48
$EAUDIT_{i,t}$	0.7077	15.845***						
$EMA_{i,t}$	-0.0820	0.066	0.0739	0.048	0.3019	1.019	0.0231	0.005
$EDISTRESS_{i,t}$	0.4799	3.933**	1.1166	26.972***	0.7166	10.951***	0.6563	7.662***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.35. Aggressive earnings management and age of interlocked directors – Controlling for the pair having similar individual signals of earnings management

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1335	430.257***	-3.0218	569.242***	-2.5049	573.488***	-2.5738	581.803***
$ILW\_Y_{i,t}$*$ILW\_Y\_AGE_{i,t}$	0.0109	4.497**	0.0075	1.956	0.0103	5.437**	0.0119	7.825***
$EDEBT\_Y\_PAIR_{i,t}$	0.3033	0.212	0.8617	0.918	-13.4796	0	-13.7622	0
$EDDEBT\_Y\_PAIR_{i,t}$	-14.5618	0.001	-13.5239	0.001	-0.3830	0.345	-2.1632	4.271**
$ESEO\_Y\_PAIR_{i,t}$	0.6538	0.403	0.7332	0.662	-13.9097	0	0.7143	1.088
$EMA\_Y\_PAIR_{i,t}$	-14.4779	0	-0.6220	0	-14.1001	0		
$EOV\_Y\_PAIR_{i,t}$	0.3190	0.234	-2.1773	1.958	0.9434	1.262	1.0347	1.398
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-13.7081	0						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.2830	1.061	-1.9142	3.45*	14.5725	0	29.4243	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-14.8459	0
$ECYCLE\_Y\_PAIR_{i,t}$					-13.6355	0		
$EAUDIT\_Y\_PAIR_{i,t}$	-0.6983	1.64						
$EBLOAT\_Y\_PAIR_{i,t}$	-1.1736	0.572						
$ECAP\_Y\_PAIR_{i,t}$	-1.8121	1.617	-12.9481	0	-13.1039	0	-0.4442	0.131
$EBT\_Y\_PAIR_{i,t}$	2.0134	3.319*	0.9870	1.387	-14.2334	0	-12.3905	0
$aBOLINK_{i,t}$	0.0325	0.169	0.0173	0.039	-0.1291	2.633	-0.1994	6.184**
$aBOSIZE_{i,t}$	-0.0301	0.318	-0.1032	3.215*	0.0360	0.582	-0.0306	0.392
$aBOIND_{i,t}$	-0.5444	0.767	-0.7192	1.169	-1.3448	4.875**	-0.2399	0.156
$aAUCOMSIZE_{i,t}$	-0.0054	0.004	0.0264	0.087	-0.0168	0.049	-0.0747	0.989
$aAUCOMIND_{i,t}$	-0.1987	0.144	-0.1075	0.035	0.2292	0.179	0.4894	0.698
$DUALITY_{i,t}$	0.3076	1.427	0.1301	0.184	0.2226	0.675	0.0185	0.004
$aTOTCOMPEN_{i,t}$	-0.0001	0.01	-0.0003	0.198	-0.0006	0.622	0.0014	3.214*
$aLn(MVE)_{i,t-1}$	-0.1877	9.115***	-0.0706	1.212	0.0592	1.159	0.0609	1.223
$aMTB_{i,t-1}$	0.0024	0.046	0.0388	11.044***	-0.0027	0.05	-0.0384	8.412***

Table T4.35. (continued)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
$aROA_{i,t}$	3.1203	46.441***	-2.7025	35.266***	-0.2950	0.478	2.2869	23.461***
$aDEBT_{i,t-1}$	-1.2477	4.089**	-0.8252	1.736	-1.0067	3.073*	0.8701	2.812*
$aNOA_{i,t-1}$	-1.1258	13.764***						
$aRD_{i,t}$	-0.0083	0.15	0.0354	2.365	-0.0042	0.041	-0.1010	34.815***
$aCAP_{i,t}$	-0.0440	0.023	-0.3172	0.996	-0.7008	5.4**	-0.5869	4.066**
$aBOOKTAX_{i,t}$	0.0057	0.611	-0.0143	5.035**	0.0009	0.021	0.0007	0.008
$ESEO_{i,t}$	0.7206	17.394***	0.5120	7.877***	0.1598	0.826	0.2862	2.574
$EAUDIT_{i,t}$	0.7056	15.762***						
$EMA_{i,t}$	-0.0789	0.061	0.0700	0.043	0.3037	1.032	0.0370	0.012
$EDISTRESS_{i,t}$	0.4813	3.965**	1.1104	26.698***	0.7153	10.928***	0.6704	8.008***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \beta_2 EDEBT\_Y\_PAIR + \beta_3 EDDEBT\_Y\_PAIR + \beta_4 ESEO\_Y\_PAIR + \beta_5 EMA\_Y\_PAIR + \beta_6 EOV\_Y\_PAIR + \beta_7 EROA\_Y\_PAIR + \beta_8 EDROA\_Y\_PAIR + \beta_9 EDIV\_Y\_PAIR + \beta_{10} EDISTRESS\_Y\_PAIR + \beta_{11} ESIZE\_Y\_PAIR + \beta_{12} ECYCLE\_Y\_PAIR + \beta_{13} EAUDIT\_Y\_PAIR + \beta_{14} EBLOAT\_Y\_PAIR + \beta_{15} ECAP\_Y\_PAIR + \beta_{16} EBT\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.36. Aggressive earnings management and nationality of interlocked directors – Controlling for the pair having similar individual signals of earnings management

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1414	427.518***	-3.0301	564.843***	-2.5071	566.476***	-2.5600	575.47***
$ILW\_Y\_BRIT_{i,t}$	0.6823	4.598**	0.6251	3.865**	0.6685	6.16**	0.6307	5.817**
$ILW\_Y\_NONBRIT_{i,t}$	0.4453	0.678	-1.5787	2.774*	-0.0341	0.003	-0.0273	0.002
$EDEBT\_Y\_PAIR_{i,t}$	0.2930	0.199	0.7454	0.652	-13.6202	0	-13.7790	0
$EDDEBT\_Y\_PAIR_{i,t}$	-14.5355	0.001	-13.5667	0.001	-0.4309	0.431	-2.0909	4.003**
$ESEO\_Y\_PAIR_{i,t}$	0.5367	0.275	0.9447	1.09	-13.8248	0	0.6863	0.958
$EMA\_Y\_PAIR_{i,t}$	-14.4722	0	-0.7058	0	-14.0967	0		
$EOV\_Y\_PAIR_{i,t}$	0.3211	0.239	-2.3158	2.138	0.9082	1.161	1.0542	1.436
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-14.1376	0						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.4564	1.394	-2.1797	4.245**	14.4079	0	29.4571	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-14.9406	0
$ECYCLE\_Y\_PAIR_{i,t}$					-13.6329	0		
$EAUDIT\_Y\_PAIR_{i,t}$	-0.7269	1.775						
$EBLOAT\_Y\_PAIR_{i,t}$	-1.2070	0.616						
$ECAP\_Y\_PAIR_{i,t}$	-1.8987	1.845	-12.8640	0	-13.1626	0	-0.4331	0.124
$EBT\_Y\_PAIR_{i,t}$	1.8652	2.952*	0.9965	1.457	-14.3026	0	-12.3579	0
$aBOLINK_{i,t}$	0.0323	0.166	0.0046	0.003	-0.1301	2.689	-0.1890	5.651**
$aBOSIZE_{i,t}$	-0.0303	0.321	-0.1084	3.533*	0.0368	0.609	-0.0313	0.411
$aBOIND_{i,t}$	-0.5434	0.761	-0.7744	1.352	-1.3497	4.907**	-0.2370	0.152
$aAUCOMSIZE_{i,t}$	-0.0133	0.024	0.0312	0.121	-0.0188	0.06	-0.0755	1.013
$aAUCOMIND_{i,t}$	-0.2200	0.176	-0.0781	0.018	0.2318	0.182	0.4823	0.679
$DUALITY_{i,t}$	0.3076	1.426	0.1123	0.136	0.2207	0.664	0.0056	0
$aTOTCOMPEN_{i,t}$	0.0000	0.003	-0.0005	0.369	-0.0006	0.639	0.0014	3.18*
$aLn(MVE)_{i,t-1}$	-0.1850	8.859***	-0.0660	1.051	0.0586	1.132	0.0611	1.232
$aMTB_{i,t-1}$	0.0023	0.041	0.0392	11.176***	-0.0028	0.053	-0.0384	8.296***

Table T4.36. (continued)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
$aROA_{i,t}$	3.1304	46.833***	-2.7634	36.431***	-0.2945	0.475	2.2719	23.17***
$aDEBT_{i,t-1}$	-1.2258	3.952**	-0.9630	2.307	-1.0119	3.1*	0.9073	3.026*
$aNOA_{i,t-1}$	-1.1276	13.802***						
$aRD_{i,t}$	-0.0086	0.158	0.0360	2.451	-0.0046	0.051	-0.1008	34.649***
$aCAP_{i,t}$	-0.0524	0.033	-0.2182	0.46	-0.6965	5.321**	-0.5820	4.007**
$aBOOKTAX_{i,t}$	0.0053	0.543	-0.0148	5.405**	0.0010	0.024	0.0008	0.012
$ESEO_{i,t}$	0.7179	17.265***	0.5238	8.2***	0.1597	0.824	0.2842	2.543
$EAUDIT_{i,t}$	0.7093	15.898***						
$EMA_{i,t}$	-0.0817	0.065	0.0622	0.034	0.3072	1.057	0.0384	0.013
$EDISTRESS_{i,t}$	0.4838	4**	1.1123	26.772***	0.7159	10.939***	0.6627	7.825***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.37. Aggressive earnings management and positions of interlocked directors at the exposed firms – Controlling for the pair having similar individual signals of earnings management

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1404	427.66***	-3.0153	567.396***	-2.5061	566.572***	-2.5612	575.85***
$ILW\_Y\_FINEX_{i,t}$	0.6379	4.336**	0.4078	1.708	0.5242	4.015**	0.5049	3.728*
$ILW\_Y\_NOFINEX_{i,t}$	0.5626	0.724	-1.2733	1.231	0.8326	1.567	0.7891	1.775
$EDEBT\_Y\_PAIR_{i,t}$	0.3086	0.221	1.1156	1.696	-13.5369	0	-13.0929	0.001
$EDDEBT\_Y\_PAIR_{i,t}$	-14.5786	0.001	-13.4674	0.001	-0.4238	0.412	-2.0311	3.802*
$ESEO\_Y\_PAIR_{i,t}$	0.5813	0.324	0.8521	0.864	-14.1484	0	0.6084	0.744
$EMA\_Y\_PAIR_{i,t}$	-14.4592	0	-0.6361	0	-13.9708	0		
$EOV\_Y\_PAIR_{i,t}$	0.3194	0.236	-1.2979	0.823	0.9617	1.315	1.1816	1.81
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-14.3289	0						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.5304	1.58	-2.0187	3.576*	14.7730	0	28.0488	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-14.1499	0
$ECYCLE\_Y\_PAIR_{i,t}$					-13.5165	0		
$EAUDIT\_Y\_PAIR_{i,t}$	-0.7034	1.666						
$EBLOAT\_Y\_PAIR_{i,t}$	-1.3065	0.741						
$ECAP\_Y\_PAIR_{i,t}$	-1.9468	1.938	-13.0673	0	-13.0210	0	-0.3263	0.07
$EBT\_Y\_PAIR_{i,t}$	1.8301	2.839*	1.2435	2.162	-14.1840	0	-11.5530	0
$aBOLINK_{i,t}$	0.0355	0.203	0.0213	0.06	-0.1196	2.331	-0.1851	5.45**
$aBOSIZE_{i,t}$	-0.0300	0.314	-0.1011	3.09*	0.0359	0.577	-0.0300	0.379
$aBOIND_{i,t}$	-0.5535	0.789	-0.7284	1.195	-1.3173	4.682**	-0.2453	0.163
$aAUCOMSIZE_{i,t}$	-0.0155	0.032	0.0212	0.056	-0.0216	0.08	-0.0735	0.963
$aAUCOMIND_{i,t}$	-0.2165	0.171	-0.1050	0.033	0.1973	0.132	0.4762	0.663
$DUALITY_{i,t}$	0.3097	1.441	0.1263	0.173	0.2256	0.694	0.0126	0.002
$aTOTCOMPEN_{i,t}$	0.0000	0.002	-0.0004	0.222	-0.0006	0.556	0.0014	3.134*
$aLn(MVE)_{i,t-1}$	-0.1850	8.87***	-0.0651	1.026	0.0583	1.126	0.0600	1.189
$aMTB_{i,t-1}$	0.0023	0.041	0.0389	11.106***	-0.0024	0.041	-0.0377	8.034***

Table T4.37. (continued)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
$aROA_{i,t}$	3.1300	46.856***	-2.7125	35.261***	-0.2790	0.428	2.2670	23.09***
$aDEBT_{i,t-1}$	-1.2191	3.914**	-0.8506	1.828	-1.0223	3.178*	0.8586	2.731*
$aNOA_{i,t-1}$	-1.1243	13.729***						
$aRD_{i,t}$	-0.0084	0.151	0.0365	2.487	-0.0046	0.05	-0.1018	35.355***
$aCAP_{i,t}$	-0.0611	0.045	-0.3135	0.965	-0.7187	5.68**	-0.5883	4.096**
$aBOOKTAX_{i,t}$	0.0053	0.529	-0.0144	5.13**	0.0008	0.013	0.0007	0.009
$ESEO_{i,t}$	0.7179	17.252***	0.5092	7.743***	0.1601	0.83	0.2850	2.558
$EAUDIT_{i,t}$	0.7066	15.817***						
$EMA_{i,t}$	-0.0781	0.06	0.0816	0.058	0.3088	1.07	0.0296	0.008
$EDISTRESS_{i,t}$	0.4867	4.053**	1.1172	27.078***	0.7163	10.924***	0.6672	7.922***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \sum \beta_k Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.38. Aggressive earnings management and positions of interlocked directors at the contagious firms – Controlling for the pair having similar individual signals of earnings management

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-3.1414	427.404***	-3.0113	568.091***	-2.5058	566.681***	-2.5666	574.415***
$ILW\_Y\_FINCO_{i,t}$	0.5643	3.261*	0.3237	1.047	0.5483	4.331**	0.6761	6.843***
$ILW\_Y\_NOFINCO_{i,t}$	0.9766	2.425	0.2773	0.084	0.5843	0.585	-0.6008	0.562
$EDEBT\_Y\_PAIR_{i,t}$	0.3697	0.314	0.9199	1.059	-13.4802	0	-13.2331	0
$EDDEBT\_Y\_PAIR_{i,t}$	-14.6364	0.001	-13.4387	0.001	-0.3952	0.363	-2.0183	3.741*
$ESEO\_Y\_PAIR_{i,t}$	0.5619	0.301	0.7702	0.696	-14.0689	0	0.7814	1.215
$EMA\_Y\_PAIR_{i,t}$	-14.4552	0	-0.5542	0	-14.0555	0		
$EOV\_Y\_PAIR_{i,t}$	0.2830	0.18	-2.1344	1.846	0.9588	1.297	1.0215	1.356
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-14.2514	0						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.6869	1.886	-1.9483	3.35*	14.6890	0	27.9433	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-14.0542	0
$ECYCLE\_Y\_PAIR_{i,t}$					-13.5669	0		
$EAUDIT\_Y\_PAIR_{i,t}$	-0.6366	1.333						
$EBLOAT\_Y\_PAIR_{i,t}$	-1.3922	0.813						
$ECAP\_Y\_PAIR_{i,t}$	-2.1352	2.274	-12.8861	0	-13.0805	0	0.1145	0.008
$EBT\_Y\_PAIR_{i,t}$	1.7912	2.8*	1.0011	1.404	-14.2099	0	-11.7836	0
$aBOLINK_{i,t}$	0.0358	0.208	0.0273	0.1	-0.1203	2.341	-0.2018	6.285**
$aBOSIZE_{i,t}$	-0.0277	0.268	-0.1022	3.159*	0.0360	0.583	-0.0311	0.408
$aBOIND_{i,t}$	-0.5550	0.798	-0.7000	1.109	-1.3264	4.752**	-0.2008	0.109
$aAUCOMSIZE_{i,t}$	-0.0143	0.028	0.0269	0.09	-0.0220	0.082	-0.0691	0.859
$aAUCOMIND_{i,t}$	-0.2177	0.173	-0.1168	0.041	0.2013	0.138	0.4637	0.625
$DUALITY_{i,t}$	0.3106	1.454	0.1349	0.199	0.2242	0.685	0.0114	0.001
$aTOTCOMPEN_{i,t}$	0.0000	0.003	-0.0003	0.17	-0.0006	0.553	0.0014	3.053*
$aLn(MVE)_{i,t-1}$	-0.1852	8.878***	-0.0720	1.26	0.0593	1.163	0.0568	1.059
$aMTB_{i,t-1}$	0.0022	0.037	0.0388	11.053***	-0.0025	0.045	-0.0387	8.325***

Table T4.38. (continued)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
$aROA_{i,t}$	3.1196	46.573***	-2.6911	34.795***	-0.2846	0.443	2.3337	24.126***
$aDEBT_{i,t-1}$	-1.2201	3.918**	-0.8153	1.691	-1.0221	3.157*	0.9440	3.269*
$aNOA_{i,t-1}$	-1.1411	14.049***						
$aRD_{i,t}$	-0.0085	0.155	0.0344	2.234	-0.0046	0.05	-0.1004	34.391***
$aCAP_{i,t}$	-0.0563	0.038	-0.3206	1.014	-0.7156	5.618**	-0.6013	4.278**
$aBOOKTAX_{i,t}$	0.0054	0.56	-0.0142	4.943**	0.0007	0.013	0.0009	0.016
$ESEO_{i,t}$	0.7172	17.203***	0.5085	7.768***	0.1600	0.827	0.2899	2.651
$EAUDIT_{i,t}$	0.7113	15.97***						
$EMA_{i,t}$	-0.0762	0.057	0.0713	0.045	0.3075	1.059	0.0148	0.002
$EDISTRESS_{i,t}$	0.4813	3.962**	1.1083	26.574***	0.7153	10.898***	0.6671	7.925***

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \sum \beta_k\, Control_k + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9); $Control_k$ include the variables described in Section 4.5.3. Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

The specification designed above to address the shared individual contexts of earnings management might suffer from multi-collinearity issue because some of the control variables are also used to define the common characteristics. For example, ESEO is used as a control variable, but it is also used to define ESEO_PAIR. To mitigate this concern, Equation (E4.2), (E4.3), (E4.4), (E4.5), (E4.6) and (E4.7) are re-estimated with the fifteen pair dummy controls being added to the right hand side (i.e. similar to the previous specification), but only corporate governance and compensation variables are retained as control variables. Again, the results, as presented in Table T4.39, T4.40, T4.41, T4.42, T4.43 and T4.44, indicate that the main conclusions of the chapter do not change qualitatively under this specification.

Table T4.39. Aggressive earnings management and interlocked directors – Controlling for the pair having similar individual signals of earnings management (no fundamentals as control variables)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-2.3686	794.494***	-2.3262	763.284***	-2.2599	816.766***	-2.2558	823.931***
$ILW\_Y_{i,t}$	0.3760	1.856	0.1624	0.335	0.4669	3.54*	0.4533	3.533*
$EDEBT\_Y\_PAIR_{i,t}$	0.3833	0.357	1.1330	2.072	-13.5681	0.000	-12.7219	0.000
$EDDEBT\_Y\_PAIR_{i,t}$	-14.1524	0.001	-13.7974	0.001	-0.5015	0.600	-1.9616	3.574*
$ESEO\_Y\_PAIR_{i,t}$	0.7344	0.584	0.9160	1.105	-14.1285	0.000	0.7592	1.324
$EMA\_Y\_PAIR_{i,t}$	-14.4715	0.000	-0.0290	0.000	-13.9368	0.000		
$EOV\_Y\_PAIR_{i,t}$	0.6216	0.926	-1.8629	2.037	0.7774	0.865	0.9996	1.350
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-14.1619	0.000						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.3281	1.324	-0.0143	0.000	15.2338	0.000	28.6370	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-12.7041	0.000
$ECYCLE\_Y\_PAIR_{i,t}$					-13.8975	0.000		
$EAUDIT\_Y\_PAIR_{i,t}$	0.0252	0.002						
$EBLOAT\_Y\_PAIR_{i,t}$	-0.8984	0.378						
$ECAP\_Y\_PAIR_{i,t}$	-1.3062	0.920	-13.9508	0.000	-13.5683	0.000	-0.1995	0.030
$EBT\_Y\_PAIR_{i,t}$	1.2012	1.396	1.5733	5.157**	-13.9046	0.000	-13.1486	0.000
$aBOLINK_{i,t}$	-0.0425	0.324	-0.0672	0.719	-0.1399	3.401*	-0.1602	4.533**
$aBOSIZE_{i,t}$	-0.1222	6.827***	-0.2422	23.807***	0.0166	0.162	0.0220	0.289
$aBOIND_{i,t}$	-1.3089	4.843**	-0.9789	2.681	-1.3717	5.412**	0.0544	0.009
$aAUCOMSIZE_{i,t}$	-0.1184	2.023	-0.0025	0.001	-0.0227	0.096	-0.0764	1.050
$aAUCOMIND_{i,t}$	-0.5667	1.335	-0.2024	0.163	0.1407	0.072	0.1321	0.057
$DUALITY_{i,t}$	0.4402	3.278*	-0.0297	0.011	0.1966	0.544	0.0152	0.003
$aTOTCOMPEN_{i,t}$	-0.0001	0.033	0.0011	3.866**	-0.0001	0.015	-0.0006	0.947

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y + \beta_2 EDEBT\_Y\_PAIR + \beta_3 EDDEBT\_Y\_PAIR + \beta_4 ESEO\_Y\_PAIR + \beta_5 EMA\_Y\_PAIR + \beta_6 EOV\_Y\_PAIR + \beta_7 EROA\_Y\_PAIR + \beta_8 EDROA\_Y\_PAIR + \beta_9 EDIV\_Y\_PAIR + \beta_{10} EDISTRESS\_Y\_PAIR + \beta_{11} ESIZE\_Y\_PAIR + \beta_{12} ECYCLE\_Y\_PAIR + \beta_{13} EAUDIT\_Y\_PAIR + \beta_{14} EBLOAT\_Y\_PAIR + \beta_{15} ECAP\_Y\_PAIR + \beta_{16} EBT\_Y\_PAIR + \beta_{17} aBOLINK + \beta_{18} aBOSIZE + \beta_{19} aBOIND + \beta_{20} aAUCOMSIZE + \beta_{21} aAUCOMIND + \beta_{22} DUALITY + \beta_{23} aTOTCOMPEN + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.40. Aggressive earnings management and gender of interlocked directors – Controlling for the pair having similar individual signals of earnings management (no fundamentals as control variables)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-2.3689	794***	-2.3286	760.524***	-2.2617	815.051***	-2.2566	823.584***
ILW_Y_MALE$_{i,t}$	0.4278	2.168	0.2306	0.629	0.5552	4.481**	0.5633	4.742**
ILW_Y_FEMALE$_{i,t}$	0.0664	0.010	-0.3982	0.240	-0.0325	0.003	0.0264	0.003
EDEBT_Y_PAIR$_{i,t}$	0.3445	0.285	1.0597	1.774	-13.6401	0.000	-12.6680	0.000
EDDEBT_Y_PAIR$_{i,t}$	-14.1554	0.001	-13.8247	0.001	-0.5055	0.612	-1.9966	3.682*
ESEO_Y_PAIR$_{i,t}$	0.7535	0.611	0.9913	1.285	-14.0209	0.000	0.8073	1.470
EMA_Y_PAIR$_{i,t}$	-14.4714	0.000	-0.0576	0.000	-14.0088	0.000		
EOV_Y_PAIR$_{i,t}$	0.6285	0.951	-1.9176	2.127	0.8120	0.935	1.0330	1.429
EROA_Y_PAIR$_{i,t}$								
EDROA_Y_PAIR$_{i,t}$								
EDIV_Y_PAIR$_{i,t}$	-13.8501	0.000						
EDISTRESS_Y_PAIR$_{i,t}$	1.1814	0.982	-0.0796	0.006	15.1141	0.000	28.4574	0.001
ESIZE_Y_PAIR$_{i,t}$							-12.8177	0.000
ECYCLE_Y_PAIR$_{i,t}$					-13.9681	0.000		
EAUDIT_Y_PAIR$_{i,t}$	-0.0172	0.001						
EBLOAT_Y_PAIR$_{i,t}$	-0.8130	0.311						
ECAP_Y_PAIR$_{i,t}$	-1.2354	0.821	-13.9098	0.000	-13.6602	0.000	-0.2933	0.066
EBT_Y_PAIR$_{i,t}$	1.3119	1.593	1.6361	5.39**	-13.9709	0.000	-13.0692	0.000
aBOLINK$_{i,t}$	-0.0467	0.384	-0.0747	0.864	-0.1489	3.743*	-0.1643	4.744**
aBOSIZE$_{i,t}$	-0.1234	6.932***	-0.2433	23.967***	0.0169	0.167	0.0202	0.242
aBOIND$_{i,t}$	-1.3067	4.823**	-0.9916	2.745*	-1.3837	5.498**	0.0503	0.007
aAUCOMSIZE$_{i,t}$	-0.1151	1.902	-0.0015	0.000	-0.0186	0.065	-0.0758	1.033
aAUCOMIND$_{i,t}$	-0.5613	1.307	-0.1873	0.139	0.1617	0.095	0.1492	0.072
DUALITY$_{i,t}$	0.4375	3.238*	-0.0347	0.016	0.1948	0.534	0.0065	0.001
aTOTCOMPEN$_{i,t}$	-0.0001	0.038	0.0011	3.674*	-0.0001	0.020	-0.0006	1.011

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_MALE + \beta_2 ILW\_Y\_FEMALE + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \beta_{18} aBOLINK + \beta_{19} aBOSIZE + \beta_{20} aBOIND + \beta_{21} aAUCOMSIZE + \beta_{22} aAUCOMIND + \beta_{23} DUALITY + \beta_{24} aTOTCOMPEN + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.41. Aggressive earnings management and age of interlocked directors – Controlling for the pair having similar individual signals of earnings management (no fundamentals as control variables)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-2.3643	806.668***	-2.3228	768.061***	-2.2617	827.617***	-2.2670	833.454***
$ILW\_Y_{i,t}$*$ILW\_Y\_AGE_{i,t}$	0.0064	1.724	0.0023	0.212	0.0091	4.425**	0.0103	6.237**
$EDEBT\_Y\_PAIR_{i,t}$	0.3773	0.342	1.1475	2.089	-13.5875	0.000	-12.6373	0.000
$EDDEBT\_Y\_PAIR_{i,t}$	-14.2341	0.001	-13.7748	0.001	-0.4877	0.581	-2.0660	3.948**
$ESEO\_Y\_PAIR_{i,t}$	0.7920	0.683	0.9290	1.133	-14.0337	0.000	0.7827	1.457
$EMA\_Y\_PAIR_{i,t}$	-14.4704	0.000	-0.0341	0.000	-14.0269	0.000		
$EOV\_Y\_PAIR_{i,t}$	0.6392	0.980	-1.8889	2.053	0.7527	0.811	0.8881	1.067
$EROA\_Y\_PAIR_{i,t}$								
$EDROA\_Y\_PAIR_{i,t}$								
$EDIV\_Y\_PAIR_{i,t}$	-13.7926	0.000						
$EDISTRESS\_Y\_PAIR_{i,t}$	1.1724	0.997	0.0192	0.000	15.1997	0.000	28.3398	0.001
$ESIZE\_Y\_PAIR_{i,t}$							-12.7239	0.000
$ECYCLE\_Y\_PAIR_{i,t}$					-13.9775	0.000		
$EAUDIT\_Y\_PAIR_{i,t}$	0.0148	0.001						
$EBLOAT\_Y\_PAIR_{i,t}$	-0.8122	0.304						
$ECAP\_Y\_PAIR_{i,t}$	-1.2271	0.793	-14.0216	0.000	-13.6337	0.000	-0.2751	0.058
$EBT\_Y\_PAIR_{i,t}$	1.3220	1.637	1.6150	5.522**	-13.9430	0.000	-13.0140	0.000
$aBOLINK_{i,t}$	-0.0435	0.336	-0.0662	0.688	-0.1477	3.695*	-0.1722	5.141**
$aBOSIZE_{i,t}$	-0.1227	6.878***	-0.2423	23.831***	0.0166	0.161	0.0222	0.294
$aBOIND_{i,t}$	-1.3065	4.823**	-0.9817	2.695	-1.3829	5.493**	0.0485	0.007
$aAUCOMSIZE_{i,t}$	-0.1147	1.902	-0.0019	0.001	-0.0187	0.066	-0.0766	1.049
$aAUCOMIND_{i,t}$	-0.5556	1.283	-0.1962	0.153	0.1651	0.099	0.1463	0.070
$DUALITY_{i,t}$	0.4397	3.272*	-0.0313	0.013	0.1964	0.542	0.0224	0.006
$aTOTCOMPEN_{i,t}$	-0.0001	0.043	0.0011	3.859**	-0.0001	0.018	-0.0006	0.947

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1(ILW\_Y \times ILW\_Y\_AGE) + \beta_2 EDEBT\_Y\_PAIR + \beta_3 EDDEBT\_Y\_PAIR + \beta_4 ESEO\_Y\_PAIR + \beta_5 EMA\_Y\_PAIR + \beta_6 EOV\_Y\_PAIR + \beta_7 EROA\_Y\_PAIR + \beta_8 EDROA\_Y\_PAIR + \beta_9 EDIV\_Y\_PAIR + \beta_{10} EDISTRESS\_Y\_PAIR + \beta_{11} ESIZE\_Y\_PAIR + \beta_{12} ECYCLE\_Y\_PAIR + \beta_{13} EAUDIT\_Y\_PAIR + \beta_{14} EBLOAT\_Y\_PAIR + \beta_{15} ECAP\_Y\_PAIR + \beta_{16} EBT\_Y\_PAIR + \beta_{17} aBOLINK + \beta_{18} aBOSIZE + \beta_{19} aBOIND + \beta_{20} aAUCOMSIZE + \beta_{21} aAUCOMIND + \beta_{22} DUALITY + \beta_{23} aTOTCOMPEN + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.42. Aggressive earnings management and nationality of interlocked directors – Controlling for the pair having similar individual signals of earnings management (no fundamentals as control variables)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-2.3687	794.205***	-2.3300	760.128***	-2.2617	815.233***	-2.2557	824.015***
ILW_Y_BRIT$_{i,t}$	0.4215	1.933	0.3487	1.415	0.5930	5.038**	0.5376	4.498**
ILW_Y_NONBRIT$_{i,t}$	0.2287	0.196	-0.8556	1.251	-0.1487	0.059	-0.0490	0.006
EDEBT_Y_PAIR$_{i,t}$	0.3667	0.325	1.0791	1.808	-13.6670	0.000	-12.6305	0.000
EDDEBT_Y_PAIR$_{i,t}$	-14.1353	0.001	-13.8678	0.001	-0.5201	0.649	-1.9872	3.666*
ESEO_Y_PAIR$_{i,t}$	0.6982	0.522	0.9761	1.256	-13.8702	0.000	0.7746	1.368
EMA_Y_PAIR$_{i,t}$	-14.4788	0.000	-0.1251	0.000	-14.0328	0.000		
EOV_Y_PAIR$_{i,t}$	0.6250	0.934	-2.0073	2.294	0.7272	0.751	0.9184	1.131
EROA_Y_PAIR$_{i,t}$								
EDROA_Y_PAIR$_{i,t}$								
EDIV_Y_PAIR$_{i,t}$	-14.0130	0.000						
EDISTRESS_Y_PAIR$_{i,t}$	1.2590	1.150	-0.1318	0.017	14.9768	0.000	28.3781	0.001
ESIZE_Y_PAIR$_{i,t}$							-12.7925	0.000
ECYCLE_Y_PAIR$_{i,t}$					-13.9930	0.000		
EAUDIT_Y_PAIR$_{i,t}$	-0.0102	0.000						
EBLOAT_Y_PAIR$_{i,t}$	-0.8264	0.314						
ECAP_Y_PAIR$_{i,t}$	-1.2764	0.878	-13.8271	0.000	-13.6961	0.000	-0.2693	0.055
EBT_Y_PAIR$_{i,t}$	1.2457	1.469	1.6224	5.197**	-14.0141	0.000	-13.0239	0.000
aBOLINK$_{i,t}$	-0.0443	0.348	-0.0777	0.934	-0.1484	3.745*	-0.1626	4.654**
aBOSIZE$_{i,t}$	-0.1224	6.826***	-0.2451	24.311***	0.0170	0.169	0.0217	0.281
aBOIND$_{i,t}$	-1.2998	4.764**	-1.0121	2.856*	-1.3897	5.539**	0.0537	0.009
aAUCOMSIZE$_{i,t}$	-0.1178	2.000	0.0017	0.000	-0.0196	0.072	-0.0770	1.064
aAUCOMIND$_{i,t}$	-0.5688	1.343	-0.1679	0.112	0.1721	0.107	0.1418	0.065
DUALITY$_{i,t}$	0.4409	3.289*	-0.0402	0.021	0.1931	0.524	0.0088	0.001
aTOTCOMPEN$_{i,t}$	-0.0001	0.036	0.0010	3.497*	-0.0001	0.022	-0.0006	0.915

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_BRIT + \beta_2 ILW\_Y\_NONBRIT + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \beta_{18} aBOLINK + \beta_{19} aBOSIZE + \beta_{20} aBOIND + \beta_{21} aAUCOMSIZE + \beta_{22} aAUCOMIND + \beta_{23} DUALITY + \beta_{24} aTOTCOMPEN + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.43. Aggressive earnings management and positions of interlocked directors at the exposed firms – Controlling for the pair having similar individual signals of earnings management (no fundamentals as control variables)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-2.3685	794.5***	-2.3249	763.177***	-2.2598	816.843***	-2.2558	823.951***
ILW_Y_FINEX$_{i,t}$	0.3951	1.861	0.1990	0.496	0.4463	2.999*	0.4308	2.9*
ILW_Y_NOFINEX$_{i,t}$	0.2557	0.157	-0.7336	0.545	0.6571	1.031	0.6197	1.152
EDEBT_Y_PAIR$_{i,t}$	0.3719	0.335	1.2642	2.604	-13.5960	0.000	-12.7529	0.000
EDDEBT_Y_PAIR$_{i,t}$	-14.1507	0.001	-13.8101	0.001	-0.5172	0.633	-1.9658	3.592*
ESEO_Y_PAIR$_{i,t}$	0.7426	0.596	0.9971	1.279	-14.1715	0.000	0.7353	1.223
EMA_Y_PAIR$_{i,t}$	-14.4762	0.000	-0.0560	0.000	-13.9011	0.000		
EOV_Y_PAIR$_{i,t}$	0.6207	0.923	-1.4863	1.352	0.7847	0.882	1.0220	1.400
EROA_Y_PAIR$_{i,t}$								
EDROA_Y_PAIR$_{i,t}$								
EDIV_Y_PAIR$_{i,t}$	-14.1795	0.000						
EDISTRESS_Y_PAIR$_{i,t}$	1.2975	1.244	-0.0698	0.005	15.2773	0.000	28.6654	0.001
ESIZE_Y_PAIR$_{i,t}$							-12.8714	0.000
ECYCLE_Y_PAIR$_{i,t}$					-13.8618	0.000		
EAUDIT_Y_PAIR$_{i,t}$	0.0117	0.001						
EBLOAT_Y_PAIR$_{i,t}$	-0.8955	0.376						
ECAP_Y_PAIR$_{i,t}$	-1.3039	0.916	-14.4341	0.000	-13.5459	0.000	-0.1801	0.025
EBT_Y_PAIR$_{i,t}$	1.2293	1.433	1.7294	5.837**	-13.8838	0.000	-13.1290	0.000
aBOLINK$_{i,t}$	-0.0433	0.334	-0.0694	0.761	-0.1391	3.363*	-0.1600	4.526**
aBOSIZE$_{i,t}$	-0.1216	6.728***	-0.2394	23.233***	0.0163	0.157	0.0219	0.288
aBOIND$_{i,t}$	-1.2998	4.752**	-0.9739	2.653	-1.3707	5.403**	0.0511	0.008
aAUCOMSIZE$_{i,t}$	-0.1193	2.047	-0.0059	0.005	-0.0226	0.096	-0.0759	1.037
aAUCOMIND$_{i,t}$	-0.5698	1.348	-0.2013	0.161	0.1382	0.069	0.1322	0.057
DUALITY$_{i,t}$	0.4425	3.305*	-0.0343	0.015	0.1974	0.548	0.0151	0.003
aTOTCOMPEN$_{i,t}$	-0.0001	0.032	0.0011	3.813*	-0.0001	0.015	-0.0006	0.956

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINEX + \beta_2 ILW\_Y\_NOFINEX + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \beta_{18} aBOLINK + \beta_{19} aBOSIZE + \beta_{20} aBOIND + \beta_{21} aAUCOMSIZE + \beta_{22} aAUCOMIND + \beta_{23} DUALITY + \beta_{24} aTOTCOMPEN + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Table T4.44. Aggressive earnings management and positions of interlocked directors at the contagious firms – Controlling for the pair having similar individual signals of earnings management (no fundamentals as control variables)

	Y=AGDAC		Y=AGDCF		Y=AGDPROD		Y=AGDDISEXP	
	Coef.	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**	**Coef.**	**Chi-square**
Intercept	-2.3681	794.162***	-2.3261	763.575***	-2.2609	815.639***	-2.2587	821.909***
ILW_Y_FINCO$_{i,t}$	0.3547	1.421	0.1884	0.434	0.5110	3.89**	0.5573	5.02**
ILW_Y_NOFINCO$_{i,t}$	0.4787	0.674	-0.1651	0.037	0.0954	0.016	-0.5132	0.427
EDEBT_Y_PAIR$_{i,t}$	0.3990	0.381	1.1451	2.131	-13.6015	0.000	-12.8046	0.000
EDDEBT_Y_PAIR$_{i,t}$	-14.1461	0.001	-13.7980	0.001	-0.5093	0.618	-1.9384	3.482*
ESEO_Y_PAIR$_{i,t}$	0.7258	0.569	0.9637	1.168	-14.1251	0.000	0.9022	1.825
EMA_Y_PAIR$_{i,t}$	-14.4693	0.000	0.2977	0.000	-13.5524	0.000		
EOV_Y_PAIR$_{i,t}$	0.6144	0.900	-1.9346	2.127	0.7380	0.775	0.9004	1.091
EROA_Y_PAIR$_{i,t}$								
EDROA_Y_PAIR$_{i,t}$								
EDIV_Y_PAIR$_{i,t}$	-14.1417	0.000						
EDISTRESS_Y_PAIR$_{i,t}$	1.3716	1.365	-0.0716	0.005	15.2281	0.000	28.4657	0.001
ESIZE_Y_PAIR$_{i,t}$							-12.8080	0.000
ECYCLE_Y_PAIR$_{i,t}$					-13.9276	0.000		
EAUDIT_Y_PAIR$_{i,t}$	0.0454	0.008						
EBLOAT_Y_PAIR$_{i,t}$	-0.9227	0.393						
ECAP_Y_PAIR$_{i,t}$	-1.3614	0.964	-13.9145	0.000	-13.1894	0.000	0.1505	0.016
EBT_Y_PAIR$_{i,t}$	1.1945	1.378	1.6084	5.283**	-13.9351	0.000	-13.2498	0.000
aBOLINK$_{i,t}$	-0.0424	0.322	-0.0672	0.720	-0.1436	3.542*	-0.1730	5.144**
aBOSIZE$_{i,t}$	-0.1217	6.761***	-0.2414	23.623***	0.0167	0.163	0.0211	0.266
aBOIND$_{i,t}$	-1.3106	4.856**	-0.9703	2.633	-1.3670	5.374**	0.0864	0.022
aAUCOMSIZE$_{i,t}$	-0.1178	2.000	-0.0041	0.003	-0.0227	0.097	-0.0720	0.940
aAUCOMIND$_{i,t}$	-0.5666	1.335	-0.2121	0.179	0.1274	0.059	0.1008	0.033
DUALITY$_{i,t}$	0.4405	3.283*	-0.0260	0.009	0.1980	0.551	0.0135	0.002
aTOTCOMPEN$_{i,t}$	-0.0001	0.030	0.0011	3.795*	-0.0001	0.016	-0.0006	1.073

Notes: The table reports the estimated coefficients together with the chi-square statistics of the following logistic regressions: $Logit(Y) = \alpha + \beta_1 ILW\_Y\_FINCO + \beta_2 ILW\_Y\_NOFINCO + \beta_3 EDEBT\_Y\_PAIR + \beta_4 EDDEBT\_Y\_PAIR + \beta_5 ESEO\_Y\_PAIR + \beta_6 EMA\_Y\_PAIR + \beta_7 EOV\_Y\_PAIR + \beta_8 EROA\_Y\_PAIR + \beta_9 EDROA\_Y\_PAIR + \beta_{10} EDIV\_Y\_PAIR + \beta_{11} EDISTRESS\_Y\_PAIR + \beta_{12} ESIZE\_Y\_PAIR + \beta_{13} ECYCLE\_Y\_PAIR + \beta_{14} EAUDIT\_Y\_PAIR + \beta_{15} EBLOAT\_Y\_PAIR + \beta_{16} ECAP\_Y\_PAIR + \beta_{17} EBT\_Y\_PAIR + \beta_{18} aBOLINK + \beta_{19} aBOSIZE + \beta_{20} aBOIND + \beta_{21} aAUCOMSIZE + \beta_{22} aAUCOMIND + \beta_{23} DUALITY + \beta_{24} aTOTCOMPEN + \varepsilon$; where Y is replaced by AGDAC (columns 2 and 3), AGDCF (columns 4 and 5), AGDPROD (columns 6 and 7), AGDDISEXP (columns 8 and 9). Definitions of variables are in Section 4.9. *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

4.7.3. Other robustness tests

4.7.3.1. Alternative specifications to estimate discretionary accruals

Consistent with the rest of the thesis, this chapter employs the modified-Jones model to estimate discretionary. Hence, the results regarding the spread of aggressive accruals earnings management might be subject to the same criticism faced by Chapter 2 in relation to the specification errors of the discretionary accruals model (see Section 2.2.4. and 2.6.2 for more in-depth discussions). In response to those concerns, all main analyses of the chapter are replicated using various specifications to estimate the discretionary accruals model, including (i) the working capital discretionary accruals model, (ii) the cross-sectional version of the original Jones model, (iii) using the balance sheet approach to estimate total accruals and (iv) suppressing the intercept from the modified-Jones model. Details of the estimation of those alternative specifications are the same as described in Section 2.5.1.1 and 2.6.2. The results, untabulated for brevity, suggest that the main conclusions do not change qualitatively using those alternative specifications.

4.7.3.2. Different cut-off points to define aggressive earnings management

In the main test, aggressive earnings management is identified as those which belongs to the top decile sorted by the measures of earnings management within each industry-year (see Section 4.5.1). The choice of defining stocks as those above the 90th percentile as aggressive is admittedly arbitrage, although it is one of the decisions which need to be made eventually for a research of this kind to be implementable. However, to alleviate any concerns that the results might be sensitive to the research choice regarding the definition of aggressive firms, the chapter also replicates all main analyses using the cut-off points at 85th and 95th percentiles to define aggressive firms. Unreported results show that in general the contagion effect still exists using those different benchmarks to define aggressive earnings management.

4.8. CONCLUSIONS

This chapter empirically investigates the spread of aggressive earnings management through board interlocks. The chapter provides evidence that a firm is significantly more likely to be an aggressive earnings management firm if it is interlocked with another aggressive firm during the contagious period, defined as the year in which aggressive earnings management is detected at the contagious firm and two years after that. In the existing literature of the contagion of financial statement restatements via board interlocks (Chiu et al., 2013), the actual accounting practices which later result in restatements could be completely different between the contagious and exposed firms. The chapter contributes to this literature by showing that the exposed firm would mimic the aggressive financial reporting practices of the contagious firm, i.e. if the contagious firm is managing earnings using accruals (or real earnings) management, the exposed firm would be more likely to be an aggressive accruals (real earnings) management firm. Finally, the chapter finds that the contagion of aggressive earnings management is more pronounced if the interlocked director is male, older, British, or charged with duties which could influence financial reporting. These findings have implications both for regulators and practitioners given the current pressures to reform corporate governance structure in response to recent accounting scandals throughout the corporate world. The study also contributes to the growing literature on the contagion effects introduced by board interlocks and is among the first that investigates this issue in the UK context.

4.9. DEFINITIONS OF VARIABLES USED IN CHAPTER 4

DAC, DCF, DPROD, DDISEXP are the measures of earnings management as defined in Chapter 2 (see Section 2.8).

ESCORE is the aggregate index which accumulates 15 individual signals of earnings management as defined in Chapter 2 (see Section 2.8).

ESEO, EDDEBT, EMA, EOV, EROA, EDROA, EDIV, EDISTRESS, EDEBT, ESIZE, ECYCLE, EAUDIT, EBLOAT, ECAP and **EBT** are the components of ESCORE as defined in Chapter 2 (see Section 2.8).

BOSIZE, BOIND, AUCOMSIZE, DUALITY, TOTCOMPEN, MVE, MTB, ROA, DEBT, NOA, CAP, BOOKTAX are as defined in Chapter 2 (see Section 2.8).

AGDAC (AGDCF, AGDPROD, AGDDISEXP) is one if a firm is in the top decile ranked in each industry-year by DAC (DCF, DPROD, DDISEXP, respectively), zero otherwise.

ILW_Y is one if a firm is interlocked with a contagious firm [i.e. those which has Y of one] during the contagious period [i.e. the period including the year in which the contagious firm is defined as aggressive and two following years], zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_MALE is one if ILW_Y is one and the interlocked director is male, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_FEMALE is one if ILW_Y is one and the interlocked director is female, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_AGE is age of the interlocked director at fiscal year-end (rounded to the nearest whole number of years) if ILW_Y is one, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_BRIT is one if ILW_Y is one and the interlocked director is British, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_NONBRIT is one if ILW_Y is one and the interlocked director is not British, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_FINEX is one if ILW_Y is one and the interlocked director is a chairman, chief executive officer, chief financial officer or member of audit committee of the exposed firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_NOFINEX is one if ILW_Y is one and the interlocked director is not a chairman, chief executive officer, chief financial officer or member of audit committee of the exposed firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_FINCO is one if ILW_Y is one and the interlocked director is a chairman, chief executive officer, chief financial officer or member of audit committee of the contagious firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_NOFINCO is one if ILW_Y is one and the interlocked director is not a chairman, chief executive officer, chief financial officer or member of audit committee of the contagious firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

aBOSIZE (aBOIND, aAUCOMSIZE, aTOTCOMPEN, aMTB, aROA, aDEBT, aNOA, aCAP, aBOOKTAX) is BOSIZE (BOIND, AUCOMSIZE, TOTCOMPEN, MTB, ROA, DEBT, NOA, CAP, BOOKTAX) of a firm minus the corresponding mean of all firms in the same industry-year.

aBOLINK is BOLINK of a firm minus the corresponding mean of all firms in the same industry-year, where BOLINK is number of board interlocks with other firms (regardless of whether they are aggressive or not).

aLn(MVE) is natural log of MVE of a firm minus the corresponding mean of all firms in the same industry-year.

aAUCOMIND is AUCOMIND of a firm minus the corresponding mean of all firms in the same industry-year, where AUCOMIND is percentage of non-executive directors on audit committee.

aRD is RD of a firm minus the corresponding mean of all firms in the same industry-year, where RD is research and development expenses divided by sales.

ILW_Y_NEW is one if ILW_Y is one and the interlocked director is within the first year of his/her directorship at the exposed firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ILW_Y_NEW2 is one if ILW_Y is one and the interlocked director is within the first two years of his/her directorship at the exposed firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ESEX_Y_PAIR is one if ILW_Y is one and ESCORE of the contagious firm is equal to ESCORE of the exposed firm, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

ESSI_Y_PAIR is one if ILW_Y is one and ESCORE of the contagious firm is equal to, or larger or smaller than ESCORE of the exposed firm but not by more than one unit, zero otherwise, where Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

IS_Y_PAIR is one if ILW_Y is one and both the exposed and contagious firms have IS of one, zero otherwise, where IS represents ESEO, EDDEBT, EMA, EOV, EROA, EDROA, EDIV, EDISTRESS, EDEBT, ESIZE, ECYCLE, EAUDIT, EBLOAT, ECAP, EBT; Y represents AGDAC, AGDCF, AGDPROD, AGDDISEXP.

CHAPTER 5

THESIS CONCLUSIONS

Earnings management has emerged as one of the most topical topics in accounting research which attracts a great deal of interest from accounting researchers during the last few decades. Knowledge of earnings management is important for market participants to better understand the information they have to rely on to make key resource allocation decisions, as well as for regulators to improve on the regulatory framework in which firms operate. The call for further research in earnings management is, therefore, still open with a lot of areas which are still considerably under-researched. This thesis aims at making original and significant contributions to three main areas on the earnings management research theme, namely the earnings management detection models, the application of earnings management model in stock investment, and the contagion effect of earnings management. The next section, Section 5.1, will summarize the work which has been done in the thesis and along the line will highlight the key results and contributions. Section 5.2 will offer a reflective account on the major limitations of the thesis and suggest some avenues for future research.

5.1. THE MAIN FINDINGS AND CONTRIBUTIONS OF THE THESIS

Using the UK stock market as the setting, the thesis empirically investigates three interesting and inter-related topics on the earnings management research theme. Those topics is investigated and presented in three empirical chapters (Chapter 2, 3 and 4) which together form the main component of the thesis. The key findings and contributions of each of the empirical chapters are summarized below.

Chapter 2 introduces an innovative approach to detect earnings management. The chapter develops an index which accumulates fifteen individual signals which have been suggested in the extant literature as related to earnings management. The index, named ESCORE, is shown to be able to capture earnings management through revealing the general context in which earnings management is likely to occur. In particular, empirical tests show that ESCORE is strongly related to other traditional measures of earnings management, such as discretionary accruals, real earnings management and *ex-post* earnings management cases being investigated.

ESCORE has a number of advantages compared to existing earnings management detection models which makes the contribution in Chapter 2 a significant one. First, ESCORE only suggests the likelihood of earnings management rather than directly measures the magnitude of earnings management. Recently there is a valid and rather strong criticism that, in the absence of a fully developed theory on the accruals generating process, it is almost 'impossible' to reliably measure the magnitude of earnings management (McNichols, 2000; Dechow et al., 2010; Owens et al., 2013). The criticism, therefore, applicable to almost all existing earnings management detection models, such as the discretionary accruals and real earnings management models. ESCORE, on the other hand, is free from this limitation and this is one of the appealing features of the model which could provide subsequent studies a powerful way to capture earnings management without having to measure the 'immeasurable'. Second, the calculation of ESCORE does not require collection of large dataset for econometric regressions. In fact, ESCORE could be calculated for each firm using information which is publicly available. This feature of the ESCORE model is very helpful especially for studies in emerging markets where data constraint is a major issue for estimating traditional earnings management detection models such as the discretionary accruals and real earnings management models. Last but not least, ESCORE could be a very handy ‘thermometer’ to flag up firms which are susceptible to earnings management. The application of ESCORE in the real world of investment, hence, has a lot of potential.

Chapter 3 applies ESCORE as developed in Chapter 2 to investigate how investors process the information contained in ESCORE. The chapter finds that stocks with low ESCORE significantly outperform those with high ESCORE. The abnormal return earned from formulating trading strategies based on ESCORE is statistically and economically significant after controlling for other known anomalies embedded in ESCORE. The evidence suggests that ESCORE contains information which the market does not rationally process. To seek for an explanation for the observed empirical evidence, the chapter looks into the literature on heuristics and cognitive biases and argue that the documented evidence is consistent with the prediction of the base rate fallacy, a cognitive bias that would systematically bias human beings’ decision-making (Tversky and Kahneman, 1982). In particular, the base rate fallacy predicts that one tends to make judgement based too much on specific information and ignore the generic information. ESCORE is designed to capture the general context of earnings management accumulating fifteen individual signals which are readily observable. In this context, investors, as human beings, are influenced by the base rate fallacy leading to them focusing too much on the specifics and at the same time under-reacting to the general context of earnings management.

The evidence that investors misprice the general context of earnings management is an original and significant contribution to both the literature on earnings management and behavioural finance. The chapter provides interesting insight to help us better understand how information is processed on the stock market. The chapter adds one more item to the list of ‘market anomalies’ compiled mostly in the finance literature over the last few decades. For practitioners, the chapter offers very interesting knowledge for them to design trading strategies which could generate high returns by exploiting the sub-optimal behaviour of the majority of investors.

Chapter 4 addresses an interesting and important issue related to the role of the board network in spreading aggressive earnings management. The chapter finds that being linked with an aggressor via board interlock significantly increases the likelihood that the firm is also aggressive in financial reporting. The chapter further shows that such contagion effect is more pronounced if the interlocked director is male, older, British or holds important financial-reporting-related positions. The empirical test has been carefully crafted to rule out some alternative explanations of the obtained results, including the endogenous appointment of directors by aggressive firms and the shared common characteristics of the pair of exposed and contagious firms.

The chapter is the first study that provides evidence showing that aggressive earnings management is contagious through the board network. The importance of such knowledge cannot be understated. After several accounting scandals in the 2000s, many critics have been channelled to the weaknesses of the existing corporate governance system in the Western world and call for reforms. One of the characteristics of the current corporate governance codes which attracts a lot of attention is how to enhance the efficiency and effectiveness of the board of directors. Recent revisions to corporate governance codes start looking at restricting directors from working for too many companies. The chapter shows that interlocks could spread ‘pernicious’ aggressive earnings management across firms, hence it directly feeds into the foundation for regulators to further argue for the restriction of interlock practice.

5.2. LIMITATIONS OF THE THESIS AND SOME SUGGESTIONS FOR FUTURE RESEARCH

Having done substantial work in the thesis, nevertheless, time and resources constraint means the thesis, as with any academic work, is far from being perfect. In developing ESCORE in Chapter 2, many aspects of the context of earnings management have been dropped. In particular, the selection of individual signals to be included in ESCORE focuses mainly on the context which could be easily extracted from annual financial statements, hence the exclusion of areas such as compensation, corporate governance, institutional and managerial holdings etc. As explained in Chapter 2 (see Section 2.4), the exclusion of those dimensions is deliberate to develop a more parsimonious and practice-oriented model as well as to avoid data constraint issues. While the ESCORE model as designed in this thesis has been shown to work effectively, future studies which include signals related to corporate governance, performance-linked compensation, managerial and institutional holdings could potentially enhance the power of the model. It might be a good idea, for example, to create an aggregate index that captures the dimensions of corporate governance, compensation, managerial and institutional holdings separately or in conjunction with ESCORE and examine if the new index could capture the context of earnings management incrementally beyond what is captured by ESCORE. That kind of model promises a lot practical benefits and will be an interesting supplement to ESCORE.

The ESCORE model as developed in Chapter 2 and used throughout the thesis uses the simple approach in which each individual signal is transformed into a binary variable and receives an equal weight. The use of binary variables might result in loss of information and the power of each signal is clearly not identical. Another method which is also popular in studies which attempt to create composite indices is to adopt logistic regressions or factor analysis to arrive at the weight for each signal (e.g.

Beneish, 1999a; Bird and Casavecchia, 2007; Dechow et al., 2011). The approach adopted in the thesis, however, is deliberate to make the model a simple one which could be easily applied in practice and has been adopted by a few influential studies (e.g. Piotroski, 2000; Mohanram, 2005). Chapter 2 has also proved that ESCORE constructed as in this thesis is highly effective in capturing the context of earnings management. Nevertheless, future research is invited to develop another version of ESCORE which takes into account the power of each individual signal in detecting earnings management and uses data which has not been transformed into binary variables.

In validating ESCORE, Chapter 2 relies on other existing earnings management detecting models, such as the modified-Jones and real earnings management models. These models estimate a measure of earnings management as the deviation of the actual levels of accruals or some measures of real activities from the expected levels arrived at using some regressions. This approach is subject to a lot of criticism. In particular, critics have argued that in the absence of a proper theory which predicts what accruals or real activities would be if there is no earnings management, trying to specify models to estimate the predicted levels would introduce estimation errors. As a profession, we do not know how large those errors are, but the existence of error is in itself worrisome. Ideally, accounting research would get round this problem by using some *ex-post* measures of earnings management, such as observed cases of fraud, restatement or being subject to investigation. The advantage of those *ex-post* measures is they have low Type I error, i.e. if a firm has to restate earnings, for example, it is quite certain that earnings management has occurred. However, using those *ex-post* measures would suffer from small sample issue and sample selection bias because typically firms are not randomly selected for investigation. All advantages and disadvantages having been considered, using an *ex-post* measure would be a good supplement to the analysis done in Chapter 2. Section 2.5.5.3 has made that attempt using a sample of firms being investigated by the FRRP. However, the FRRP sample is very small and the rate of Type I error is not very low compared to, for example, the GAO or AAER sample in the US. In particular, being investigated by the FRRP do not necessarily result in a later restatement, and even if it does, the restatement could be something which is not related to earnings at all (e.g. a reclassification on the balance sheet or cash flows statement, or a supplement of a disclosure). In the absence of a better sample compared to the FRRP's cases, a replication of ESCORE in the US market and test if ESCORE could identify AAER or GAO firms is a very interesting step to further prove that ESCORE could capture earnings management. Nevertheless, the thesis does not attempt this replication due to time and resource constraint and would leave it for future research. Another direction to improve on this front is to benchmark ESCORE against more models of earnings management detection, such as those developed by Beneish (1997), Beneish (1999a), Kothari et al. (2005), Dechow et al. (2011) or Gerakos and Kovrijnykh (2013). However, due to space restriction and time constraint, the thesis could not cover all existing models of earnings management detection and only focuses on the major models which are most popularly used in the literature, i.e. the modified-Jones discretionary accruals and Roychowdhury's (2006) real earnings management models. Future research which examines how ESCORE is related to other measures of earnings management is, hence, invited.

On a related note, although the use of the UK market as the setting in this thesis is well justified and makes significant contributions to the advancement of knowledge, a valid concern is whether the results of the thesis are generalizable to other markets, especially the US where many previous studies in this area focus on. It is also interesting to see if ESCORE also works well in some emerging markets where data constraint might be a severe issue preventing researchers from estimating other traditional proxies for earnings management, for example using the modified-Jones or Roychowdhury's (2006) models. As argued earlier, ESCORE could be a useful tool in those settings to get round the problem of small sample. Nevertheless, due to time and other practical constraints, the thesis would leave such replicates to future research.[35]

In examining the relationship between earnings management and the variables of interest in Chapter 2 and 4 (Section 2.5.5.2 and 4.6.2, respectively), the thesis has controlled for a wide range of factors which are shown in the extant literature to be determinants of earnings management. However, as with any other empirical research on earnings management, the thesis could not control for every possible control variables. Most notable is the exclusion of managerial and institutional holdings variables, mainly because of lack of access to a high quality source of data. While it might just be a minor limitation because there is no strong reason why controlling for managerial and institutional holdings variables would qualitatively change the main conclusions obtained in the thesis, future research is invited to incorporate those controls to strengthen the results of this thesis.

Chapter 3 has arrived at the conclusion that ESCORE could predict future returns after controlling for a variety of factors which could potentially affect the results. However, the issue of omitted variables, i.e. there are other unobservable factors which are related to stock returns but not included as control variables in the regressions, remains a weakness the thesis could not completely overcome. Also, the conclusion that the returns obtained from the ESCORE-based trading strategies are 'abnormal' is also subject to the 'joint hypothesis' problem as even the thesis has used five measures of abnormal returns using various methodologies, the concerns

[35] A limited attempt to replicate the main analyses in Chapter 2 and 3 to the US market has actually been done by the time this thesis is submitted. Unreported results using all US listed stocks during the period from 1987 to 2013 (87,645 observations) show that all of the main conclusions obtained in Chapter 2 and 3 are generalizable to the US.

that none of those models is capable of appropriately adjusting returns for risk remains a valid criticism. While there is no way to completely eliminate the above concerns given the current state of the literature and existing methodologies, there are a few things which could further improve on what the thesis has done but has not been attempted due to space and time constraints. One direction is to apply techniques such as difference-in-difference to see how ESCORE changes over time for each stock and how the stock's returns performance would change accordingly. It would mitigate the concern over unobservable factors which could potentially explain why ESCORE is related to future returns. Another avenue for future research to follow is to employ other risk-adjusting methods which Chapter 3 has not attempted, for example the control firm matching approach introduced by Barber and Lyon (1997), the bootstrap techniques as used in Piotroski (2000) or the adjusted alpha from the four-factor model as used in Mitchell and Stafford (2000) and Huson et al. (2004).

In Chapter 4, due to the lack of access to a database that provides comprehensive data on boards of directors and compensation for UK firms, especially those which have already been dead, the employed sample is quite biased towards surviving and larger firms, hence the generalization of the results could be deteriorated. Future research which could cover both live and dead firms is therefore invited.

Chapter 4 also suffers from the restrictions imposed by data constraint. In particular, the chapter has to focus on the formal network through board interlock and, due to lack of data, is unable to extend to the social network that recent research has shown to be an important channel through which directors interact (e.g. Krishnan et al., 2011; Kramarz and Thesmar, 2013). The chapter has also not been able to collect data which allows further investigation of the role of the interlocked directors' stature (e.g. degrees from elite universities, professional qualifications, media coverage etc.) on the spread of aggressive earnings management. Instead, the chapter has focused on gender, age, nationality and financial-related positions of the interlocked directors. However, because the sample used in this chapter is quite bias in the sense that many directors at UK listed firms are male and British, the insight from the investigation on gender and nationality is quite limited. Future research is, therefore, invited to extend the analysis in this chapter to also cover the social network of board directors and collect data which allows a deeper analysis of the impact of interlocked directors' stature on the contagion effect of aggressive earnings management.

Endogeneity is a pervasive issue which almost all studies into the contagion effect of corporate behaviour, including Chapter 4, would have to resolve. Chapter 4 has followed the existing literature to try to encounter this issue (in Section 4.7.1 and 4.7.2), but like the rest of the literature, the chapter could not claim it has completely resolved the endogeneity issue. Due to limits imposed by available methodologies as well as space and time constraints, the chapter has only addressed the main endogeneity concerns, but not everything. For example, applying the difference-in-difference technique to examine if a resignation of an interlocked director at an aggressive firm would lead the exposed firm to stopping aggressive earnings management practices could yield further evidence in support of the contagion effect rather than the endogenous matching story. Future research along this avenue would be fruitful.

Finally, to make this thesis practicable, many interesting related issues which could have been attempted had been left as 'out of scope'. Besides, the thesis might have other limitations that have not been recognized by the author. Also, there could still be some mistakes and errors which remain in the thesis even after the greatest level of caution exercised and most meticulous attention paid in the writing and final editing of the thesis. They are all the author's sole responsibility and are also hereby acknowledged.

As a general conclusion, nevertheless, with what have been done and any major limitations fully acknowledged, the thesis has applied appropriate and rigorous methodologies on relevant data to make some original contributions and significantly add to the existing literature on earnings management. The thesis has also stopped at an interesting point which enables future research to build on and further extend the topical and interesting literature on the detection, application and contagion of earnings management.

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