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The relationship between gender and promotion over the business cycle: Does firm size matter?

George Saridakis
University of Kent, Business School, UK.
G.Saridakis@kent.ac.uk

Priscila Ferreira
University of Minho, Department of Economics, Portugal.
Priscila@eeg.uminho.pt

Anne-Marie Mohammed
The University of the West Indies, Department of Economics, Trinidad and Tobago.
Anne-Marie.Mohammed@sta.uwi.edu

Susan Marlow
Haydn Green Institute, University of Nottingham, UK.
Susan.Marlow1@nottingham.ac.uk

Abstract

This article offers a more nuanced analysis of employee promotion decisions; specifically, how they are affected by firm size, gender and stages within the business cycle. Drawing upon data from Portugal, we find that during times of adverse macroeconomic conditions, promotion prospects in all firms decline. Within large firms, women are more likely to be promoted during economic downturns, reflecting the 'glass cliff' hypothesis. In small and medium sized enterprises (SMEs), overall promotion rates are less affected by adverse economic conditions, however, women are less likely to attain promotions. Our results emphasise the importance of market volatility and firm heterogeneity upon promotion and importantly, reveal differing forms of gender discrimination. In large firms, women are in effect, afforded greater responsibility for the effects of market volatility whilst SMEs invest more confidence in male employees to manage during crises.

Keywords: Promotions, firm size, gender, economic crisis, Portugal

JEL classification: C33; J21; L25

Introduction

The 'glass ceiling' hypothesis has been studied at length; it suggests that within organisations, stereotypical masculine attributes ensure that men are presumed to be more able and competent managers or leaders (Eagly, 1987; Broadbridge and Simpson, 2011; Castaño et al., 2019). Moreover, it has been found that the salience of gender stereotypes and the gender composition of a group affects a person's willingness to assume a leadership role (Babcock et al., 2017; Born et al., 2018; Chen and Houser, 2019) and this effect persists for women, even in feminised workplaces (Chen and Houser, 2019). These analyses offer possible explanations for the commonly found negative relationship between being a woman and the probability of a promotion.

This negative relationship however, differs dependent upon firm size. Typically, large firms have dedicated HR departments with related policies and procedures to professionally manage the promotion process; this is relatively rare in smaller firms where informality dominates (Lai et al., 2016a; Storey et al., 2010). Regarding the role of gender within the promotion process, the extant literature indicates that women are disadvantaged, but the evidence is drawn largely from large firms (Smith et al., 2013; Javdani and McGee, 2015; Glass and Cook, 2016). This article contributes to such evidence by investigating how this relationship differs on the basis of firm size and also, in the context of the business cycle. This is important as clearly, during down turns, market vulnerability, access to resources, flexibility and HR approaches of SMEs and large firms become more relevant in shaping attitudes towards employee promotions. It is assumed that SMEs are particularly vulnerable during periods of recession given a relatively weaker resource base and smaller market share (Kitching et al., 2009; Smallbone et al., 2012). However, such arguments are contested by evidence which indicates that flexibility and adaptability in terms of pricing, proximity to markets and exploitation of niches supports resilience (Latham, 2009; Saridakis, 2012;

Cowling et al., 2015). In addition, the tendency towards informal labour management and greater teamwork suggests that enhanced employee commitment contributes to firm sustainability (Marlow et al., 2010; Saridakis et al., 2013; Wapshott and Mallet, 2015).

However, to survive during recession, all firms must find ways to reduce costs with strategies such as redundancy, recruitment and promotion freezes being common (Wickramasinghe and Perera, 2012). This reduction is expected to be greater within large firms as their smaller counterparts typically have fewer employees whose roles are more likely to serve an essential function. Yet, it must be noted that although promotions may be reduced during recession, it is unlikely to be completely denied given the need to retain essential staff, promote rather than recruit as well as maintain employee morale and productivity (Lewis, 2009). However, the manner in which gender influences promotion decisions and how firm size shapes such decisions during volatile business cycles require further analyses particularly, in the light of recent crises such as the Great Recession of 2008 and the current COVID-19 virus pandemic.

Consequently, within this article we explore these issues contributing to the existing literature in four ways. First, although previous studies (Cobb-Clark, 2001; Frenkel and Bednall, 2016) have examined the determinants of promotions, very few have actually investigated the strength of these determinants within an environment of severe recession by firms of differing sizes. Second, promotion is usually analysed from the perspective of the employee, rather than that of added value to the firm. In this study, promotions are identified by the firm and in addition, our empirical models include variables that capture both employee and firm characteristics while controlling for unobserved heterogeneity of each. Third, we use linked employer-employee large-scale data covering the entire private sector of the Portuguese economy, which enable conclusions applicable to the whole economy.[1]

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[1] Portugal is a representative case as it has approximately the same percentage of women on boards as other European countries such as France, Denmark and Germany (Cumming et al., 2015). Furthermore, Portugal

Finally, we add a gender dimension to this debate which contributes to contemporary analyses of the influence of firm size on the different promotion prospects for women in comparison to men, and the impact of a recession upon this relationship. To capture these issues, our underpinning research objective is: '*to explore the influence of firm size upon the promotion decision from a gendered perspective over the business cycle*'.

To address this objective, the article is organised as follows: in the next section, we review the existing literature and formulate the hypotheses to be tested. We then present a brief overview of the Portuguese economy and describe the longitudinal-linked employer-employee data used. In the two following sections, we describe the empirical strategy, and present the results. We then note the limitations of our study and suggest areas for future research and finally, outline conclusions.

Literature review and hypotheses

Defining promotions

The notion of employee promotions has been critically evaluated from a range of differing perspectives with an emphasis upon data from the UK and the US. These perspectives reflect the characteristics of promoted workers (Francesconi, 2001; Davis, 2015), the evolution of promotion chances over time (Rosenbaum, 1979; Addison et al., 2014a), the impact of gender (Blau and DeVaro, 2007; Addison et al., 2014b; Cook and Glass, 2014a, 2014b), the effect of performance indicators and/or seniority in promotion decisions (Bell and Freeman, 2001; Addison et al., 2014a) and the impact of promotions upon remuneration (Herpen et al., 2004; Addison et al., 2014a). In addition, the malign notion of the 'Peter Principle',

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shares similarities with other European countries, for example, regarding regulation, labour market conditions and economic performance as well as human capital profiles enabling our findings to be generalised beyond the borders of Portugal (see, for instance, Boeri and van Ours, 2008; Taylor, 2011; van Ours, 2015; Saridakis et al., 2019). Job mobility in Portugal has been studied by Lima (2004), Lima and Pereira (2003), and Lima and Centeno (2003) but their analyses do not consider phases of the economic cycle.

whereby employees are elevated above their level of competence, has been critically evaluated (Fairburn and Malcomson, 2001; Lazear, 2004). So, whilst there is a diverse body of evidence regarding the promotion process, gaps remain since such analyses tend to be focused on particular sectors and cohorts of employees with large firms being the dominant unit of analysis.

Whilst longitudinal data (Francesconi, 2001; Booth et al., 2003; Addison et al., 2014a, 2014b) have been useful to illustrate changes over time regarding variance in career progression, promotions were measured by employee self-reporting. Hence, the definition of promotion depends upon the individual's own perception, which may not necessarily be formally recognised by employers and therefore, any results must be deemed partial. In some cases, role changes are considered as promotions by employees but may not necessarily be recorded as such by the organisation (McCue, 1996; Francesconi, 2001; Booth et al., 2003). Accordingly, the mechanisms which underpin promotions are open to debate. For example, the neoclassical assumption of perfectly competitive labour markets and homogeneous labour assumes that the interaction of employees and employers determines the equilibrium price (wage) and quantity (employment) (Kaufman, 2008). If employees are homogeneous, they will have no problem in relocating to a compatible firm. Thus, turnover is not an issue as those of equal skills are available. However, in actuality, employees differ in terms of human capital, that is, in terms of general human capital or firm-specific attributes. General human capital increases the marginal productivity of employees in every firm and employees may attain benefits from exiting; whereas firm-specific human capital increases marginal productivity where the employee is located and is not valued elsewhere (see Krasniqi and Topxhiu, 2016). In the presence of firm-specific human capital, turnover becomes an important issue. As employers invest in employee induction and training costs, they are particularly concerned about losing employees with firm-specific human capital (Riley et

al., 2017). Given these investments in firm-specific human capital, employers may view a promotion as a necessary step to avoid losses on such investment. As such, a promotion can be deemed as a consequence of human capital investment. Promotions have also been interpreted in the context of tournaments (Lazear and Rosen, 1990; Bognanno, 2001) and so, represent a prize allocated to those who rank higher than their peers over a given period where the possibility of a promotion is an incentive to exert effort. However, the possibility of external recruitment, rather than an internal promotion, may reduce the incumbent's incentive to exert effort.

From the available evidence regarding motivations for, and definitions of promotions, a dichotomous model emerges between employee and employer perceptions underpinned by substantive evidence illustrating a change in role, status and for most, remuneration. Yet, much remains opaque within this model in terms of extraneous influences upon promotion opportunities and decisions. The means by which we can gain a more nuanced picture of how employee/employer perceptions complement or contradict each other are lacking. Thus, we explore some of these issues through our analysis of a large-scale recessionary-sensitive data set of the Portuguese labour market that enables greater insight into the promotion process and facilitates a gendered analysis. It also enables us to focus upon promotion reports by the employer reflecting a substantive promotion event, which in turn reflects the promotion policies of the firm so avoiding self-report bias.

Background and hypothesis development

Evidence indicates that there is a positive relationship between the likelihood of employee promotions, firm prosperity and market cycles (Bennett and Levinthal, 2017). Specifically, under favourable market conditions, jobs are created both within the firm and in the economy in general. The Vacancy Chain Theory (VCT) (White, 1970; Keyfitz, 1973; Stewman, 1986)

predicts that, as a consequence of growth, vacancies are created at the top of the firm and new subunits are filled from within by promoted employees. As Stewman (1986: 214) argues:

"when an initial job vacancy arises, whether by a newly created job or by a person leaving the organization, the demand for that work will prompt management to select someone to fill the vacancy. If a person is selected from within the firm, then another vacancy opens and so on, until the last job to become vacant is either abolished or filled by a new recruit from the outside".

VCT is grounded upon the importance of firm-specific human capital as an invaluable asset that facilitates organisational growth and the existence of an internal labour market (ILM). Larger firms are expected to have internal labour markets with 'job ladders' – essentially, promotion ladders (Drucker, 2012). Axiomatically, larger firms have longer career ladders and promotion sequences than their smaller counterparts. According to Moscarini and Postel-Vinay (2013), large firms are also more responsive to business cycles in terms of poaching employees from other firms, including SMEs, given their ability to offer better terms and conditions of employment. Accordingly, in times of economic growth, opportunities for promotions and promotion rates will be higher in larger firms (Moscarini and Postel-Vinay, 2016; Bennett and Levinthal, 2017). Nevertheless, promotion prospects between men and women differ.

Promotion prospects of men and women in SMEs and large firms

Evidence regarding women's promotion prospects within larger firms suggests that even those who have the same qualifications and observable characteristics as their male counterparts are less likely to be promoted within management positions (Smith et al., 2013; Javdani and McGee, 2015; Glass and Cook, 2016). Although the literature on employee promotion prospects within SMEs is limited, it is likely that attention to equality and diversity issues to support women's career progression will be limited. SMEs are far more

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likely, particularly at the smaller end of the range, to rely upon informal human resource management (HRM) practices (Storey et al., 2010; Kitching and Marlow, 2013; Lai et al., 2016a) with little knowledge or attention afforded to equality regulation.[2] Therefore, within a setting of informal HRM and a context of employee/employer proximity, work practices and managerial decisions are informed by a complex web of socio-economic relationships embedded within the firm (Granovetter, 1985; Atkinson and Storey, 2016). Such informality varies across the SME sector but overall, the evidence regarding the limited investment in HR polices per se, the tendency to outsource this managerial role to ensure minimal compliance and discrimination against women regarding maternity leave and other benefits make the probability of promotions for women in SMEs poorer than in larger firms (Stumbitz et al., 2018).

A contemporary study by Johan and Valenzuela (2019) illustrates that SMEs in Chile who outsourced advisory services, included HR serviced, were less likely to depend upon informal, unpaid family labour as they created more formal and full-time jobs. Furthermore, it was demonstrated that men benefitted more from this process with a 30% higher recruitment rate. Since the absolute magnitude of the increase in male recruitment was twice that compared to the decrease of women, this resulted in an overall increase in the number of new full-time roles. Johan and Valenzuela (2019) propose two possible explanations for the gender difference in hiring decisions; first, the composition of the labour participation market in Chile. This is male-dominated with 73% of men and only 48% of the women in employment. The second suggests it is related to laws in Chile that create more incentives for women in work in large firm; so for example, regulations require at least 20 women to be on the payroll before it must legally provide a childcare centre.

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[2] We perceive "informality" in the sense of workplace relations: "a process of workforce engagement, collective and/or individual, based mainly on unwritten customs and the tacit understanding that arise out of the interactions of the parties at work" (Ram et al., 2001:846).

Informality is, to a certain extent, a reflection of a business strategy that is either more entrepreneurial in approach and thus, the preferred choice of SME owners and managers, or a reflection of the ignorance of a formal human resource management policy and practice (Edwards and Ram, 2010; Wapshott and Mallett, 2015). Formal HRM procedures and policies, overseen by dedicated professional HR managers, are deemed inappropriate for such firms (Kitching and Marlow, 2013; Lai et al., 2016a, 2016b). Fewer SMEs have the resources to employ functional/professional managers (Marlow et al., 2010) rather, there is a more generic managerial approach by the owner/manager team which informs and encourages greater informality (Wapshott and Mallet, 2015). In addition, formality is deemed to introduce barriers within teams, suppress innovation, reduce trust and deter flexibility (Bartram, 2005; Marlow et al., 2010).

It can be argued that embedment in this informality may result in the promotion criteria being both less rigorous and time-consuming. The direct control by the owners/managers as well as the close working proximity and employer-employee mutual dependence can reduce the need for tedious documentation, bureaucracy, administrative processes, and accountability procedures (Kitching and Marlow, 2013). This may encourage faster promotional changes and greater flexibility to adapt or respond to market changes. However, the absence of formal and clear promotion planning as well as a staff development policy is a barrier to equal career opportunities and promotions based on merit. Saridakis et al. (2008), for example, find that SMEs are more likely to experience employment tribunal cases and lose them when they reach the hearing stage. Controlling for firm size, as well as other characteristics, they also find that being a woman increases the likelihood of pursuing redundancy payments and sex discrimination cases. Equally, Stumbitz et al. (2018) find that women are subject to overt discrimination and dismissal within SMEs if they become pregnant and try to claim leave/welfare entitlements.

There is a dearth of substantive evidence regarding how women managers in SMEs fare in terms of promotions. The debate pertaining to gender, women and SMEs focuses upon women's propensity for entrepreneurial behaviour and the performance of their firms (Marlow and Martinez Dy 2018; Yousafzai et al., 2018). Consequently, we know a great deal about the gender related challenges facing women as entrepreneurial actors, but very little about their employment experiences or promotion prospects within SMEs or how these might be affected during periods of crises. The limited evidence regarding HRM practices, particularly the influence of equality and diversity (E&D) in SMEs (Barrett and Burgess, 2008; Stumbitz et al., 2018) reflects established evidence suggesting a mixture of informality and ignorance. As such, women experience greater gender-based discrimination in SMEs in terms of, for example, access to maternity and parental rights (Marlow et al., 2010; Stumbitz et al., 2018) but we have little evidence regarding career progression in such firms (McAdam, 2013). As women are more vulnerable to discrimination and in the absence of regulatory protection, we might expect them to be subject to more draconian actions in SMEs, such as fall in earnings and promotion opportunities. This leads us to our first hypothesis that:

H1: *Women are less likely to be promoted in SMEs than in large firms.*

Are women's promotion chances improved during a recession?

During times of recession, the negative association between being a woman and promotion probability may change as greater opportunities for promotions might be offered for women, particularly in larger firms (Bruckmüller and Branscombe, 2010; Ryan et al., 2016). It is argued that men are less likely to pursue higher status positions when recessionary conditions have a potentially negative impact on firm performance and, by association, on those in senior management. This phenomenon is commonly referred to as the 'glass cliff' hypothesis

(Sabharwal, 2013). This suggests that female elevation during a period of crisis makes women more vulnerable to accusations of incompetence as they are held responsible for the poor performance in such circumstances. However, this evidence is drawn from large firms and, as such, this argument has not been critically evaluated across firm size thresholds.

As we noted above, evidence suggests that promotion rates of women, particularly promotions to executive leadership positions, increase during periods of crises and unstable market conditions (Ryan and Haslam, 2005 and 2007; Cook and Glass, 2014a; Bruckmüller et al., 2014). This analysis also postulates that under stable market conditions, white men are offered preferential promotion prospects. Thus, leadership and managerial abilities tend to be associated with the stereotypical attributes of masculinity, as embodied in the dated idiom in the notion of: 'think manager, think male' (Eagly, 1987; Broadbridge and Simpson, 2011). However, the 'think manager, think male' point of view was challenged by Eagly and Carli (2003) who proposed the 'leadership advantage' concept; this suggests that women possess skill sets that make them better suited for leadership in times of crises. Such skills include, for example, a more transformative approach garnering support for detrimental changes by sharing the logistics informing such decisions. Indeed, empirical studies note an increase in the promotion rates of women into top executive positions in times of crises (Ryan and Haslam, 2007; Ryan et al., 2011). As such, stereotypically masculine attributes were displaced by those associated with femininity: 'think crisis, think female' (Ryan et al., 2011; Bruckmüller et al., 2014; Glass and Cook, 2016).

Reinforcing such arguments, the literature from psychology and finance finds women to be more risk-averse, conservative, ethically sensitive and less subject to overconfidence (Barber and Odean, 2001; Berger et al., 2014; Marlow and Swail, 2014). As overconfidence encourages investors to choose riskier portfolios (Minton et al., 2014), female investors are more likely to invest in lower risk portfolios to maintain security and reduce exposure to risk

(Fine, 2017). Interestingly, work by Addison et al. (2014a) shows that women are more likely to be promoted in male-dominated jobs and vice versa. In support of this, work by Cumming et al. (2015) finds that within male-dominated industries, women are more effective in mitigating both the frequency and severity of fraud. Combining these feminine characteristics leads to the logical reasoning in the desire to promote females into leadership positions in times of crises.

The 'glass cliff' hypothesis suggests that difficult and unpopular decisions with respect to redundancies and promotion moratorium, necessary during recessionary periods, may be better articulated by women as they are associated with higher levels of emotional intelligence as well as more empathetic interpersonal and relationship styles (Ryan and Haslam, 2007; Cook and Glass, 2014a). Ryan et al. (2011) find that women are the preferred choice as leaders under conditions that require: strategic employment management, taking responsibility for failure and perseverance during a crisis period. In summary, the perception is that women have more appropriate socio-emotional traits to cope with crises (Vongas and Hajj, 2015). In addition to this socio-emotional analysis, Rink et al. (2012) add a strategic dimension arguing that rather than focusing upon firm performance, as men are likely to do under favourable conditions, women prioritise employment management. This is an important skill during periods of crises and may enhance employee commitment, effort and related or added value. Consequently, Vongas and Hajj (2015) suggest that women are more effective leaders.

Aside from the socio-economic traits of women, which may make the promotion case more convincing during economic uncertainty, there are alternative debates which provide additional explanations for this phenomenon. The implementation of queuing theory analyses the demand and supply factors which lead to women's promotions, including both their career choices and employer preferences. According to Reskin and Bielby (2005), a

gendered division of labour is visible in the equipment and processes for jobs associated with a particular gender thus, making it more hostile to outsiders and consequently, less desirable as a career choice. Furthermore, horizontal and vertical labour segregation channels men and women into differing sectors and roles; this arises from differences in skills, preferences and experiences associated with gender and employer preferences and practices (Treanor and Marlow, 2019). While economists typically account for these gender differences in the labour market by assuming that employees base their choices on utility maximisation, sociologists assume that the gender difference is due to the labour force, the individual's career aspirations, work behaviour, social structure and physical location (Reskin and Bielby, 2005). As such, these factors can contribute to the desire and the effort to seek promotion during a time of crisis.

Cook and Glass (2014a), using data from 1996 to 2010 for nineteen large firms within the group of Fortune 500 companies, find empirical support for the hypothesis that women, who constitute a minority of senior leaders, are more likely to be promoted in times of crises. In addition, they find that women are also more likely to be promoted to CEO positions in firms with poor performance profiles. In addition, Smith (2014) suggests that when the probability of firm failure increases within publicly listed organisations, women are more likely to be promoted to leadership positions.[3] To date, the 'glass cliff' hypothesis has been premised upon a generic assumption of a large firm context. Our analysis of the effect of firm size upon promotion decisions, however, has potential implications for this hypothesis – yet this remains largely unexplored. Therefore, one can argue that the existence of formal HRM practices and professional HR managers in large firms (Storey et al., 2010) allow for a more strategic analysis in promotion decisions, which may take into account the socio-emotional and socio-economic traits of women that make them more suitable for leadership

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[3] Ashby et al. (2007), Rink et al. (2013), and Glass and Cook (2016) have also found empirical evidence of the 'glass cliff' hypothesis.

positions during a crisis. While this argument may support the 'glass cliff' hypothesis for large firms, it may not be pertinent for SMEs during a crisis.

As SMEs exhibit fewer formalities and are less likely to have HR departments or professional HR managers (Storey et al., 2010; Lai et al., 2016a), it follows that their promotion decisions during a crisis may differ from those of larger firms and thus, less likely to consider the socio-emotional and socio-economic traits of women. Conversely, one may argue that SMEs may be more likely to retain and promote women managers given their loyalty and lower costs. This may be due to discrimination and tighter labour markets during crises, where women are less likely to attain alternative employment and, given the effects of gender, they are then considered cheaper management employees.

Under the 'glass cliff' hypothesis and the 'think crisis, think female' argument, we hypothesise that:

H2: *Female workers are more likely to be promoted during times of economic hardship, but this is more apparent in large firms than in SMEs.*

The Portuguese economy and data sources

Portugal was one of the OECD countries that experienced the negative effects of both the 2008 Global Financial Crisis and the 2010 Sovereign Debt Crisis. As a consequence of these two negative macroeconomic shocks, the country embarked on a fiscal consolidation programme (from May 2011 to June 2014) that involved cuts in government spending, lower-income receipts and increases in taxes. The two shocks propelled the country to an unprecedented phase of economic contraction (see Figure 1), such that in 2013 the Portuguese GDP receded to the 2000 level. This period of general economic decline was rated by the IMF as the "deepest global recession since the Great Depression" (IMF, 2009:9) and became known as the Great Recession (Bell and Blanchflower, 2011; Crawford et al.,

2013; van Dalen and Henkens, 2013; van Ours, 2015; Moscarini and Postel-Vinay, 2016). During the Great Recession individuals, firms and policymakers operated in an environment of increasing uncertainty both at the macro- and the micro-levels.[4] Unemployment rates soared, overall employment fell to a historical minimum, at a level below that observed in 1998, and net firm destruction was observed, as the number of firm exits exceeded the number of firms created (Ferreira, 2016).

[Figure 1 about here]

It is most likely that the macroeconomic turmoil and the high levels of uncertainty prompted significant differences in the ways in which the firms that survived chose to respond to the severe economic contraction. Considering the management of the workforce, for example, there is some evidence that part of the shock to GDP had been absorbed by adopting certain measures. These included flexible working time arrangements, reductions in working hours, temporary or partial closures and lower wage growth, rather than overall job losses (Gregg and Wadsworth, 2010; Bell and Blanchflower, 2011; European Commission, 2012). Between early 2008 and 2010, the likelihood of being employed in any form of non-standard work increased both in absolute and relative terms; so for example, full-time employment declined whilst part-time work for all employees increased (European Commission, 2012). Furthermore, evidence suggests that the proportion of part-time employees seeking full-time work increased, particularly amongst young people (Gregg and Wadsworth, 2010; Bell and Blanchflower, 2011).

Our main interest lies in the probability of promotions within firms and how the determinants were affected by the Great Recession. Given that the impacts of the recession have not been distributed equally across population subgroups, we pay particular attention to how the promotion prospects differ by firm size and by gender. To do this, we use the

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[4] Macroeconomic uncertainty has never been higher than that of 1960 (Jurado et al., 2015).

Portuguese-linked employer-employee data, *Quadros de Pessoal* (QP), that have been collected since the 1980s by the Ministry of Employment, Solidarity and Social Security. Both employees and firms have a unique identifier that allows them to be traced over time and to match employees with their employers. All private-sector employers, with registered employees, are required by law to complete the survey and report information on the organisation and the employees.[5] Firms are also required to make the completed survey available for public consultation thus improving data accuracy.

We use data covering the period from 2002 to 2017.[6] The estimation sample is composed of employees working in SMEs or large firms. We exclude firms that are always micro-firms during our period of analysis and firms and workers that are observed in the data only in one year.[7] In our estimation sample, we have 3,917,217 unique employees (working in 115,540 unique firms), contributing to 29,367,689 worker-year observations.

Our analysis considers three sub-periods: pre-recession (2003-2007), Great Recession (2008-2013), and recovery (2014-2017)[8]. As can be seen from Figure 1, GDP growth (measured as quarterly homologous variation) was negative in most of the quarters between 2008-2013 and became positive only in the fourth quarter of 2013.[9] In Table 1 we provide a brief description of the sample size by year, firm size and gender. Since the onset of the Great Recession, there has been net job destruction in the Portuguese economy; the number

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[5] Unless they have registered employees, entrepreneurs are not in the data.

[6] QP data were not collected in 2001, hence the data used in our analysis start from 2002; 2017 is the most recent year for which the dataset has been released by the Office for National Statistics for research purposes. Since one of the independent variables relates to the relation between the worker's pay and firm's median pay in *t-1* we lose 2002 for purposes of estimation.

[7] Firm size categories were defined following the EU recommendation 2003/361. A firm is considered micro if it employs up to 9 workers, small if it employs from10 to 49 workers, medium if it employs between 50 and 249 workers, and large if it employs 250 workers or more.

[8] The 3-year Economic Adjustment Programme for Portugal (negotiated in 2011 between the Portuguese Authorities and the European Commission, the ECB and the IMF) ended in 2014. We label the period 2014-2017 as the recovery period because over this period the country was recovering from recession and showed positive GDP growth (see Figure 1). Whilst, as mentioned earlier, in 2013 the Portuguese GDP had receded to the 2000 level, by the end of 2017 GDP was similar to that registered in 2007.

[9] The Portuguese Great Recession had traits of a double-dip recession. A short phase of economic expansion, in 2010, intertwined the Financial Crisis and the Sovereign Debt Crisis. This was probably an outcome of the European Economic Recovery Plan of 2008 (European Commission, 2008).

of employees in 2013 was smaller than that observed in 2007 (column 1). Until 2009, SMEs accounted for more than 70% of the registered employees, but that share was 8 percentage points smaller in 2017 (column 4). The share of men in total employment declined during the period of analysis (57% in 2003 to 52% in 2017) while overall our sample is composed of 54% male and 46% female workers (columns 5 and 6).

[Table 1 about here]

Statistical model

In the Portuguese labour market, employment relations and career progress are regulated by collective agreements between unions and employers. These agreements mention two different types of promotions within firms: automatic promotions and merit promotions. Automatic promotions are primarily a consequence of accumulated length of service, although there is the possibility for the employer to demand an appraisal of the employee's abilities. Merit promotions depend upon employer prerogative and imply a change to the contract of employment.

The QP survey asks employers to report the "date of last promotion of the worker", but does not require them to distinguish between the two types of promotions predicted in the law.[10] Therefore, our analyses are focussed on the determinants of (any) promotion within firms. While this can be understood as a limiting feature of the data, it may not be so, because in both cases, firms can benefit from greater employee compliance and commitment. In addition, reported promotions, where we do not observe a change in occupation, may still reflect some analysis of performance by the employer.[11] Rosenbaum (1979) affords

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[10] No information is collected on whether there are demotions within firms.

[11] Abraham and Medoff (1985) developed a model which implies that the negative impact of seniority on the probability of being promoted is consistent with a process based purely on merit; a positive coefficient on seniority signals that seniority has an important role but does not rule out the importance of merit. Büchel and Mertens (2004), while analysing over-education and under-education in the context of career mobility, referred

promotions two functions within firms: one, recruitment to upper levels of the hierarchy (consistent with VCT), and two, material or symbolic rewards. Promotions without changes in the tasks performed can be related to the latter. Pergamit and Veum (1999:582) mention that "*limiting promotions to be a subcategory of position changes results in severe underestimation of the extent to which workers report being promoted*".

To test our hypotheses, we estimate a model for the probability of promotion of worker *i* within firm *j* in year *t* of the type:

$$
\begin{aligned}
\Pr[Promotion_{ijt}] = \; & \alpha + \beta_1 SME_{jt} + \beta_2 GR_t + \beta_3\big(GR_t \times SME_{jt}\big) + \beta_4(GR_t \times Gender_i) \\
& + \beta_5\big(SME_{jt} \times Gender_i\big) + \beta_6\big(GR_t \times SME_{jt} \times Gender_i\big) + \beta_7 BPay_{t-1,ijt} \\
& + \beta_8\big(GR_t \times BPay_{t-1,ijt}\big) + \beta_9 Occup_{it} + \beta_{10}(Gender_i \times Occup_{it}) + \theta X'_{it} \\
& + \psi X'_{jt} + \gamma_{ij} + \varepsilon_{ijt}
\end{aligned}
$$

$$\text{(Eq. 1)}$$

where the dependent variable takes the value 1 if the reported date of last promotion of worker *i* in firm *j* occurred between the survey of year *t-1* and that of year *t*, and zero otherwise.[12] GR_t is a categorical variable that takes the value of 1 for the Great Recession period between 2008-2013, the value of 2 for the recovery period between 2014-2017 and zero otherwise. SME_{jt} is an indicator variable for firm size and takes the value of 1 if the firm is an SME and 0 if it is a large firm. $BPay_{t-1,ijt}$ is a dummy variable that takes the value 1 if the worker's base pay in *t-1* was above the median base pay within the firm in that period, and 0 otherwise.[13] $Occup_{it}$ stands for the occupational category (ISCO88 1-digit) of the worker and its interaction with gender ($Gender_i \times Occup_{it}$) was included to test whether females stand a better chance for promotions in professional occupations. The coefficients

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to the latent possibilities of mobility between certain occupations and concluded that changes between different occupations were by themselves not a valid indicator of upward career mobility.

[12] As robustness checks, we define a more conservative definition of promotion. In this alternative definition the dependent variable (promotion) takes the value of one if the employer reported a promotion in year *t* and we observe an increase in the base wage between *t-1* to *t* (results in Appendix Tables A5-A7).

[13] For the first observation of a worker within a firm, this variable takes the value of 0.

of main interest are those that allow us to identify any differences in the impact of gender between (i) those in SMEs and large firms (by introducing an interaction term between gender and firm size in the regression, $SME_{jt} \times Gender_i$), and over the business cycle (by introducing an interaction term between gender and business cycle, $GR_t \times SME_{jt} \times Gender_i$).

Turning to our explanatory variables, X'_{it} is a vector of observed worker characteristics and includes age, grouped into three categories (below 34 years of age, between 34 and 54 years of age, and the omitted category of 54 or more years of age); educational attainment, which was split into four categories (ISCED 1 – up to six years of schooling; ISCED2 – lower secondary education; ISCED 3 – high school; ISCED 5/6 –university graduates); level of skill (whether the employee is low-, medium-, or high-skilled), and seniority at the firm, whether the employee has a fixed-term contract and whether they are employed part-time. X'_{jt} is a vector of observed characteristics of the firm and includes the natural log of the (real) sales volume, ownership type (whether private-national, public, or foreign-owned, the baseline is private-national firms) whether the firm is multi-establishment, the legal nature of the firm, and the type of instrument of collective regulation adopted. We also include year fixed effects to control for the intensity of economic fluctuations within each phase (one year was omitted within each phase to avoid collinearity with the GR dummy). We estimate Eq. 1 using a conditional effects logit with worker-firm (match) fixed effects, thus γ_{ij} captures time-invariant worker-firm heterogeneity (observed and unobserved) that may affect the chances of promotion within firms, while ε_{ijt} is a white noise error. The tables report estimates of the average (semi-) elasticities of $Pr(y=1/x,u)$ with respect to the regressors, and the corresponding standard errors and t-statistics.[14]

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[14] These estimates were computed using Stata module -aextlogit- by Santos Silva (2016). Average elasticities are interpreted as the relative change (%) in promotion probabilities given a one-unit change in the covariates.

Table 2 shows promotion rates over the sample period by firm size and by gender within firm size categories. On average, 6% of the workers were promoted over the sample period. The probability of promotions declined during the Great Recession years (2008-2013) and started to increase thereafter, regardless of firm size and employee gender. Promotions are more likely in large firms (9%) than in SMEs (4%). In columns 4 to 7 of Table 2, we distinguish male and female promotion rates for SMEs and large firms. Between 2003 and 2017, the share of promoted male workers fell by 34% in large firms and by 50% in small firms. Women's rates of promotions also fell over the period of analysis, but by a smaller extent so, female promotion rates fell by 29% in large firms and by 35% in SMEs. Before the Great Recession, male promotion rates were greater than those of women, and that changed in the recovery period.

[Table 2 about here]

Table 3 presents the sample proportions/means of the covariates used in the regression model, splitting the sample between phases of the business cycle: pre-recession, recession and recovery period.[15] We have also tested for the significance of the differences in proportions between the recession period and the pre-recession period as well as the recovery period and the pre-recession period. All differences are statistically significant at the 1% level. In brief, promotions are more likely before the recession (7.2%) than during the Great Recession (5.4%) and the phase of recovery (4.7%). The average share of promoted workers is nearly 6%. More than half of the workers have between 34 and 54 years of age. Before the recession, 12% of workers had university degrees and this share increased by 8 percentage points in the recovery phase – suggesting that job creation and destruction were hardest on the less educated workers. Appendix Table A2 shows sub-sample means, by firm size and gender. Larger firms have higher promotion rates (9%) compared to SMEs (4%).

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[15] Appendix Table A1 describes, in detail, how all variables were defined.

The raw data also suggest that promotion rates are higher for women (6%) than for men (5%). In what follows, we test the hypotheses postulated in the previous Section.

[Table 3 about here]

Empirical results

Results from estimating a logit model, with worker-firm fixed effects, using the full sample are presented in column 1 of Table 4. The chance of a promotion within SMEs is 38% smaller than the probability of promotions for workers employed in large firms. These results are consistent with large firms having longer job ladders, more resources and formal HR procedures that support and stimulate promotions. As expected, the probability of a promotion is reduced on average by 64% during a recession. However, we find that SMEs reduce their promotion rates by less than the promotion rates of large firms during times of crises, as is suggested by the positive average elasticity of $GR_t \times SME_{jt}$ (17%). Hence, the relative disadvantage that employees have in their promotion chances when employed within an SME before the recession is attenuated in times of economic contraction. Perhaps during a recession, SMEs may invest in human capital through promotions to incentivise employees and reduce turnover. This finding lends support to Cowling et al. (2015) in that human capital, in particular entrepreneurial capital, is important for firm growth during recessions.

Turning to our main variables of interest, we find that women in SMEs are less likely to be promoted than those in large firms (average elasticity of -5%, see $SME_{jt} \times Gender_i$ in column 1), providing support for H1. As for the effect of the recession on women's probability of promotions relative to men's ($GR_t \times Gender_i$), we find a positive differential

effect. [16] During the recession, women were, on average, 5% more likely to be promoted than men. This is consistent with the view that women possess the required socio-emotional traits to cope with crises (Vongas and Hajj, 2015), such as the resilience to cope with failure and the perseverance to outlive the recession. Despite the positive differential effect of the Great Recession on the promotion probability of females ($GR_t \times Gender_i$) and of SMEs ($GR_t \times SME_{jt}$), the effect of the recession on promotion probabilities of females employed in SME is negative (average elasticity of -4%, given by the triple interaction term $Recession_t \times SME_{jt} \times Gender_i$). This result is consistent with our H2. However, the chances of promotions for women in SMEs improve during the recovery period (estimated average elasticity of 6.4%).

We also split the sample into sub-samples by time period (pre-recession, Great Recession and recovery period) to further examine whether the effect varies with the phase of the economic cycle (see columns 2-4). We find that there is a change in women's promotion prospects in SMEs as the economy moves from recession to recovery; in particular, we find that women employed in SMEs are less likely to be promoted during the recession (-9.8%). Alternatively, the chances of promotions for women in SMEs during the recovery period improve (9.2%), when compared to women employed in large firms. We return to the latter result below when we discuss the estimates by firm size and gender. The sub-sample estimates are also in line with the conclusions drawn from the triple interaction terms presented in column (1). Overall, these findings provide support for H2.

Employees whose base pay is above the median base pay of the firm in *t-1* are less likely to be promoted between *t-1* and *t* (-11%) and this effect is reinforced during recession and recovery ($Crisis_t \times BPay_{i,t-1}$ is negative and statistically significant). While in the pre-

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[16] To identify how promotion chances differ by gender, we estimate a random effects logit model. The estimated coefficient of gender is negative and statistically significant suggesting a gender bias in the probability of a promotion. Results are available upon request.

recession period (column 2) the differential effect of gender on the probability of promotions across occupations was generally negative (see average elasticities of $Gender_i \times Occup_{it}$), the situation changed during the recession and in the recovery period where the differential effect of gender is positive. The effect of gender is particularly strong for the occupation category of 'Technicians and intermediate professionals' (average elasticity of 22% during recession and 37% during the phase of recovery) and for the category of 'Clerical support' (11% and 33%, during recession and in the recovery period, respectively). We also find that promotion differential by gender was reduced for the category of 'Managers & specialised professionals' (11% and 27% in the recession and recovery period, respectively).

[Table 4 about here]

Estimation results of Eq. 1 using sub-samples by firm size are presented in Table 5. Our results suggest that promotions within firms are less likely during a recession, regardless of firm size. The probability of promotions decreased by 43% in large firms, and by 49% in SMEs. Being female, however, increases the likelihood of promotions in large firms during economic hardship (4%), and to a lesser extent in SMEs (2%). Therefore, our results provide strong support for H2.[17] We also find a positive differential effect of gender on the promotion rates of 'Skilled agricultural & manufacturing' workers, 'Services & sales', 'Clerical support' as well as 'Technicians & intermediate professionals' both in large firms and in SMEs. We also find a positive differential effect of gender on promotion rates of 'Managers & specialised professionals' in large firms. This can be explained by the 'think crisis, think female' notion and the 'glass cliff' hypothesis, which are more prominent within large firms.

[Table 5 about here]

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[17] To test whether or not the size of the estimates by firm size are statistically different we estimated a specification that interacted all variables with firm size. The 95% confidence bounds around the estimates are reported in Table A3. The estimated differences by firm size and phase of the business cycle are statistically significant.

In Table 6 we present results from estimating Eq. 1 in sub-samples by gender. These results reflect the findings reported earlier. During the recession, both men and women were less likely to be promoted. However, the recession was slightly more detrimental to women's probability of promotions (-52.6%) than for men (-51%). Our results also suggest that, on average, SMEs have lower promotion rates than large firms as the stand-alone parameters on firm size are negative and statistically significant. However, SMEs reduced their promotion differential relative to large firms during the recession as the coefficient on the interaction $GR_t \times SME_{jt}$ is positive and statistically significant for both genders (14% for males and 11% for females). Yet, the positive effect of the interaction $GR_t \times SME_{jt}$ is not sufficient to overrule the negative effect of size and recession. If we add all three terms of the interaction, the probability of the promotion of males (in SMEs during recession) is reduced by 68% while the chances of females are reduced by 78%.[18]

Robustness checks

As a check of the robustness of our results, we have estimated a worker-firm fixed effects linear probability model (LPM). It is known that predicted probabilities from an LPM may not be bound between 0 and 1and thus this is the main shortcoming of the model. Results from using this estimation method are reported in Appendix Tables A5 – A7. We conclude that the sign and the statistical significance of the estimated coefficients are, overall, similar to those observed under the conditional logit.

The results presented earlier used promotions identified by the firm. As a further robustness check, we consider a more conservative measure of promotions to check the robustness of our findings. The new variable, indicating that the employee was promoted,

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[18] To test whether differences across genders are statistically significant, we estimated a model where all variables were interacted with the workers' gender. The 95% confidence bounds around the estimates are reported in Table A4. These differences are generally statistically significant.

takes the value of one if the employer reported the date of a promotion in year *t* and we observe an increase in the real base wage from *t-1* to *t*. Therefore, this variable uses not only the employer's belief that the worker was promoted but also an observable measure of upward mobility of the workers which might be implied by an increase in the real base wage. As expected, the average share of promoted workers (3.4%) is lower when compared to the less conservative definition of promotion used thus far (see Table 3, line 2). During the pre-recession and the recession periods, promotion rates were on average, 5.4% and 4%, respectively. However, during the recovery period there were almost no promotions that involved an increase in the real base wage (0.4%) which is in line with the fact that, on average, base wages stagnated in the recovery period (Ferreira et al., 2020). The results from using this dependent variable are reported in Appendix Tables A8 – A10. Although the magnitude of the coefficients changes a little, the main conclusions remain unaffected. As such, our results are robust to this alternative, and a more orthodox definition of promotion.

Limitations and future research

Our data do not discriminate between labour intensive and skilled or technological firms, which can be considered a weakness for our analysis. However, by controlling for the observed characteristics of firms and for time invariant effects (observed or unobserved), in particular industries, the capital/labour intensity is indirectly controlled, assuming it is match-specific. Baldock et al. (2015) found that technology-based SMEs increased employment during the financial recession. Thus, under the VCT, it is probable that promotions in such firms also increased. In addition, our data do not contain information on training. Future research could explore whether there are any industry-specific requirements for a more formally, externally-educated workforce, or one that can be educated mainly via on the job training. Technology-based small firms are likely to need more formally educated

workers and so, might offer greater opportunities for promotions. Such employees can easily move between firms and in so doing, take their specific capabilities to an alternative firm. Johan and Valenzuela (2019) found that SMEs which sought advisory services were less likely to hire women; however, future work should explore the gender difference in the employment probability or promotion probability within SMEs which outsource advisory services during economic uncertainty. Additionally, it would be interesting to study the effectiveness of outsourced HR advisory services versus dedicated internal HR departments in terms of a firm's survival during economic uncertainty. We would also encourage future research to focus specifically on how gender influences women's managerial careers in SMEs. Beyond assumptions of informal or poor equality and diversity policies, and in the absence of formal career pathways, we have very little evidence regarding women's experiences in top management teams in SMEs, the contribution they offer or their career progression. Finally, the study is focused on Portugal, an advanced European economy with many similarities to other Eurozone economies. That said, undertaking studies in other contexts would advance this research, as would complementary interpretive work, to reveal detailed analyses of the rationale regarding employee promotion decisions.

Conclusion

The extant evidence clearly indicates that women experience gender related discrimination in terms of their promotion prospects and related career progression (Treanor and Marlow, 2019), but this debate largely focuses upon large firms and disregards issues such as market volatility. Thus, this debate rests upon assumptions of market stability and a corporate business model. Disaggregating such assumptions, we analyse the impact of the Portuguese Great Recession upon the prospects for employee promotions with particular attention afforded to the effects of firm size and employee gender. Regarding large firms, women's

promotion prospects are supported by regulatory requirements for equal opportunity policies, strategies and audits overseen by a professional HR function (Allen et al., 2016). Yet, evidence quite clearly confirms that such provisions are not sufficient to compensate for broader socio-economic structural gender disadvantages which prevent women from seeking a promotion, or issues such as covert bias and discrimination within organisations (Treanor and Marlow, 2019). Regarding the situation in SMEs however, we have very limited evidence regarding women's experiences as employees per se other than an emerging thread, which suggests that given the prevalence of informal HR, women have less regulatory protection, particularly in the area of maternity protection and benefits (Stumbitz et al., 2018). Although it could be speculated that closer team work and smaller managerial teams may actually highlight the contributions of women to SME performance, we can find no evidence for this. As such, we assume that women will be disadvantaged by gender and firm size with regard to promotion prospects in both SMEs and large firms.

This argument is confirmed by our results in that employee promotion opportunities are greater within large firms regardless of gender. Furthermore, the HR procedures, policies and formalities in large firms and greater transparency in compliance do, to some extent, facilitate greater equality in promotion opportunities. This is evident from our results, which indicate that women have a greater probability of being promoted in large firms compared to those in SMEs. Our study extends the extant debate however, by adopting a more nuanced discriminatory analysis regarding the influence of gender upon promotion prospects during times of economic contraction, and how this might be moderated by firm size. Our empirical analysis is consistent with the 'glass cliff' hypothesis regarding the propensity for women to be promoted within large firms during times of crises. There may be two reasons for this: that women are deemed to have more appropriate management skills to weather severe economic shocks or alternatively, that fewer men seek promotion at such times given the

higher probability of volatility in firm performance and related detriment to senior staff. It might be assumed that women would be equally risk-averse in terms of seeking promotions during a recession but, if there are fewer men in the competitive field, this may actually reduce the potential for discrimination and so, favour women. In contrast, although there is a reduction in the probability for promotions of the employees in both SMEs and large firms during times of crises, the promotion rate for women is further reduced in SMEs. We can only speculate that as SMEs are more vulnerable during crises and have smaller management teams, gender bias regarding promoting women to undertake greater responsibility may become more salient. This clearly requires further exploration in future research.

Overall, this study adds to the existing literature on employee promotion decisions as it relates to gender, firm size and economic turmoil. The impact of firm size upon promotion suggests that we require far more nuanced analyses of such decisions and related career progression prospects. The expansion of promotion opportunities for women in larger firms during difficult times may be a double edged sword if they are positioned as 'fall guys' [sic] for declining performance. In the longer term, when conditions stabilise, this may contribute to negative connotations of women's past performance as senior managers. We also shed some light upon the dynamics of promotion decisions within SMEs. This suggests that the absence of dedicated policies and pathways to encourage compliance with equality regulations is detrimental to women and this effect is enhanced during periods of crises. Policies in the areas of childcare, maternity and paternity benefits, together with greater awareness of equality issues are required but without some form of regulatory obligation, compliance is unlikely based on existing evidence regarding the attitudes of SME owners to HR formality (Wapshott and Mallet, 2015; Atkinson and Storey, 2016).

Finally, the global economic crisis arising from the COVID-19 pandemic, combined with evidence that women are bearing the brunt of this by for example, adapting employment

to caring responsibilities (Alon et al., 2020) will radically damage their promotion prospects in firms of all sizes. This effect is likely to be accentuated in SMEs given their greater vulnerability in terms of lower resilience and resources. Thus, our study has implications for the contemporary crisis in terms of promoting and informing future research agendas which recognise how firm size, market volatility and gendered ascriptions will impact upon future career progression trajectories across economies.

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Figures

Figure 1 Homologous (quarterly) variation of the Portuguese GDP over the period of analysis (2003-2017)
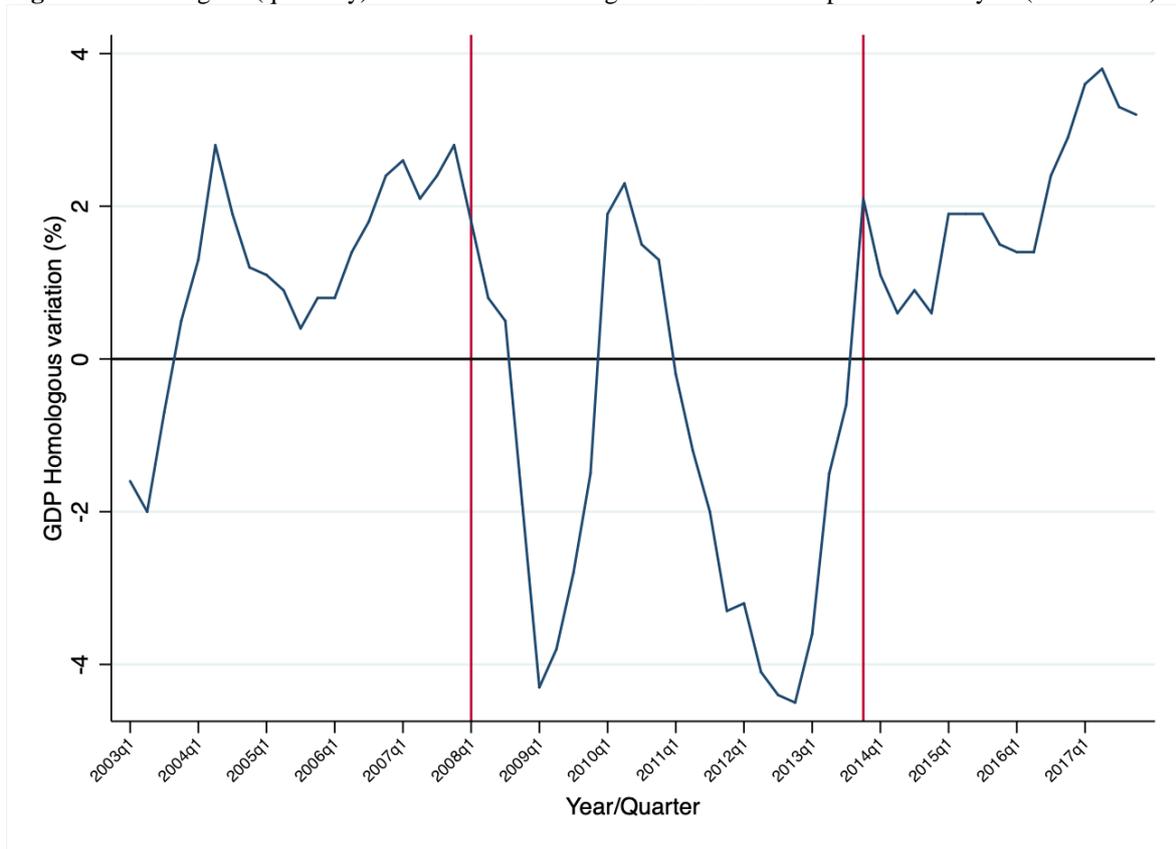
Source: Portuguese Office for National Statistics (INE)

Tables

Table 1. Sample size and distribution of workers by firm size and year, 2003-2017

Year	Overall sample		% Distribution of workers by:			
			Firm size		Gender	
	No. Workers	% of total	Large	SME	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)
2003	1,662,189	5.66	28.93	71.07	56.51	43.49
2004	1,718,365	5.85	28.87	71.13	56.51	43.49
2005	1,883,861	6.41	28.97	71.03	56.12	43.88
2006	1,910,732	6.51	28.62	71.38	55.69	44.31
2007	1,973,521	6.72	28.74	71.26	55.26	44.74
2008	2,025,215	6.90	29.68	70.32	54.70	45.30
2009	1,927,037	6.56	29.43	70.57	54.20	45.80
2010	2,087,788	7.11	33.91	66.09	54.52	45.48
2011	2,059,690	7.01	34.74	65.26	53.92	46.08
2012	1,943,017	6.62	34.99	65.01	52.73	47.27
2013	1,943,519	6.62	35.20	64.80	52.40	47.60
2014	1,993,652	6.79	35.40	64.60	52.33	47.67
2015	2,046,795	6.97	35.76	64.24	52.19	47.81
2016	2,110,331	7.19	36.27	63.73	52.18	47.82
2017	2,081,977	7.09	36.87	63.13	52.34	47.66
Overall	29,367,689	100.00	32.56	67.44	54.03	45.97

Notes: Own calculations based on the estimation sample.

Table 2. Within firm promotions (%)

Year	Overall	Firm size		Large firms		SMEs	
		Large	SME	Men	Women	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2003	8.24	12.15	6.65	6.33	5.82	3.63	3.02
2004	7.62	12.70	5.57	6.68	6.01	2.90	2.66
2005	7.21	12.44	5.08	6.94	5.50	2.72	2.35
2006	6.63	11.16	4.81	6.05	5.11	2.55	2.26
2007	6.49	10.56	4.85	6.02	4.54	2.56	2.29
2008	6.13	9.26	4.81	4.98	4.28	2.55	2.26
2009	5.58	8.83	4.23	4.29	4.54	2.12	2.11
2010	6.58	9.80	4.92	4.98	4.82	2.50	2.42
2011	5.32	7.86	3.97	3.74	4.12	1.98	1.99
2012	4.80	8.55	2.78	4.43	4.12	1.43	1.35
2013	3.86	6.66	2.34	3.11	3.55	1.21	1.13
2014	4.26	6.45	3.05	3.16	3.29	1.55	1.50
2015	4.37	7.06	2.87	3.56	3.51	1.42	1.45
2016	4.68	7.04	3.33	3.31	3.73	1.64	1.69
2017	5.45	8.34	3.76	4.18	4.16	1.80	1.96
Overall	5.76	9.00	4.20	4.62	4.37	2.17	2.03

Notes: Promotion takes the value 1 only in the year it occurred, and zero otherwise. Promotions (within firm) are reported by the employer.

Table 3. Sample proportions (means) of covariates: overall sample and sub-samples by period

Variable	All (1)	Pre-recession (2)	Recession (3)	Recovery (4)
Promotion reported by firm	0.058	0.072	0.054	0.047
Promotion by firm & increase in base wage	0.034	0.054	0.040	0.004
Women	0.460	0.440	0.462	0.477
Period (base: pre-recession, 2003-2007)				
Recession (2008-2013)	0.408			
Recovery (2014-2017)	0.280			
SME	0.674	0.712	0.670	0.639
Age group (base: >=54 years of age)				
<34 years of age	0.354	0.408	0.352	0.295
>=34 & <54 years of age	0.527	0.492	0.532	0.559
Base Pay$_{(i,t-1)}$> Median Base Pay$_{(j, t-1)}$	0.367	0.351	0.375	0.375
ISCED (base: ISCED 1 - up to 6 years of schooling)				
ISCED 2 - lower secondary education	0.234	0.204	0.241	0.256
ISCED 3 - high school	0.229	0.187	0.231	0.274
ISCED 5/6 - university graduates	0.160	0.115	0.167	0.200
Skill Level				
Medium	0.388	0.412	0.381	0.373
High	0.255	0.226	0.263	0.275
Tenure	7.878	7.379	7.869	8.447
Fixed term contract	0.236	0.246	0.229	0.233
Part-time work	0.056	0.040	0.060	0.067
Occupation (base: elementary occupations)				
Plant & machine operators & assemblers	0.130	0.147	0.123	0.121
Skilled agricultural & manufacturing workers	0.177	0.202	0.173	0.156
Services & sales	0.192	0.172	0.197	0.207
Clerical support	0.126	0.117	0.127	0.134
Technicians & intermediate professionals	0.104	0.102	0.106	0.101
Managers & specialized professionals	0.140	0.127	0.145	0.146
Inst. collective regulation (base: multi-firm agreement)				
Association agreement	0.774	0.823	0.771	0.723
Labour regulation directive	0.053	0.043	0.055	0.063
Company-level agreement	0.043	0.043	0.044	0.042
Other	0.092	0.062	0.092	0.124
ln(real sales volume)	14.991	14.212	15.161	15.609
Ownership (base: private national)				
Public	0.046	0.036	0.052	0.049
Foreign	0.135	0.117	0.130	0.164
Multi-plant firm	0.443	0.403	0.454	0.471
Legal nature (base: quota society)				
Sole proprietorship	0.012	0.019	0.011	0.007
Uniperson quota society	0.034		0.036	0.069
Anonymous society	0.379	0.348	0.382	0.409
Other	0.139	0.119	0.145	0.151
No. Observations	29,367,689	9,148,668	11,986,266	8,232,755

Table 4. Promotions within firms, by period – Conditional logit

	All obs.	Pre-recession	Recession	Recovery
	(1)	(2)	(3)	(4)
SME	-0.380***	-0.004	-0.124***	-0.169***
	(0.012)	(0.018)	(0.021)	(0.029)
Recession	-0.643***			
	(0.008)			
Recovery	-1.597***			
	(0.014)			
SME*Female	-0.051***	-0.013	-0.098***	0.092**
	(0.019)	(0.027)	(0.031)	(0.046)
Recession*Female	0.053***			
	(0.007)			
Recovery*Female	-0.002			
	(0.009)			
Recession*SME	0.172***			
	(0.007)			
Recovery*SME	0.374***			
	(0.009)			
Recession*SME*Female	-0.040***			
	(0.010)			
Recovery*SME*Female	0.064***			
	(0.013)			
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.109***	-0.203***	-0.194***	-0.366***
	(0.004)	(0.004)	(0.005)	(0.007)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.120***			
	(0.005)			
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.228***			
	(0.006)			
Female*Plant, machine operators & assemblers	0.088***	-0.164***	0.139***	0.066
	(0.022)	(0.035)	(0.034)	(0.061)
Female*Skilled agricultural & manufacturing	0.179***	0.088***	0.127***	0.466***
	(0.020)	(0.032)	(0.031)	(0.059)
Female*Services & sales	0.230***	0.028	0.230***	0.488***
	(0.019)	(0.032)	(0.029)	(0.055)
Female*Clerical support	0.045**	-0.248***	0.113***	0.329***
	(0.020)	(0.032)	(0.032)	(0.061)
Female*Technicians & intermediate pros	0.139***	-0.097***	0.221***	0.370***
	(0.020)	(0.031)	(0.031)	(0.061)
Female*Managers & specialized professionals	0.053**	-0.242***	0.114***	0.272***
	(0.021)	(0.035)	(0.033)	(0.066)
Pseudo-R^2	0.041	0.020	0.038	0.034
Log-likelihood	-2,302,074	-573,630	-685,246	-332,872
No. Observations	7,319,292	1,595,690	1,996,357	943,688

Notes: Conditional logit estimates of Eq. 1, computed using -aextlogit-. Average (semi) elasticities of $Pr(y=1|x,u)$ reported. Column 1 relates to the estimation of Eq. 1 on the full sample. In columns 2-4 the sample was split by time period. Further controls as described in the section pertaining to the statistical model. Year and worker-firm (match) fixed effects are included. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 5. Promotions within firms, by firm size – Conditional logit

	SME (1)	Large (2)
Recession	-0.486***	-0.430***
	(0.009)	(0.010)
Recovery	-1.206***	-1.127***
	(0.015)	(0.017)
Recession*Female	0.019***	0.043***
	(0.006)	(0.006)
Recovery*Female	0.064***	-0.001
	(0.008)	(0.008)
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.037***	-0.162***
	(0.005)	(0.005)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.074***	-0.128***
	(0.006)	(0.006)
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.163***	-0.208***
	(0.007)	(0.007)
Female*Plant and machine operators & assemblers	-0.064***	0.204***
	(0.023)	(0.033)
Female*Skilled agricultural and manufacturing workers	0.097***	0.235***
	(0.021)	(0.030)
Female*Services & sales	0.199***	0.208***
	(0.021)	(0.026)
Female*Clerical support	0.061***	0.065**
	(0.023)	(0.028)
Female*Technicians & intermediate professionals	0.115***	0.132***
	(0.022)	(0.028)
Female*Managers & specialized professionals	0.024	0.089***
	(0.025)	(0.029)
Pseudo-R^2	0.035	0.051
Log-likelihood	-1,112,343	-1,152,900
No. Observations	3,653,704	3,529,826

Notes: Conditional logit estimates, on subsamples by firm size, computed using -aextlogit-. Average (semi) elasticities of Pr(y=1|x,u) reported. Further controls as described in the section pertaining to the statistical model. Year and worker-firm (match) fixed effects are included. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 6. Promotions within firms, by gender – Conditional logit

	Males (1)	Females (2)
SME	-0.307***	-0.365***
	(0.010)	(0.012)
Recession	-0.510***	-0.526***
	(0.009)	(0.010)
Recovery	-1.373***	-1.295***
	(0.015)	(0.016)
Recession*SME	0.141***	0.109***
	(0.006)	(0.006)
Recovery*SME	0.309***	0.362***
	(0.008)	(0.008)
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.089***	-0.094***
	(0.005)	(0.005)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.080***	-0.122***
	(0.005)	(0.006)
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.127***	-0.255***
	(0.007)	(0.007)
Plant and machine operators & assemblers	0.140***	0.184***
	(0.012)	(0.014)
Skilled agricultural and manufacturing workers	0.181***	0.306***
	(0.010)	(0.013)
Services & sales	0.210***	0.394***
	(0.013)	(0.010)
Clerical support	0.286***	0.297***
	(0.012)	(0.012)
Technicians & intermediate professionals	0.277***	0.392***
	(0.011)	(0.012)
Managers & specialized professionals	0.399***	0.455***
	(0.013)	(0.013)
Pseudo-R^2	0.042	0.043
Log-likelihood	-1,198,566	-1,101,765
No. Observations	3,822,837	3,496,455

Notes: Conditional logit estimates of Eq. 1, on subsamples by gender, computed using -aextlogit-. Average (semi) elasticities of Pr(y=1|x,u) reported. Further controls as described in the section pertaining to the statistical model. Year and worker-firm (match) fixed effects are included. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Online Appendix

Table A1. Description of the variables

Variable	Definition of the variable
Promotion reported by firm	Takes the value of 1 if the "Date of last promotion" reported in the data falls within the survey year, and 0 otherwise.
Promotion reported by firm & increase in base wage	Same as before, but conditional on an observed increase in the workers' base wage between *t-1* and *t*.
Women	Takes the value of 1 if the gender of the worker is female and 0 if otherwise.

Period (base: pre-recession, 2003-2007)
  Recession (2008-2013)
  Recovery (2014-2017)
	Takes the value of 1 for the years 2008-2013 (recession); value of 2 for the years 2014-2017 (recovery); and 0 otherwise (pre-recession).

SME	A firm is SME if it employs up to 250 workers, and Large if it employs more than 250 workers. We have excluded from the data, firms that are always microfirms (less than 10 workers).
Age group (base: >=54 years of age) <34 years of age >=34 & <54 years of age	Following van Ours (2015) we created three age groups. The variable takes the value of 1 if the worker is younger than 34 years of age; the value of 2 if the worker's age is between 34 and 53 years; and 0 if the worker if 54+ years old.
Base Pay$_{(i,t-1)}$> Median Base Pay$_{(j, t-1)}$	Since we have data on all workers at the firm, we computed the firms' yearly median base wage and created a categorical variable that takes the value of 1if the worker's base wage in *t-1* is above the firm's median wage in *t-1*, and 0 if otherwise.

ISCED (base: ISCED 1 – up to 6 years of schooling)
  ISCED 2 - lower secondary education
  ISCED 3 - high school
  ISCED 5/6 - university graduates
	The number of years of schooling are recorded in the data. Using that information we created a new variable that relates to the International Standard Classification of Education. ISCED 2 includes workers with 9 years of schooling; ISCED 3, 12 years of schooling; ISCED 5/6 University degrees.

Skill Level (base: low skilled)
  Medium
  High
	8 Hierarchical levels are defined by law (Decree Law 121/78). We have grouped these into 3 skill levels: low skilled workers (includes the categories of Semi-skilled professionals, Unskilled professionals, and Apprentices); medium-skilled (includes Skilled professionals); and high-skilled workers (includes the Top executives, Middle management; Supervisors and team leaders; and Higher-skilled professionals).

Tenure	Accounts for the time since entry to the firm.
Fixed term contract	Takes the value of 1 if the contract is fixed-term, and 0 if the worker has an open-ended contract.
Part-time work	Takes the value of 1 if part-time work, and 0 if full-time work.

Table A1. Description of the variables (continued)

Occupation (base: elementary occupations)	The categories of this variable relate to the International
Plant & machine operators & assemblers	Standard Classification of Occupations (88) major groups.
Skilled agricultural & manufacturing workers	
Services & sales	
Clerical support	
Technicians & intermediate professionals	
Managers & specialized professionals	
Inst. collective regulation (base: multi-firm agreement)	The instruments of collective regulation of work relate to
Association agreement	the contracts established by unions and employers of
Labour regulation directive	different sectors of economic activity.
Company-level agreement	
Other	
ln(real sales volume)	Natural logarithm of the sales volume at constant prices.
Ownership (base: private national)	Takes the value of 1 (2) if more than 50% of the firm's
Public	equity capital is held by public (foreign) entities, and 0 if
Foreign	otherwise.
Multi-plant firm	Takes the value of 1 if the firm has more than one plant, and 0 if otherwise.
Legal nature (base: quota society)	The legal nature of the firm affects how it operates. This
Sole proprietorship	variable takes the value of 0 if it is a quota society; 1 if it is
Uniperson quota society	Sole proprietorship; 2 Uniperson quota society; 3
Anonymous society	Anonymous society; and 4 other juridical forms.
Other	

Notes: All variables were constructed using the Portuguese administrative data Quadros de Pessoal (2002-2017). These data are proprietary to the Portuguese Ministry of Labour, Solidarity and Social Security (MTSSS).

Table A2. Sample means of covariates: sub-samples by firm size and by gender

Variable	By firm size		By gender	
	Large	SME	Male	Female
	(1)	(2)	(3)	(4)
Promotion reported by firm	0.090	0.042	0.055	0.061
Promotion reported & increase in base wage	0.056	0.024	0.033	0.036
Women				
Period (base: pre-recession)				
Recession	0.414	0.405	0.406	0.411
Recovery	0.311	0.266	0.271	0.291
SME			0.692	0.653
Age group (base: >=54 years of age)				
<34 years of age	0.373	0.344	0.343	0.366
>=34 & <54 years of age	0.516	0.533	0.525	0.529
Base Pay$_{(i,t-1)}$> Median Base Pay$_{(j, t-1)}$	0.388	0.358	0.407	0.321
ISCED (base: ISCED 1 - up to 6 years of schooling)				
ISCED 2 - lower secondary education	0.237	0.232	0.253	0.211
ISCED 3 - high school	0.283	0.203	0.216	0.245
ISCED 5/6 - university graduates	0.194	0.144	0.134	0.192
Skill Level (base: low skilled)				
Medium	0.321	0.421	0.443	0.324
High	0.293	0.237	0.272	0.235
Tenure (in years)	8.736	7.465	8.047	7.680
Fixed term contract	0.207	0.249	0.234	0.238
Part-time work	0.104	0.032	0.029	0.086
Occupation (base: elementary occupations)				
Plant and machine operators & assemblers	0.113	0.138	0.153	0.104
Skilled agricultural and manufacturing workers	0.095	0.217	0.261	0.079
Services & sales	0.241	0.168	0.130	0.264
Clerical support	0.152	0.113	0.097	0.159
Technicians & intermediate professionals	0.108	0.101	0.124	0.080
Managers & specialized professionals	0.151	0.134	0.139	0.141
Inst. collective regulation (base: multi-firm agreement)				
Association agreement	0.642	0.837	0.772	0.775
Labour regulation directive	0.032	0.064	0.054	0.053
Company-level agreement	0.121	0.006	0.054	0.030
Other	0.134	0.071	0.088	0.096
ln(real sales volume)	17.759	13.654	15.324	14.599
Ownership (base: private national)				
Public	0.118	0.012	0.047	0.045
Foreign	0.269	0.071	0.137	0.134
Multi-plant firm	0.782	0.279	0.414	0.477
Legal nature (base: quota society)				
Sole proprietorship	0.000	0.018	0.014	0.011
Uniperson quota society	0.019	0.041	0.034	0.034
Anonymous society	0.654	0.246	0.409	0.343
Other	0.135	0.141	0.074	0.215
No. Observations	9,563,073	19,804,616	15,868,763	13,498,926

Table A3. Promotions within firms: incremental effect of SME – Conditional logit

	95% confidence intervals
Recession	[-0.085, -0.045]
Recovery	[-0.135, -0.080]
Recession*Female	[-0.044, -0.012]
Recovery*Female	[0.040, 0.081]
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	[0.113, 0.141]
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	[0.038, 0.070]
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	[0.032, 0.071]
Female*Plant and machine operators & assemblers	[-0.432, -0.297]
Female*Skilled agricultural and manufacturing workers	[-0.239, -0.109]
Female*Services & sales	[-0.049, 0.070]
Female*Clerical support	[-0.037, 0.088]
Female*Technicians & intermediate professionals	[-0.055, 0.068]
Female*Managers & specialized professionals	[-0.081, 0.046]
Pseudo-R^2	0.43
Log-likelihood	-2,297,478
No. Observations	7,319,292

Note: The confidence intervals were retrieved from the estimation of a specification where all explanatory variables were interacted with firm size (this estimation method is consistent with the additive approach used in Table 5).

Table A4. Promotions within firms: incremental effect of Females – Conditional logit

	95% confidence intervals
SME	[-0.090, -0.029]
Recession	[-0.045, 0.006]
Recovery	[0.026, 0.112]
Recession*SME	[-0.047, -0.015]
Recovery*SME	[0.034, 0.076]
Base Pay$_{(i, t-1)}$>Median Base Pay $_{(j, t-1)}$	[-0.019, 0.009]
Recession*Base Pay$_{(i, t-1)}$>Median Base Pay $_{(j, t-1)}$	[-0.059, -0.027]
Recovery*Base Pay$_{(i, t-1)}$>Median Base Pay $_{(j, t-1)}$	[-0.149, -0.109]
Plant and machine operators & assemblers	[0.009, 0.081]
Skilled agricultural and manufacturing workers	[0.094, 0.160]
Services & sales	[0.155, 0.217]
Clerical support	[-0.021, 0.046]
Technicians & intermediate professionals	[0.085, 0.151]
Managers & specialized professionals	[0.023, 0.095]
Pseudo-R^2	0.042
Log-likelihood	2,300,331.4
No. Observations	7,319,292

Note: The confidence intervals were retrieved from the estimation of a specification where all explanatory variables were interacted with gender (this estimation method is consistent with the additive approach used in Table 6).

Table A5. Promotions within firms, full sample and sub-samples by period (LPM)

	All obs. (1)	Pre- (2)	Recession (3)	Recovery (4)
SME	-0.039***	0.000	-0.002**	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Recession	-0.056***			
	(0.001)			
Recovery	-0.107***			
	(0.001)			
SME*Female	0.001	0.000	-0.010***	0.005***
	(0.001)	(0.002)	(0.001)	(0.002)
Recession *Female	0.009***			
	(0.001)			
Recovery*Female	0.006***			
	(0.001)			
Recession *SME	0.040***			
	(0.000)			
Recovery*SME	0.059***			
	(0.001)			
Recession*SME*Female	-0.011***			
	(0.001)			
Recovery*SME*Female	-0.007***			
	(0.001)			
Base Pay$_{(i,\,t-1)}$ >Median Base Pay $_{(j,\,t-1)}$	-0.009***	-0.014***	-0.012***	-0.016***
	(0.000)	(0.000)	(0.000)	(0.000)
Recession*Base Pay$_{(i,\,t-1)}$ >Median Base Pay $_{(j,\,t-1)}$	-0.004***			
	(0.000)			
Recovery*Base Pay$_{(i,\,t-1)}$ >Median Base Pay $_{(j,\,t-1)}$	-0.006***			
	(0.000)			
Female*Plant, machine operators & assemblers	0.001	-0.016***	0.005**	0.018***
	(0.001)	(0.003)	(0.002)	(0.004)
Female*Skilled agricultural & manufacturing	0.006***	0.006**	0.004**	0.041***
	(0.001)	(0.003)	(0.002)	(0.004)
Female*Services & sales	0.009***	-0.001	0.010***	0.034***
	(0.001)	(0.003)	(0.002)	(0.003)
Female*Clerical support	-0.000	-0.027***	0.003	0.017***
	(0.001)	(0.003)	(0.002)	(0.003)
Female*Technicians & intermediate pros	0.003***	-0.012***	0.009***	0.018***
	(0.001)	(0.003)	(0.002)	(0.003)
Female*Managers & specialized professionals	0.002	-0.027***	0.002	0.012***
	(0.001)	(0.003)	(0.002)	(0.004)
Constant	0.128***	0.049***	0.167***	0.000
	(0.001)	(0.003)	(0.002)	(0.004)
R^2-within	0.010	0.005	0.008	0.007
Log-likelihood	7,171,549	2,387,820	3,905,133	3,710,594
No. Observations	29,367,689	9,148,668	11,986,266	8,232,755

Notes: Coefficients from a fixed effects estimation of a linear probability model for binary response reported. Coefficients show how much the $Pr(y=1|x,u)$ changes given a one-unit shift in the covariates, ceteris paribus and are interpreted as percentage point changes in the probability of promotion. Column 1 relates to the estimation of Eq. 1 on the full sample. In columns 2- 4 the sample was split by time period. Further controls as described in the section pertaining to the statistical model. Year and worker-firm (match) fixed effects are included. Clustered (by match) standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A6. Promotions within firms – by firm size (LPM)

	SME (1)	Large (2)
Recession	-0.022***	-0.044***
	(0.000)	(0.001)
Recovery	-0.051***	-0.102***
	(0.001)	(0.001)
Recession*Female	-0.001***	0.010***
	(0.000)	(0.001)
Recovery*Female	-0.000	0.006***
	(0.000)	(0.001)
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.003***	-0.023***
	(0.000)	(0.001)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.002***	-0.007***
	(0.000)	(0.001)
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.004***	-0.008***
	(0.000)	(0.001)
Female*Plant and machine operators & assemblers	-0.003**	0.010***
	(0.001)	(0.003)
Female*Skilled agricultural and manufacturing workers	0.005***	0.007**
	(0.001)	(0.003)
Female*Services & sales	0.008***	0.007**
	(0.001)	(0.003)
Female*Clerical support	0.002*	-0.007**
	(0.001)	(0.003)
Female*Technicians & intermediate professionals	0.005***	-0.003
	(0.001)	(0.003)
Female*Managers & specialized professionals	0.001	0.001
	(0.001)	(0.003)
Constant	0.079***	0.126***
	(0.001)	(0.002)
R^2-within	0.005	0.017
Log-likelihood	8,132,271	224,487
No. Observations	19,804,616	9,563,073

Notes: Coefficients from fixed effects estimation of a linear probability model of Eq. 1 on subsamples by firm size. Further controls as described in the section pertaining to the statistical model. Year and worker-firm (match) fixed effects are included. Clustered (by match) standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A7. Promotions within firms – by gender (LPM)

	Males (1)	Females (2)
SME	-0.039***	-0.038***
	(0.001)	(0.001)
Recession	-0.054***	-0.049***
	(0.001)	(0.001)
Recovery	-0.109***	-0.099***
	(0.001)	(0.001)
Recession*SME	0.040***	0.029***
	(0.000)	(0.001)
Recovery*SME	0.059***	0.052***
	(0.001)	(0.001)
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.008***	-0.010***
	(0.000)	(0.000)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.002***	-0.007***
	(0.000)	(0.000)
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.002***	-0.011***
	(0.000)	(0.000)
Plant and machine operators & assemblers	0.007***	0.006***
	(0.001)	(0.001)
Skilled agricultural and manufacturing workers	0.009***	0.014***
	(0.001)	(0.001)
Services & sales	0.013***	0.021***
	(0.001)	(0.001)
Clerical support	0.016***	0.013***
	(0.001)	(0.001)
Technicians & intermediate professionals	0.016***	0.019***
	(0.001)	(0.001)
Managers & specialized professionals	0.023***	0.025***
	(0.001)	(0.001)
Constant	0.121***	0.134***
	(0.002)	(0.002)
R^2-within	0.010	0.011
Log-likelihood	4,185,196	3,002,200
No. Observations	15,868,763	13,498,926

Notes: Coefficients from fixed effects estimation of a linear probability model of Eq. 1 on subsamples by gender. Further controls as described in the section pertaining to the statistical model. Year and worker-firm (match) fixed effects are included. Clustered (by match) standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A8. Promotions (wage) within firms, by period – Conditional logit

	All obs. (1)	Pre-recession (2)	Recession (3)
SME	-0.230***	0.005	-0.122***
	(0.017)	(0.027)	(0.029)
Recession	-0.526***		
	(0.012)		
Recovery	-4.324***		
	(0.038)		
SME*Female	-0.077***	-0.091**	-0.207***
	(0.025)	(0.040)	(0.042)
Recession*Female	0.081***		
	(0.008)		
Recovery*Female	-0.028		
	(0.046)		
Recession*SME	0.185***		
	(0.008)		
Recovery*SME	0.641***		
	(0.044)		
Recession*SME*Female	-0.004		
	(0.012)		
Recovery*SME*Female	-0.018		
	(0.064)		
Base Pay$_{(i,\,t-1)}$>Median Base Pay $_{(j,\,t-1)}$	-0.574***	-0.772***	-0.611***
	(0.005)	(0.007)	(0.006)
Recession*Base Pay$_{(i,\,t-1)}$>Median Base Pay $_{(j,\,t-1)}$	-0.085***		
	(0.006)		
Recovery*Base Pay$_{(i,\,t-1)}$>Median Base Pay $_{(j,\,t-1)}$	-0.236***		
	(0.029)		
Female*Plant, machine operators & assemblers	-0.015	-0.182***	0.122***
	(0.030)	(0.051)	(0.047)
Female*Skilled agricultural & manufacturing	0.108***	0.079*	0.167***
	(0.027)	(0.047)	(0.042)
Female*Services & sales	0.214***	0.115**	0.349***
	(0.026)	(0.046)	(0.040)
Female*Clerical support	0.036	-0.281***	0.208***
	(0.028)	(0.047)	(0.044)
Female*Technicians & intermediate pros	0.121***	-0.085*	0.307***
	(0.027)	(0.046)	(0.042)
Female*Managers & specialized professionals	0.023	-0.283***	0.159***
	(0.029)	(0.051)	(0.045)
Pseudo-R^2	0.191	0.038	0.079
Log-likelihood	-1,291,506	-465,638	-514,927
No. Observations	5,296,150	1,330,092	1,590,975

Notes: The dependent variable uses an alternative definition of promotion by restricting the indicator variable to take the value of 1 if a promotion was reported and we observe an increase in the real base wage between *t-1* and *t*. Owing to the small number of transitions, the specification for the recovery period did not converge, hence parameter estimates are not retrieved. Further notes as in Table 4.

Table A9. Promotions (wage) within firms, by firm size – Conditional logit

	SME (1)	Large (2)
Recession	-0.365***	-0.504***
	(0.015)	(0.016)
Recovery	-3.685***	-4.377***
	(0.044)	(0.045)
Recession*Female	0.087***	0.074***
	(0.009)	(0.008)
Recovery*Female	-0.040	-0.023
	(0.047)	(0.045)
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.559***	-0.598***
	(0.007)	(0.008)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.057***	-0.120***
	(0.008)	(0.008)
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.303***	-0.172***
	(0.044)	(0.038)
Female*Plant and machine operators & assemblers	-0.259***	0.261***
	(0.037)	(0.055)
Female*Skilled agricultural and manufacturing workers	-0.007	0.349***
	(0.033)	(0.051)
Female*Services & sales	0.247***	0.234***
	(0.035)	(0.043)
Female*Clerical support	0.098***	0.060
	(0.037)	(0.046)
Female*Technicians & intermediate professionals	0.121***	0.158***
	(0.035)	(0.046)
Female*Managers & specialized professionals	0.019	0.071
	(0.040)	(0.047)
Pseudo-R^2	0.168	0.213
Log-likelihood	-610,197	-660,878
No. Observations	2,491,960	2,701,791

Notes: The dependent variable uses an alternative definition of promotion by restricting the indicator variable to take the value of 1 if a promotion was reported and we observe an increase in the real base wage between *t-1* and *t*. Further notes as in Table 5.

Table A10. Promotions (wage) within firms, by gender – Conditional logit

	Males (1)	Females (2)
SME	-0.223***	-0.315***
	(0.017)	(0.019)
Recession	-0.496***	-0.480***
	(0.015)	(0.016)
Recovery	-4.472***	-4.194***
	(0.044)	(0.046)
Recession*SME	0.183***	0.183***
	(0.008)	(0.009)
Recovery*SME	0.638***	0.606***
	(0.044)	(0.046)
Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.582***	-0.563***
	(0.007)	(0.008)
Recession*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	-0.046***	-0.131***
	(0.008)	(0.009)
Recovery*Base Pay$_{(i, t-1)}$ >Median Base Pay $_{(j, t-1)}$	0.025	-0.574***
	(0.037)	(0.045)
Plant and machine operators & assemblers	0.187***	0.159***
	(0.019)	(0.024)
Skilled agricultural and manufacturing workers	0.189***	0.281***
	(0.017)	(0.022)
Services & sales	0.220***	0.436***
	(0.021)	(0.017)
Clerical support	0.397***	0.420***
	(0.019)	(0.020)
Technicians & intermediate professionals	0.350***	0.497***
	(0.018)	(0.021)
Managers & specialized professionals	0.526***	0.579***
	(0.021)	(0.021)
Pseudo-R^2	0.186	0.196
Log-likelihood	-681,024	-609,581
No. Observations	2,776,604	2,519,546

Notes: The dependent variable uses an alternative definition of promotion by restricting the indicator variable to take the value of 1 if a promotion was reported and we observe an increase in the real base wage between *t-1* and *t*. Further notes as in Table 6.