THE IMPACT OF TRADE LIBERALISATION ON EXPORTS, IMPORTS AND THE BALANCE OF PAYMENTS IN SELECTED DEVELOPING COUNTRIES

By

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To Héctor, José and Agnes
with love

ABSTRACT

Trade liberalisation is assumed to improve a country's performance by promoting domestic economic efficiency and by encouraging trade flows between nations, according to the supply side/orthodox plethora of studies. The limited empirical evidence related to the balance of payments and trade liberalisation that exists suggests that import flows respond more rapidly than exports following trade liberalisation, causing 'temporary' trade imbalances. This thesis extends this existing evidence by examining the effect of liberalisation on export growth, import growth, the trade balance and the balance of payments for a geographically diverse sample of 22 developing countries over the period 1972 to 1998.

The impact of trade liberalisation is measured by changes in duties on exports and imports, and by an indicator for the years in which significant trade liberalisation took place. Differences between countries in Africa, Latin America, East Asia and South Asia are explored, as is the importance of the degree of protection afforded by the trade regime.

The central findings are that exports react favourably to decreases in export duties, though the impact is relatively small, but trade liberalisation emerges as a significant positive determinant of export growth. The results indicate that import duty reductions raise import growth, but the effect varies according to the region and type of trade policy regime existing in the country, and trade liberalisation has a strong, positive impact on import growth. On balance, trade liberalisation worsens the trade balance by nearly two percent of GDP. While all regions suffered deterioration in their trade balance, Africa has been particularly severely affected. The negative impact of liberalisation is greater in countries which have liberalised from a more highly protected regime.

A case study for the Dominican Republic (DR) shows that trade liberalisation has raised the rate of growth of exports and imports, and that the trade balance has improved, suggesting that the DR has not suffered deterioration as other countries in the sample, following trade policy reform.

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DECLARATION

An earlier version of Chapter 4 of this thesis is published as a Discussion Paper in the Department of Economics, University of Kent (UKC), *Discussion Papers Series* (No. 00/12); and a revised version is published in the *Journal of Development Studies* (Vol. 39, October 2002); it was also presented at the Fifth Postgraduate Economics Conference held at the University of Leeds on 1st December 2000.

An earlier version of Chapter 5 also appeared as a Discussion Paper of the UKC's Department of Economics (No. 01/10), and a later version is published in *World Development* (Vol.30, No.6, June 2002); it was also presented at the University of Kent internal seminar series, and the Latin American Economic Research Network (LAERN), Oxford University, in April 2001. The paper was also accepted for presentation at the International Economics Study Group (IESG) Annual Conference at Gregynog, Wales, 15th to 17th September 2001.

The material on Chapter 6 of the thesis is a Discussion Paper of the UKC Department of Economics (No. 02/02), and a revised version has been submitted to *The Manchester School.* Additionally, the empirical results of the thesis have been the base of a joint work with Professor Tony Thirlwall, and this paper was presented at the Conference on Globalisation, Regionalism, and Economic Growth, Downing College, University of Cambridge, 5th April 2002; and at the IESG Easter Conference, University of Birmingham, 11th April 2002. It was also selected for presentation at the Seventh International Post Keynesian Workshop, held in Kansas City, Missouri from June 30 to July 3, 2002.

SUMMARY

Trade liberalisation is assumed to improve a country's performance by promoting domestic economic efficiency and by encouraging trade flows between nations. There is a large literature that shows the 'beneficial' effects of trade policy reforms, based on the supply side tradition, but the impact on demand variables and the trade balance and the balance of payments has been in general neglected. This thesis analyses the impact of trade liberalisation on export growth, import growth and the balance of payments for a geographically diverse sample of twenty-two developing countries over the period 1972 to 1998.

The impact of trade liberalisation is measured by changes in duties on exports and imports, and by an indicator for the years in which significant trade liberalisation took place. Differences between countries in Africa, Latin America, East Asia and South Asia are explored, as is the importance of the degree of protection afforded by the trade regime. The research applies dynamic panel data models based on fixed-effects and generalised methods of moments (GMM) estimators. In addition, heterogeneous panels for the complete sample, as well as for different regions of the world, and different classification of trade policy regimes, are estimated using a time-series/cross-section technique.

The first part of the thesis is formed by Chapter 1, which surveys the literature on trade liberalisation. Particularly, it shows the main definitions of trade liberalisation and their shortcomings. Also, it discusses the main contributions regarding the analysis of the impact of trade liberalisation on

economic growth, exports, imports, and the balance of payments. Chapter 3 describes and discusses the different panel data methodologies used in the thesis.

In the second part of the thesis the impact of trade liberalisation on export and import growth is examined. First, in Chapter 4 the main findings are that trade liberalisation is a significant determinant of export performance, but its effect varies across continents. Export duties by themselves have only a small effect on export performance. Trade liberalisation has affected the income elasticity but not the price elasticity of exports.

In Chapter 5, which looks at the impact of trade liberalisation on import growth, a symmetric analysis to Chapter 4 is undertaken. The results indicate that import duty reductions raise import growth, but the effect varies according to the region and the type of trade policy regime existing in the country. The results also demonstrate that the elimination of trade policy distortions has a strong, positive impact on import growth. Lastly, it is found that the income and price elasticity of imports are higher as a result of trade policy reform.

In the case of the trade balance and the balance of payments, the effect of liberalisation is theoretically ambiguous whatever framework of balance of payments adjustment is used. The limited empirical evidence that exists suggests that import flows respond more rapidly than exports following trade liberalisation, causing 'temporary' trade imbalances. Chapter 6 extends this existing evidence by examining the effect of liberalisation on the trade balance and the balance of payments. The central finding is that trade liberalisation has a direct effect, which worsens the trade balance by nearly two percent of GDP, and an indirect effect operating through a positive effect on output growth, which also serves to weaken

the trade balance. While all regions have suffered deterioration in their trade balances, Africa has been particularly severely affected. In addition, the negative impact of liberalisation is greater in countries that have liberalised from a more highly protected regime.

The third part of the thesis undertakes a study-case of the evolution of trade policy reforms in the Dominican Republic (DR), and the impact of trade liberalisation on exports, imports, and the trade account of the balance of payments. Chapter 7 shows that the DR has made significant progress towards a more open trade regime, particularly through the elimination of non-tariff barriers and through the simplification of the tariff structure and the reduction in the rates of duties. In addition, the process of liberalisation has affected export and import growth, almost by the same magnitude, although the export response is somewhat higher. Additionally, the results show that there is a lagged response of export and import growth to trade liberalisation, which can be explained by the fact that the elimination of most restrictions (including export taxes) was not addressed until the second year after the reform. The trade account of the balance of payments shows a positive reaction to trade liberalisation, which is an indication of the higher export growth in comparison to import growth following liberalisation.

Chapter 8 summarises the main results and contains the concluding remarks.

Chapter 1

INTRODUCTION

The last fifty years have witnessed a profound evolution of economic policy in developing countries, particularly in the case of trade policy. Both internal, as well as external factors have prompted the need for more outward oriented (or liberalised) trade policy regimes.

This claim in favour of freer trade relations has also become an important issue in economic policy circles and in the development literature. The creation of the General Agreement on Tariffs and Trade (GATT) in 1947, and converted since 1995 into the World Trade Organisation (WTO), has been an important driving force for free trade[1]. Since then, the major quantitative barriers to trade, i.e. tariffs and non-tariff barriers (quotas, licenses, and technical specifications, among other restrictions), have substantially been reduced or dismantled.

The decades of the 1950s, 1960s, and 1970s were characterised by the protectionism as a means of development for developing countries. One of the most influential strategies was "import substitution industrialisation (ISI)" protectionist policy, which had its origins in the seminal works of Raúl Prebisch (1950) and Hans Singer (1950). According to Prebisch, the smaller countries wishing to industrialise, required temporary assistance to protect their newly

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[1] Ben-David and Papell (1997) show that a considerable number of countries experienced statistically significant changes in the paths of their export-GDP and import-GDP ratios over the post war (World War II) periods, particularly after the Kennedy Round of trade negotiations in the late 1960s. However, the coincidence in timing between the import and export breaks does not appear to be particularly strong; and there found little relation between the extent of changes in imports and exports for most countries.

emerging manufacturing sector. This reasoning is known as the "infant industry" argument for industrialisation, and goes back to List (1841).

However, the 1980s and 1990s witnessed the beginnings of a change among developing countries with respect to trade policy, which has been manifested in the new writings in the trade and development literature. The main argument of the innovative literature suggests that the performance of more outward-oriented economies is superior to that of those countries pursuing more inward-looking trade practices (see Dollar, 1991; Sachs and Warner, 1995, Rodríguez and Rodrik, 2000). Recent developments in the trade liberalisation literature focus on the potential dynamic effects of trade liberalisation, i.e. simplification of tariff structures and elimination of non-tariff barriers, in reducing the incentives to rent seeking and in accelerating the flow of technical knowledge from the world market. The explanation is that trade liberalisation would generate greater access to new capital and intermediate goods, and greater knowledge leading to faster imitation of advanced techniques (Romer, 1994; Grossman and Helpman, 1995). Moreover, the elimination of anti-trade bias can result in a more efficient allocation of resources and economic growth (see Krueger, 1998).

However, the literature on trade liberalisation has hitherto focused on showing the beneficial effects of liberalisation episodes, mainly by supply-side growth models, overlooking the effects on the balance of payments. Thus, the objective of this thesis is to fill this void by investigating the impact of trade liberalisation on export growth, import growth, and the balance of payments. To our knowledge, this is the first study to do so in a systemic way. Explicitly, it aims to answer four major issues related to the process of trade policy reform. First, what has been the

impact of trade liberalisation on export and import growth? Second, how has trade liberalisation affected the price and income elasticities of demand for exports and imports? Third, what has been the effect of trade liberalisation on the trade balance and the current account of the balance of payments; has there been an improvement or deterioration? Finally, we are interested to discern if there has been a differential impact of trade liberalisation on exports, imports and the balance of payments in the different regions, or in the countries grouped by the degree of trade policy distortions.

The analysis of the thesis focuses on sample of twenty-two developing countries from different continents that have undergone extensive trade liberalisation since the mid-1970s. Specifically the regions (countries) are, from Africa: Cameroon, Malawi, Morocco, Tunisia and Zambia. From East Asia: Indonesia, Korea, Malaysia, Philippines, and Thailand. From South Asia: India, Pakistan and Sri Lanka. From Latin America and the Caribbean: Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, Paraguay, Uruguay, and Venezuela.

Dean *et al* (1994, pp.14-18) summarise the different approaches to trade policy reform within the regions and their degree of success[2]. For instance, in the case of **Africa**, the authors show that most of the countries had very restrictive trade regimes to start with (both in terms of tariffs and non-tariff barriers), and regarding foreign exchange restrictions. Many of the countries undertook trade liberalisation in the early 1980s after suffering the adverse effects of commodity

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[2] The policy reforms of the countries/regions are discussed in more detail in the corresponding chapters.

price fluctuations. However, in some instances the reform process was reversed (e.g. Zambia) or slowed (e.g. Malawi), which imposes a problem of credibility and sustainability. The main reasons for such setbacks were political, namely the lack of commitment by the government, and the lack of institutional resources to accomplish the reforms. Additionally, as Milner (1998) analyses, African countries suffer from natural barriers, which are often understated, and affect the effectiveness of policy reform. In **East Asia** the process of trade liberalisation consisted mainly on implementing policies to promote exports, i.e. granting incentives to offset the remaining anti-export bias in the import regime. Together with trade liberalisation, domestic policy reforms and macroeconomic stability were crucial to the achievements of these economies, particularly in the case of successful export performance. In **South Asia**, on the other hand, the process of liberalisation was generally slow and not always sustained. Trade reform reversals were related not only to political changes and opposition, but also to exogenous factors such as the oil price crisis of 1973. In the **Latin American and Caribbean** region, trade liberalisation was often embarked on in the context of macroeconomic stabilisation, following economic turmoil (i.e., high inflation, balance of payments and fiscal deficits, government changes, etc). In this case, there were also some reversals, which occurred mainly due to faulty sequencing, and internal conflict between stabilisation and liberalisation policies. In general, in all the regions, the extent of liberalisation was very diverse, as well as the sequencing of the liberalisation of exports and imports.

Since the major task of trade reform is to liberalise tariffs and quotas, two basic indicators of liberalisation are used in this thesis. The first is a measure of

duties applied to exports and imports, where the rate of export duty is defined as the ratio of export duty revenue to the value of exports, and the rate of import duty (or implicit tariff) is calculated as revenue from imports as a ratio of import value. The second measure takes the form of a dummy variable applied to the year in which trade liberalisation is deemed to have taken place in a significant way (and continued). The advantage of this variable is that it was carefully constructed by investigating the main trade policy reforms during the period of the analysis for each country, founded on criteria compiled by the World Trade Organisation (WTO), World Bank, IMF, and country-specific studies.

This detailed research about trade liberalisation allowed us to identify the most important dates of trade policy changes for each country, allowing us to isolate the 'pure' impact of trade liberalisation. This makes our dummy a preferable choice over other indicators existing in the literature (which will be discussed in Chapter 2), which sometimes are based on subjective arguments, or cover other economic, social and political events, and not just trade reforms. Thus, liberalisation refers to all measures taken to reduce anti-export bias and import controls, including non-tariff barriers (quantitative restrictions, quotas, subsidies, etc.) and exchange rate distortions. Therefore, it is expected that the shift dummy will have a higher impact on exports, imports, the trade and current account balances than the sole reduction of duties. Since the optimal structure of trade policy (i.e. optimal tariff structure and quota reform) involves the replacement of existing trade policies including quantitative restrictions by an appropriate set of tariffs, this also explains the possible increase in tariffs and taxes following trade liberalisation, and this in turn could be reflected in the empirical estimations.

An important contribution of the thesis is that it applies dynamic panel data models based on fixed effects and generalised methods of moments (GMM). Also, heterogeneous panels for the complete sample, as well as for the different regions of the world, are estimated using a time series/cross section technique. Additionally, the countries are classified according the degree of trade policy distortion based on the Heritage Foundation Index of Economic Freedom (see O'Driscoll et al, 1999). Also, short and long run (cointegration) time series analysis are employed for a case study of the impact of trade liberalisation on exports, imports, and the trade balance in the Dominican Republic.

The thesis is divided into three main sections. **Part I** contains Chapters 2 and 3. Chapter 2 surveys the literature on trade liberalisation in developing countries. It discusses the different theoretical and empirical approaches that have been developed to analyse trade liberalisation episodes. Chapter 3 reviews the different panel data estimators employed in the thesis.

Part II presents the analysis of the impact of trade liberalisation on exports, imports, and the balance of payments. Chapter 4 has the purpose of analysing the relationship between trade liberalisation and export growth. The impact of liberalisation on exports is assessed with export duties, and the use of shift and slope dummies in a conventional export growth equation, in which price competitiveness and the growth of income in importing countries are also assumed vital determinants of export performance. Although there is a large number of studies which assess the impact of trade liberalisation on exports, most of them are based on the supply side tradition (exceptions are Krueger, 1978; and Bleaney, 1999). The analysis is done for the complete sample (employing fixed

effects and GMM panel data models), and for the different regions (Africa, East Asia, South Asia, and Latin America) through the time-series/cross-section panel model.

Chapter 5 specifies an import growth function, and presents new and relatively comprehensive evidence regarding the impact of trade liberalisation on import growth, focusing on the impact of import controls, i.e., tariff and non-tariff barriers. This chapter undertakes a symmetrical approach to Chapter 4, in that it uses the import demand theory approach to evaluate the impact of liberalisation. The chapter also looks at differences in the performance in Africa, Latin America, East Asia and South Asia; also, the countries are classified according to the degree of protection of the trade regime. It is worth mentioning that few studies have analysed the impact of trade liberalisation on import behaviour across developing countries (exceptions are Bertola and Faini, 1991, and Faini *et al* 1992).

The aim of Chapter 6 is to examine the balance of payments consequences of trade liberalisation in the countries in the sample. The chapter focuses on examining what has been the impact of trade liberalisation on the trade and current account balances of the balance of payments; and the main question is whether there has been an improvement or deterioration in such accounts following the trade reform programmes. The chapter also looks at differences in the performance in Africa, Latin America, East Asia and South Asia, and the countries are also classified according to the degree of protection of the trade regime, as in Chapter 5. This is the first study to evaluate this matter thoroughly, employing different estimation procedures.

The final part of the thesis, **Part III**, portrays a study-case of the Dominican Republic (DR), which is one of the countries in the sample. The DR has a noteworthy trade liberalisation experience, because it has undertaken important reforms of its trade policy regime, mainly within the framework of structural adjustment programmes financed by the IMF and the World Bank (where some of the initial efforts were reversed for political reasons), as well as following the commitments with the WTO. Chapter 7 examines the evolution of trade policy reforms in the DR, and it provides an empirical assessment of the impact of trade liberalisation on export and import growth.

Finally, Chapter 8 summarises the main results, and presents the general conclusions of the thesis. It also provides indications for future research, within the context of the themes analysed in the present study.

Part I

THEORY, EMPIRICAL EVIDENCE AND PANEL DATA ECONOMETRIC TECHNIQUES

Chapter 2

TRADE LIBERALISATION: THEORY AND EVIDENCE FOR DEVELOPING COUNTRIES

2.1 Introduction

The free trade doctrine has been discussed since the beginning of the formal study of economics. Classical economists were the first to provide insights concerning the foundations of free trade, where the main issue was the growth process driven by trade in international markets.

Adam Smith (1776) stressed the importance of trade as a way of distributing national surpluses internationally, and as a means of widening the market, thereby improving the division of labour and the level of productivity. The productivity doctrine founded by Smith in the eighteenth century, advanced beyond a free-trade argument into an export-drive argument, particularly in the colonies. Later, David Ricardo (1817) developed the efficiency (comparative cost) doctrine known as the theory of comparative advantage. John Stuart Mill [1848 (1917)] recognised the importance of the dynamic effects of trade, describing such effects as indirect. He also stressed the favourable effect of imports on work effort. Also, Alfred Marshall (1890) expressed the view that the causes that determine the economic progress of nations belong to the study of international trade.

In the twentieth century, the claims in favour of freer trade relations became an important issue in economic policy circles, as well as in the development literature. For instance, since 1950 there has been an "extensive" movement in

favour of trade liberalisation, especially in developed countries, under the support of the General Agreement on Tariffs and Trade (GATT), established in 1947, and converted since 1995 into the World Trade Organisation (WTO). Since then, the major quantitative barriers to trade, i.e. tariffs and non-tariff barriers (quotas, licenses, and technical specification, among other restrictions), have been reduced or substantially dismantled. Moreover, the 1980s and 1990s have seen the beginnings of a change among developing countries with respect to trade policy. The simplification of import procedures, the reduction or elimination of quotas, and the rationalisation of the tariff structures are the most widespread reforms[3].

Additionally, major aid donors and international financial organisations encountered the economic and debt crisis during the late 1970s and early 1980s in developing countries, with a major change in aid policy to a move towards more conditional aid flows[4]. Consequently, the World Bank and the IMF began to recommend market-oriented reforms, which included as a basic component the reduction of trade barriers and the opening of international trade to foreign competition, among other long-term growth and development strategies. For example, the main goals of trade liberalisation in the IMF supported programs have been "to improve the economic efficiency by creating a transparent and neutral system of incentives that eliminates anti-export bias, direct impediments to trade, and economic distortions caused by the trade regime" (IMF, 1998 p.4). Although most of the 'good practising' countries that undertook such programs

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[3] Rodrik (1992) presents a comprehensive article about the limits of trade reforms in developing countries.

[4] See Harrigan and Mosley (1991), Mosley *et al* (1991), Greenaway and Morrissey (1993), and McGillivray and Morrissey (1999) for a general evaluation of these programs.

managed to reduce to some extent the degree of trade policy distortions, a significant number, including those starting with highly restrictive trade regimes, did not target any quantifiable reduction in restrictiveness[5]. These outcomes where influenced by country-specific circumstances, particularly political and socio-economic factors (see, for example, Milner and Morrissey, 1999 for an assessment of the problems of trade policy reform and economic liberalisation in Africa).

There has also been a resurgence of a new trade literature, which stresses the positive externalities derived from more competition in trade relations. The main argument of the new trade and development literature suggests that the performance of more open and outward oriented economies is superior to that of those countries pursuing more inward-looking trade practices (see Krueger, 1998; and OECD, 1998). Thus, the obvious policy implication is that developing countries should deviate from protectionist and restrictive trade strategies and open their foreign trade sector. However, the contributions made in this field have been concentrated on the orthodox supply-side tradition, overlooking the monetary consequences of trade liberalisation, such as the trade account of the balance of payments and the balance of payments as a whole.

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[5] For instance, a study (IMF, 1998) of trade liberalisation in IMF encouraged programs show that the average targeted improvement in trade restrictiveness was slightly less than 2 points on a 1-10 point scale (where 1 is the most open category and 10 the most restrictive). These reform programs generally aimed at reducing tariff protection, but in many cases, these efforts were modest. More than one-third of programs targeted a reduction in tariffs sufficient to change the classification of tariff protection. Regarding the NTBs, somewhat more than one-half of the programs expected a reduction sufficient to lower the classification of the restrictiveness of the NTBs. Table A2.1 in the appendix presents a classification of the restrictiveness rating.

In the light of this background, the aim of this chapter is to survey the literature on trade liberalisation in developing countries. We discuss the different theoretical and empirical approaches that have been developed to analyse trade liberalisation episodes. In Section 2.2, the definitions and the different measures of trade liberalisation are presented. Section 2.3 discusses the models of trade liberalisation and economic growth. Section 2.4 analyses the studies on the relationship between trade liberalisation and exports. Section 2.5 reviews the research on the impact of trade liberalisation on imports. The studies on the effect of trade liberalisation on the balance of payments are surveyed in Section 2.6. Section 2.7 provides the conclusions.

2.2 The definition of trade liberalisation

There is a large literature that analyses the effects of trade policy reform, and from which the different concepts of trade liberalisation are derived. Overall, as Dean *et al* (1994) express, trade liberalisation has been linked with becoming more 'outward-oriented', where both terms are generally used synonymously (see also Pritchett, 1996). Countries are considered more outward-oriented (liberalised) if their trade reforms imply a move towards neutrality, liberality or openness. Specifically, a shift toward neutrality involves equalising incentives (on average) between the exporting and importing competing sectors (this is the spirit of the Krueger, 1978 research which is discussed later). A regime is regarded as more liberal when the general level of intervention has been reduced. Sometimes, an increase in openness is equated with an increase in the importance of trade in the

economy (i.e. total trade as a proportion of GDP). However, a more neutral trade regime can be accomplished through a reduction in import barriers, or via the introduction of a symmetric system of export subsidies, where the first policy implies a reduction in the intervention of the trade policy whilst the latter implies an increase (see Edwards, 1989 for a detailed discussion on this issue). Thus, as will be explained later, there are many approaches to assess trade liberalisation, and this could be affecting the results of the empirical studies that exploit such indicators.

The theoretical and empirical work on trade liberalisation and economic performance can be classified into two broad categories. First, large-scale multi-country studies that have investigated in detail the experiences of a group of individual countries regarding trade policy reform, and which provide 'indicators' or definitions of trade liberalisation. Second, empirical studies using cross-section analysis to investigate, for example, the relationship between trade liberalisation and exports, trade liberalisation and aggregate economic growth, etc. In this section we discuss the first type of work.

At this point, it is worth making clear that the direction taken by such studies has been mainly to measure trade liberalisation through the construction of trade orientation or openness indexes which, as we will discuss later, are plagued by many data and conceptual problems.

2.2.1 Trade policy and liberalisation: the earlier studies

(i) The first projects

The studies co-ordinated by Little, Scitovsky and Scott (1970) and by Balassa (1971)[6] are the seminal multi-country investigations on trade orientation and economic performance in developing countries[7].

Possibly, the most important contribution of such projects is that they provide comparative evidence on how the structure of protection (i.e. import restrictions) to intermediate and final goods affected the relative profitability of sectoral value-added. This was done by computing the *effective rates of protection* (ERP) for each country in the sample. Balassa (1965), Johnson (1965) and Corden (1966) were the pioneers of this type of calculation[8]. The ERP tries to capture the rate of protection granted to value added in a given industry in a single indicator. The main policy recommendation derived from these studies was that developing countries should significantly reduce their degrees of protection, and open up their industrial sectors to international competition[9].

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[6] Little *et al* analysed the cases of Argentina, Brazil, Mexico, India, Pakistan, the Philippines, and Taiwan. The study of Balassa included Chile, Brazil, Mexico, Malaysia, Pakistan, the Philippines and Norway.

[7] Edwards (1993) presents a comprehensive survey of the early literature on trade liberalisation and economic performance until the early 1990s.

[8] The Corden (1966)-Anderson and Naya (1969) definition of ERP is the proportionate increase in value added per unit level of an activity (y) brought about by the tariff structure over its free-trade value. That is $ERP = \frac{\sum_n^1 p_i y_i}{\sum_n^1 p_i^* y_i} - 1$, where p_i is the domestic price of good i and p_i^* is its world price. This definition considers only traded-goods components because of the difficulty of measuring non-traded goods.

[9] See Streeten (1971) for a far-reaching review of Little *et al* (1970).

But the projects directed by Little *et al* (1970) and Balassa (1971) presented two serious measurement deficiencies. First, the evolution of the ERP through time was not calculated in any of the countries studied, mainly due to data limitations. As a result, it is difficult to discuss properly liberalisation episodes in these countries. Second, in some cases, the studies generated important differences in ERP calculations for the same country in the same years[10].

Moreover, neither Little *et al* (1970) nor Balassa (1971) analysed in detail how specific countries evolved from one trade regime to another, nor did they assess empirically how alternative policies had affected growth at particular moments of time. Rather, they concentrated their studies on the features of import substitution policies, without comparing them with alternative policies of foreign trade orientation.

Also, Michaely (1977) and Balassa (1978 and 1979)[11] analysed trade practices (and their impact on growth) in developing countries, but as the previous studies, their results were subject to several criticisms. First, they ignored the role of other factors in the growth process –they focused only on correlation coefficients. Second, no attempt was made to distinguish between endogenous and exogenous variables –i.e., causality between export growth and GDP growth. Finally, the theoretical bases of these studies have been very *ad hoc*.

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[10] For instance, applying the same technique (i.e. Corden's method for computing ERPs) to the manufacturing sector in the Philippines in 1965, Little's *et al* study provided a rate of 49 per cent, while Balassa calculated an ERP of 61 per cent, for the same country in the same year.

[11] Using pooled data (simple rank correlation) on 11 countries for 1960-73, Michaely found a positive correlation coefficient between different measures of the rate of growth of exports and GDP growth. To avoid spurious correlation, he used the rate of growth of exports share of GDP, and their relation with GDP growth.

(ii) The NBER (1978) projects

Most cross-country investigations have emphasised the fact that in developing countries, non-tariff barriers (quotas, licenses and prohibitions) have traditionally constituted the most significant way of restricting trade.

The studies directed by Krueger (1978) and Bhagwati (1978), sponsored by the NBER, represent the first organised attempts to formally classify trade regimes[12]. In these projects, trade orientation was measured by the degree to which the structure of protection and incentives in a country was biased against exports.

Liberalisation and bias reduction were defined using the concepts of effective exchange rates (EER) and quantitative restrictions (QR). The degree of bias (B) of the trade regime at time t is defined as:

$$B_t = \frac{EER_M}{EER_X} = \frac{E_M\left(1+t+n+PR\right)}{E_X\left(1+s+r\right)}, \tag{2.1}$$

that is, the ratio of the exchange rate effectively paid by importers (EER_M) to the exchange rate effectively paid by exporters (EER_X).

The effective exchange rate for imports [EER_M ($1 + t + n + PR$)] is defined as the nominal exchange rate applied to imports E_M, corrected by the average effective import tariff (t), other import charges (n), and the premium associated

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[12] The countries included are Chile, Colombia, Egypt, Ghana, India, Israel, Korea, the Philippines, and Turkey. The project also included Brazil and Pakistan, but they did not publish any empirical results on these countries.

with the existence of quantitative restrictions such as import licenses (PR)[13]. The effective exchange rate for exports [E_X (1 + s+ r)] is calculated as the nominal exchange rate for exports (E_X), corrected by export subsidies (s) and other incentives to exports (r), including export encouragement schemes.

The conclusions that emanate from this calculation are that if this ratio is greater than one ($B > 1$) it implies that the trade regime is biased against exports, that is, the country is following an import substitution strategy. If there are unified nominal exchange rates for commercial transactions, then the trade regime is regarded as trade neutral when $B = 1$. Finally, if $B < 1$ the country in question is engaged in an export promotion strategy.

Consequently, Krueger-Bhagwati defined trade liberalisation as 'any policy that reduces the degree of anti-export bias', where the empirical emphasis was focused on the reductions in the import licenses premium (PR) as the fundamental step in the liberalisation reforms. The most compelling property of such a measure is that it does not require zero (or even low) import tariffs. Indeed, they stated that it is possible to have a 'liberalised' economy with high tariff rates. It is clear that a liberal trade regime, as defined by Krueger-Bhagwati, is not necessarily equal to *laissez-faire* or free trade. That is, this measure of trade liberalisation refers to trade distortions. However, even when trade distortions are reduced, inefficiencies in the system may still exist due to interventions (even if $B = 1$) for these countries.

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[13] See also Bhagwati (1988) for a discussion related to this index.

In another investigation, the NBER project dealt with the issue of QR at the theoretical level, by constructing a series of models that examined under what circumstances there was equivalence between tariffs and quotas.

In order to estimate the effect of trade policies, the concepts of premium (*PR*) and bias (*B*) were combined with the definition of five phases in the evolution of trade regimes:

- *Phase I.* It is characterised by across-the board imposition of quantitative controls, usually associated with a balance of payments crisis.
- *Phase II.* During this phase, the control system becomes more complex and discriminatory, increasing the anti-export bias of the regime.
- *Phase III.* It is the beginning of the liberalisation process and is characterised by the implementation of a (nominal) devaluation and relaxation of some quantitative restrictions (QRs).
- *Phase IV.* During this phase, further steps towards liberalisation are implemented, through the replacement of quotas by tariffs.
- *Phase V.* In this phase the economy has become completely liberalised, current account transactions are fully convertible, and QRs are not applied any longer.

Table 2.1 presents Krueger's estimates from the country studies on the magnitude of bias and changes in it following devaluation episodes[14], that is, the *phase III*. Krueger (1978, p.110) summed up the evidence from the countries'

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[14] See Krueger (1978) for the explanation of the sources and variable definitions in particular countries.

experiences as: "bias reduction is usually a major component of net devaluation and that the reduction results from the absorption of pre-existing premiums on import licenses rather than by differential changes in export and import EERs".

Table 2.1

Bias of trade regimes before and after 'Phase III' episodes in selected countries

Country	Devaluation year	Export EER		Import EER plus Premium		Bias[a]	
		Old	Two years later	Old	Two years later	Old	Two years later
Brazil	1957	53	114	188	25.8	2.45	2.26
	1961	160	553	367	779	1.79	1.41
	1964	884	2200	2601	2953	1.41	1.34
Chile	1956	0.18	0.75	0.99	1.39	3.69	1.94
	1959	0.72	1.05	1.89	2.09	1.94	1.99
	1965	2.47	5.08	6.04	9.11	1.95	1.79
Philippines	1960-1962	2.00	3.90	5.27	5.33	2.01	1.36
	1970	3.90	7.56	8.03	8.41	1.37	1.16
South Korea	1961	147.6	189.4	146.4	148.1	0.67	0.78
	1964	189.4	322.9	293.1	296.4	0.78	0.92
Turkey	1958-1959	3.17	9.00	17.9	14.3	6.31	1.59
	1970	9.96	14.52	27.2	26.2	3.01	1.80

Source: Krueger (1978).

Notes: The index is defined in detail in equation (2.1).

After identifying the phases, Krueger (1978) tested econometrically two hypotheses. First, that more liberalised regimes enjoy a higher rate of growth of exports; and second, that a more liberalised trade sector has a positive effect on aggregate growth. In the latter case, Krueger supposed that there are two channels through which openness positively affects growth: 1) there are **direct effects** that operate via *dynamic advantages* (including higher capacity utilisation and more

efficient investment projects); 2) there are **indirect effects** which work through exports, that is, more liberalised economies have a faster growth of exports and these, in turn, result in more rapidly growing GNP.

The results concerning trade policy reforms and exports confirmed that a lower real effective exchange rate has a positive impact on non-traditional exports. Traditional exports, however, did not appear to be sensitive to real exchange rate changes. The coefficient for the dummy variable, which accounts for phases IV and V in the evolution of trade regimes, was significantly positive, suggesting that a more 'liberalised' regime has a positive effect on export growth. Regarding their relative contributions to export growth, real exchange rate changes appeared to be considerably more important than trade liberalisation. In this regard, Krueger concludes: "it is bias reduction [index], to a considerable greater extent than it is liberalisation which brings about export response" (1978, p.205).

In relation to GNP growth, the estimations provided strong evidence in favour of an *indirect effect* of liberalisation on growth, that is, higher exports positively affected GNP growth. Nevertheless, the dummy variable coefficients were not significant in any of the regressions, implying that there is no direct effect of trade liberalisation on growth.

(iii) Criticisms of the NBER (1978) projects and further developments

Krueger's conclusions about the effects of liberalisation on economic performance have raised some criticisms. For instance, Balassa (1982) argued that these results were seriously affected by an inadequate classification of trade regimes. According to Balassa, the NBER project ignored the protective effect of tariffs; that is, in addition to quantitative restrictions, tariffs usually introduce an strong bias against exports.

Thus, Balassa (1982) proposed a four-way classification of trade regimes as an alternative to the NBER study. Balassa's classification ranged from outward orientation (where the export bias stemming both from quantitative restrictions and from tariffs has been eliminated), to inward orientation (where the anti-export bias is the highest). Eleven countries were classified [15] into four categories using as criteria the effective rates of protection, effective export subsidies, and nominal protection. One of the main findings of this study for the period 1960-73 is that those countries with a lower anti-export bias experienced a faster rate of growth of exports. He concluded that this was strong evidence favouring the hypothesis that protectionism seriously hampered export expansion.

Trying to test a more advanced proposition, explicitly that trade regimes affect GDP growth independent of exports, Balassa faced the usual problem of

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[15] The countries covered were Argentina, Brazil, Chile, Colombia, India, Israel, Korea, Morocco, Singapore, Taiwan, and Yugoslavia.

measuring trade orientation. Instead of using dummy variables[16], as Krueger (1978), he used the growth rate of net exports as a proxy for policy orientation. Appling Spearman rank coefficients of pooled data for all the countries in the sample, he found that "export growth and output growth had been positively correlated" (1982, p.59). Nevertheless, Balassa's comparative analysis has some limitations, such as the arbitrary definition of export incentives; the lack of a role for the real exchange rate in the explanation of export performance; the use of export growth for trade orientation; the inability to deal convincingly with causality issues; and that he uses a non-parametric method and little can be said about true robustness of this relationship. Moreover, the causality between export growth and output expansion is not clear.

At the beginning of the 1990s, Michael Michaely directed another project under the World Bank auspices, as a basis for its lending program policies[17]. This comparative study covering nineteen countries went further than the previous investigations analysing the most appropriate ways of implementing a trade liberalisation policy[18]. The project comprised the study of sequencing, speed, and transitional costs of liberalisation across countries.

Michaely *et al* (1991), after identifying episodes of significant change in trade policy in the different countries of their study, defined trade liberalisation as "any change which leads a country's trade system toward neutrality in the sense of

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[16] One of the most relevant problems with the use of binary dummies is that it is not possible to analyse how different grades of trade liberalisation affect growth and other key variables.

[17] The results of the project are published in seven volumes edited by Michaely, Papageorgiou, and Choksi (1991).

[18] The countries included in the study are Argentina, Brazil, Chile, Colombia, Greece, Indonesia, Israel, Pakistan, Peru, the Philippines, Portugal, Singapore, Spain, Sri Lanka, Turkey, Uruguay, and Yugoslavia.

bringing its economy closer to the situation which would prevail if there were no governmental interference ...." (Michaely, Papageorgiou, and Choksi, 1991, Vol 7, p.xx).

Considering the shortcomings of the previous studies in providing a convincing classification of the countries' trade regimes, including the well-known data problems, these inconveniences were faced by asking the individual country authors to construct their own index of trade liberalisation. Such an index could take the value of one if the economy was considered to have a repressed external sector and up to twenty if foreign trade was completely liberalised[19].

Based on the preceding definition of trade liberalisation, and on the liberalisation indexes, the authors identified 36 liberalisation attempts for the 19 countries in the study. Of these attempts, 19 were regarded as strong liberalisation and 17 were considered as weak efforts. Only 15 cases were sustained, in the sense that the trade reform had not been reversed after a few years.

Although Michaely's *et al* (1991) project represents an improvement in the measurement of trade liberalisation, as well as the process that it involves, their index remains very subjective, reflecting the personal insights of the individual country authors. For this reason, it is not appropriate to compare these results across countries. Consequently, the indices could not be used as indicators of trade orientation in their cross-section econometric analysis relating economic performance to trade policy; thus, they relied on dummy variables to classify different episodes.

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[19] This index was calculated for as many years as possible from 1948 to 1985. One of the most interesting results was that in only one of the 19 countries did the liberalisation index attain a value of 20: Chile in the late 1970s.

2.2.2 Other Indexes of Trade Liberalisation

Because of the unavailability of time series on trade policy indicators, most of the studies employ proxies for the trade policy variables. For instance, import penetration ratios, particularly their variability over time, have been used by many authors to account for the levels of trade barriers, including Balassa and Balassa (1984).

Also, Balassa (1985) constructed an index of trade policy as the deviation of the actual volume of exports from the volume of exports predicted by a simple structural model of trade for 43 countries. He assumed that exports are a function of per capita income, population and mineral resources availability, and used the residuals of the regressions as a measure of trade orientation. Positive residuals were interpreted as reflecting "export promotion policies", and negative residuals were considered as an "inward orientation" strategy.

One of the major shortcomings of Balassa's results is that he did not treat this index of trade orientation as a variable measured with errors, or check the robustness of the results with alternative specifications of the export equations.

An alternative methodology has been to construct other indices of trade orientation, often subjective, where the authors use country-specific information to classify them into different groups.

(i) World Bank (1987) outward-inward trade orientation

One of the most influential, as well as controversial, studies has been provided by the World Bank (1987) classification of trade orientation in 41 developing countries[20]. The World Bank (1987, p.82) defines four trade orientation categories as follows:

- *"Strongly Outward Oriented:* Trade controls are either non-existent or very low in the sense that any disincentives to export resulting from import barriers are more or less counterbalanced by export incentives. There is little (or no) use of direct controls and licensing agreements, and the exchange rate is maintained so that the effective exchange rates for importables and exportables are roughly equal.
- *Moderately Outward Oriented:* The overall incentive structure is moderately biased toward production for domestic rather than export markets.
- *Moderately Inward Oriented:* The overall incentive structure distinctly favours production for the domestic market and the exchange rate is clearly overvalued.
- *Strongly Inward Oriented*: The overall incentive structure strongly favours production for the domestic market and the exchange rate is significantly overvalued".

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[20] For instance, many authors have objected the classification of Korea and Singapore as strongly outward oriented economies, pointing out that government intervention in the case of Korea has played an important role in the development of the country (see for example, Helleiner, 1990; and Edwards, 1998).

Table 2.2

Composition of trade orientation country groups: 1963-73 and 1973-85

Strongly outward oriented	Moderately outward oriented	Moderately inward oriented	Strongly inward oriented
PERIOD I: 1963-1973			
Hong Kong Republic of Korea Singapore	Brazil *Cameroon *Colombia *Costa Rica *Ivory Coast *Guatemala *Indonesia Israel Malaysia Thailand	*Bolivia El Salvador Honduras Kenya *Madagascar Mexico Nicaragua *Nigeria Philippines Senegal *Tunisia Yugoslavia	Argentina Bangladesh Burundi *Chile Dominican Republic Ethiopia Ghana India *Pakistan Peru *Sri Lanka Sudan Tanzania *Turkey *Uruguay Zambia
PERIOD II: 1973-1985			
Hong Kong Republic of Korea Singapore	Brazil *Chile Israel Malaysia Thailand *Tunisia *Turkey *Uruguay	*Cameroon *Colombia *Costa Rica El Salvador *Guatemala Honduras *Ivory Coast *Indonesia Kenya Mexico Nicaragua *Pakistan Philippines Senegal *Sri Lanka Yugoslavia	Argentina Bangladesh *Bolivia Burundi Dominican Republic Ethiopia Ghana India *Madagascar *Nigeria Peru Sudan Tanzania Zambia

Source: World Bank, World Development Report (1987), p.83.

Note: * Refers to countries that changed trade orientation between the two periods.

The World Bank's index was used to compare overall performance across the 41 countries. Table 2.2 shows the rank of the countries according to these four criteria. Although some countries may lie on the borderline between categories, and others may change classification through time, the distinction between the different groups is clear. The study concluded, "the evidence suggests that the economic performance of the outward-oriented economies has been broadly superior to that of inward-oriented economies in all respects" (World Bank, 1987, p.85).

Unlike the World Bank classification, Heitger (1987) has taken a more direct approach, using actually computed ERP as a measure of restrictiveness of trade regimes, rather than constructing a subjective index of trade orientation. Heitger estimated a growth model for 47 countries over the period 1960-70 including as explanatory variables the average and standard deviation of ERPs across commodities, the investment ratio, initial GDP, and adult literacy. He found, for a number of specifications, that the coefficients of both ERP variables were significant and negative, providing support for the standpoint that trade distortions have a negative impact on GDP growth.

Since the publication of the World Bank study in late 1980s, the policy debate on the merits of the liberalisation of foreign trade regimes became very controversial, the focus of the debate being the inability to provide an definitive measure of *trade liberalisation*[21]. For instance, Cooper (1987) states that "it is necessary to distinguish between different types of liberalisation to make clear

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[21] See Bradford and Branson (1987), Cooper (1987), and Edwards (1989) for discussions on this subject.

that liberalisation can be viewed as a process rather than as a state and to disassociate liberalisation from laissez-faire" (p. 518).

Because of that, most of the cross-section econometric studies on, for example, the relationship between trade orientation and growth present biased arguments in favour of more open trade orientation. It is assumed ex-ante, rather than tested, that 'more liberalised economies' experience faster growth of exports, and hence, faster economic growth. For instance, Krueger (1998) says, "there is no doubt that the countries following outer-oriented strategies grew faster" [22] (p.1514).

(ii) Edward Leamer (1988) Openness Index

One basic measure of openness is the trade intensity ratio (*TIR*) [23], that is, exports plus imports divided by GNP or GDP. Leamer (1988) develops a model that provides an explanation of trade at the three-digits SITC (Standard International Trade Classification, Revision 2) level of disaggregation; and, attributes the estimated residuals of the model to trade barriers. Implicitly, trade barriers are assumed to be the only important omitted variables, and they are correlated with the included variables. However, both of these arguments are suspect.

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[22] Krueger (1998) defines "outer-oriented" strategy as a trade policy that is not biasing incentives in favour of import-competing industries, and that provides roughly equal incentives to all exporting activities.

[23] Balassa (1982) used trade dependency ratios and the rate of growth of exports as proxies of openness. The main limitation of these indicators is that they are not necessarily related to policy: a country can distort trade heavily, and still have high trade dependency ratios.

In Leamer's index, factor endowments (land, labour, capital, oil production, and minerals), along with distance and the trade balance, are used to predict net trade within a product category for each country. Net trade within a product category is regressed on factor endowments for a cross section of countries. A separate equation is estimated for each product category.

The measure of trade intensity nets (actual values) imports (M) from exports (X) at the three digits SITC level of disaggregation:

$$TIR^{*} = \frac{\sum_{j} \left| X_{j} - M_{j} \right|}{GNP} \tag{2.2}$$

where the summation ($\sum_{j}$) refers to the set of commodity types. At the very lowest level of aggregation, commodities are expected to be either exported or imported, but not both. As is clear from (2.2), this trade intensity ratio is no more than the ratio of the overall trade surplus (deficit) to GNP. Leamer also estimated an intra-industry trade measure, which is defined as the difference between total trade (TIR) and trade surplus (TIR^{*}), that is:

$$IIT = \left[\frac{\sum_{j} \left(\left| X_{j} \right| + \left| M_{j} \right| \right)}{\sum_{j} \left| X_{j} - M_{j} \right|} \right] - 1 = \left(\frac{TIR^{*}}{TIR} \right) - 1 \tag{2.3}$$

where (2.3) would be zero if there were no intra-industry trade at this level of disaggregation.

As Table 2.3 portrays, most of the larger figures for this index occur in manufactures, and partly for that reason, the measures are generally greatest for the industrial market economies with trade relatively concentrated in manufactures (e.g. Belgium, the United Kingdom). There are some exceptions to this rule. For instance, Singapore and Hong Kong stand out among the non-industrial market economies with high intra-industry trade. Japan, New Zealand, and Australia, though classified as 'industrial market economies' have rather low levels of *IIT*. Other exceptions are the large values of *IIT* of resource trade for Trinidad and Tobago, the United Kingdom, Belgium and Fiji, and agricultural trade for Singapore, France, Germany, the Netherlands and Belgium.

Leamer's model assumes constant returns to scale, which is one of its weaknesses, and does not allow for intra-industry trade. One might interpret the results from this study as suggesting that increasing returns to scale or some other phenomenon is a more significant determinant of trade in manufactures than in primary commodities, that is, resources or agriculture.

While this model does not predict the patterns of trade under trade liberalisation conditions, one of its assumptions is that each country adopts the world's average level of protection. In this sense, Leamer's model represents an improvement over the traditional measure of trade intensity, which only indicates the degree to which countries differ in terms of factor endowments, not in their level of protection.

Table 2.3

Ranks of trade intensity ratios in selected countries* (1982)

Country	Resources	Agriculture	Manufacturing	Overall
Low income economies				
Pakistan	12	17	15	11
Ethiopia	9	42	19	24
Sri Lanka	52	55	48	50
French Guiana	62	63	65	64
Lower-middle-income economies				
Colombia	1	31	12	9
Dominican Rep.	19	36	8	17
Turkey	36	20	11	18
Indonesia	59	15	27	41
Costa Rica	41	65	42	55
Upper-middle income economies				
Brazil	13	10	2	3
Argentina	6	38	5	7
Hong Kong	29	43	63	59
Singapore	64	50	64	65
Industrial market economies				
U.S.A.	5	1	3	2
United Kingdom	7	11	6	4
France	15	5	4	5
Japan	30	3	24	13
Germany	14	4	30	14
Australia	17	21	14	15
Netherlands	55	39	16	36
Belgium	53	23	43	39
New Zealand	18	56	39	40

Source: Leamer (1988).

Note: * Countries sorted by overall trade dependence.

(iii) David Dollar (1992) distortion index

The main contribution of Dollar's work is the construction of two separate indices which, according to the results, are negatively correlated with growth over the period 1976-1985 in a sample of 95 developing economies. The two indexes are an index of real exchange rate (RER) distortion and an index of RER variability. These indicators relate to outward-orientation as defined by Dollar[24]:

> "Outward orientation generally means a combination of two factors: first, the level of protection, especially for inputs into the production process, is relatively low (resulting in a sustainable level of the real exchange rate that is favourable to exporters); and second, there is relatively little variability in the real exchange rate, so that incentives are consistent over time" (Dollar, 1992, p. 524).

Dollar uses the variation in the value of the RER distortion across countries to measure differences in the restrictiveness of trade policy across economies (see Table 2.4). However, this is a very limited approach to account for the degree of trade policy distortion, because it does not consider tariffs, export duties and taxes, export subsidies, and other non-tariff barriers applied in these countries.

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[24] Dollar developed a cross-country measure of trade orientation, using data from Summers and Heston (1988, Mark 4.0) on comparative price levels. The United States is used as the benchmark country, so the index of country *i*'s relative price level (RPL) is $RPL_i = 100x\frac{eP_i}{P_{US}}$, where e is the exchange rate and P_i is the consumption price index of country *i*. Since not all goods are tradable, the author made further adjustment to overcome the differences between price levels and factor endowments.

Table 2.4

Measures of outward orientation, 1976-85
(Simple averages by region)

Region	RER distortion*	RER variability**
Developing Countries		
Africa	160	0.15
Asia	86	0.11
Latin America	114	0.22
Europe/Middle East	104	0.15
Developed Countries	108	0.11

Source: Dollar (1992).

Notes: * Index of price level adjusted for per capita income level.
** Coefficient of variation in the index of price level adjusted for per capita income level.

As far as RER variability is concerned, its estimation is justified because the country ranking using RER distortions produces some 'anomalies'. Dollar states that "the number of anomalies declines substantially if the real exchange rate distortion measure is combined to produce an outward orientation index ... This measure is simply the variation of each country's real exchange rate distortion index around its mean during the period 1976-85" (p.531). Table A1 shows the outward orientation rankings performed by this study.

The ten least distorted economies, according to the measure of *RER variability* include Hong Kong, Thailand, Malta, Sri Lanka, Mexico, Bangladesh, South Africa, Nepal, Pakistan and Syria. The countries with the highest *variability* are Iraq, Uganda, Bolivia, El Salvador, Nicaragua, Guyana, Somalia, Nigeria, Ghana, and Guatemala. It is apparent that these countries have experienced very high inflation episodes as well as difficult political instability during the period

covered. Thus, it is possible that *RER variability* measures economic instability at large, and not only economic openness.

Dollar's (1992) article is one of the most cited in the recent trade and development literature, and his indices of trade liberalisation (*distortion* and *variability*) have been used as ancillary variables in many cross-section studies on the relationship between trade liberalisation and economic performance. However, Dollar's results have been questioned, mainly about the extent to which these indices reflect liberalisation and outward-orientation, and about the claims of robust results on the relationship between openness and growth. Rodríguez and Rodrik (2000) verify the robustness of Dollar's empirical results by extending them in two directions: first, they rerun his regressions following standard cross-section estimation procedures; second, they re-estimated his calculations for the *distortion* and *variability* indices using the more recent Summers and Heston Mark 5.6 data to see whether his regressions results hold with the revised data. Rodríguez and Rodrik's replications and Dollar's core results are virtually identical[25].

However, none of Dollar's estimations included conditional explanatory variables such as initial income, education, and regional dummies. Rodríguez and Rodrik modified Dollar's specification to include such variables, and added regional dummies (Latin America, East Asia, and Sub-Saharan Africa) to ensure that the results are not subject to omitted factors correlated with geographical location. They found that the *variability* index is robust to these changes, but that

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[25] The only difference is that their t-statistics are based on heteroskedasticity-corrected standard errors.

distortion is not (in effect, when regional dummies were introduced in the regressions, the estimated coefficient on *distortion* was smaller and became insignificant). Other estimations were carried out for different periods, using cross-section as well as panel regressions with fixed effects. The main results are that the estimated coefficient on *variability* is generally robust to alterations in specifications but the coefficient on *distortion* is not. Thus, Rodríguez and Rodrik's results suggest that Dollar's findings are spurious, because the *distortion* index is correlated with omitted variables.

(iv) Jeffrey Sachs and Andrew Warner (1995) openness index

Sachs and Warner's (1995) work presents a substantial research agenda. Their main contribution has been to develop a new measure of economic openness. Even so, theirs is not yet a definitive approach to estimating trade liberalisation. Sachs and Warner attempt to solve the measurement error problem in the literature by constructing an index of openness, which combines information about numerous aspects of trade policy and other country specific factors. Using this measure of openness the authors conclude that there is "strong evidence that protectionist trade polices reduce overall growth..." (p. 51).

The Sachs and Warner indicator is a dichotomous variable (zero-one), which takes the value of zero if the economy is closed, that is, if it satisfies at least one of the following criteria (or "open" if none of the conditions is satisfied):

1. Non-tariff barriers covering 40% or more of trade;
2. Average tariff rates of 40% or more;

3. A black-market exchange rate that has depreciated on average by 20% or more relative to the official exchange, during the 1970s and 1980s;
4. The country has a socialist economic system;
5. The country has a state monopoly of major exports.

Using cross-country indicators of trade openness as the measure of each country's trade orientation, they examine the timing of trade liberalisation, and the implications of trade liberalisation for subsequent growth, and for the beginning or avoidance of economic crisis. Sachs and Warner find that in developing countries, open trade has tended to be correlated with other features of a healthy economy, such as macroeconomic balance, and reliance on the private sector as the main engine of growth. Trade openness has also helped, to some extent, to promote governmental responsibility in other areas.

But, as Rodríguez and Rodrik (2000) suggest, we should ask to what extent the black-market premium and state monopoly variables are measures of trade orientation. The significance of such variables in explaining growth may be correlated with other determinants of growth: for instance, macroeconomic instability or an overvalued exchange rate can explain the black-market premium. In the case of the state monopoly variable (which is justified in the spirit of Lerner's symmetry, 1936)[26], only countries in Sub-Saharan Africa were taken[27],

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[26] Lerner's symmetry implies that the existence of a state monopoly of main exports represents the equivalence between import and export taxes. Therefore, this variable is meant to capture the cases in which government taxed principal exports and thus reduced the level of trade, i.e. both of exports and imports. But the trade balance is a crucial requisite for the symmetry, and the import tariffs

which represents a country selection bias. Sachs and Warner use their measure of trade policy as an approximation for an entire array of policy actions, which is very ambitious in term of economic policy analysis.

Another weak point in this study is the methodology. They use cross-section estimation, which have many shortcomings (as for example, in obtaining unbiased parameters from growth estimations), as opposed to more appropriate econometric techniques such as panel data. Additionally, the problem of using binary data arises here.

(v) The Heritage Foundation index of economic freedom

Since 1995, the Heritage Foundation has developed *the Index of Economic Freedom*, which provides an annual examination of the factors that contribute most directly to economic freedom and prosperity (see Johnson and Sheehy, 1995; and O'Driscoll *et al*, 1999). The index includes the broadest array of institutional factors such as corruption, trade distortions, the fiscal burden of the government, the rule of law, regulatory burdens, monetary and financial restrictions, labour market regulations, and black market activities. The broad categories of countries are: 1) *free-countries* with an average overall score of 1.95 or less; 2) *mostly free-countries* with an average overall score of 2.00-2.95; 3) *mostly unfree*-an average

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have to be uniform on all goods for the free trade equilibrium to be preserved, which is very implausible.

[27] Sachs and Warner use a measure of the degree of distortions caused by export marketing boards, taken from a World Bank study related to the process of adjustment and reform in Africa (See World Bank, 1994).

overall score of 3.00-3.95; and 4) *repressed*-an average overall score of 4.00 or higher.

Table 2.5

Heritage's trade policy grading scale

Score	Levels of protectionism	Criteria
1	Very low	Average tariff rate of less than or equal to 4 percent and/or very low non-tariff barriers.
2	Low	Average tariff rate greater than 4 percent but less than or equal to 9 percent and/or low non-tariff barriers.
3	Moderate	Average tariff rate of greater than 9 percent but less than or equal to 14 percent and/or moderate non-tariff barriers.
4	High	Average tariff rates of greater than 14 percent but less than or equal to 19 percent and/or high non-tariff barriers.
5	Very high	Average tariff rate of greater than 19 percent and higher and/or very high non-tariff barriers that virtually close the market to imports

One of the key factors in measuring economic freedom is trade policy. Table 2.5 shows that trade policy score is based on a country's average tariff rate – the higher the rate, the worse (or higher) the score[28]. The other factors of trade policy are non-tariff barriers and corruption in the customs services. This index

[28] When average tariff rates are not available, the average rate is determined by calculating the revenue collected from tariffs and duties as a percentage of total imports. The authors also analyse information on the overall tariff structure, its various rates, and the items to which these rates apply to estimate an effective tariff rate.

takes values of one to five and tries to measure the extent to which government policy distorts trade.

(vi) Other indexes used in the empirical literature

a) *Average Black Market Exchange Rate Premium:* the average value of the black market premium in the foreign exchange market.

b) *Average Import Tariff* for total imports and/or Manufacturing.

c) *Average Export Duties:* this ratio is calculates as the revenue collected from export duties as a percentage of total exports.

d) *Average coverage on Non Tariff Barriers.*

e) *Collected Trade Taxes Ratio:* this variable is constructed as the average of the ratio of total revenues from taxes on international trade (imports plus exports) to total trade.

f) *Holger Wolf's Index of Import Distortion:* Wolf's (1993) regression-based index of import distortions for 1985.

Even though the cross-country studies surveyed in this section have uncovered important information on trade practices in several countries, they present two major limitations. First, it has been difficult to devise satisfactory indexes of protection and trade orientation. Second, methodological issues fail to provide evidence on causality issues, robustness, and selection bias. Also, most studies have employed cross-section techniques instead of the more appropriate panel data models. Moreover, none of the liberalisation indicators takes into account whether these 'successful' countries ever had import substitution

strategies (infant industry argument), and thus, we cannot say anything about the preconditions of trade liberalisation. Second, such studies have not been able to provide a fully convincing theoretical framework that links trade policy, trade orientation and growth.

2.3 Trade liberalisation and economic growth

As discussed in the previous section, methodological difficulties with the empirical approaches undertaken in the trade liberalisation literature expose the results to diverse interpretations. In many cases, the measures of trade barriers and distortions are highly correlated with other sources of poor economic performance. In other instances, the methods used to ascertain the relationship between trade policy and growth have serious shortcomings.

The association between trade orientation and economic performance is the fundamental issue which cross-country comparative studies have tried to address. In dealing with such a relationship, the most important analytical difficulty has been the absence of firm theoretical grounds that link national domestic policies to long-run equilibrium growth. Even though this thesis is not directly concerned with the relationship between trade liberalisation and economic growth, most of the studies discussed in this section represent a significant contribution to the understanding of how trade policy reforms affect the macroeconomic performance of the nations, working partly through export performance and greater competition from imports. In addition, these studies have applied most of the liberalisation indices described before, and the results are relevant to our analysis.

2.3.1 Theoretical framework and empirical evidence

Within the framework of the neoclassical growth model, pioneered by Robert Solow (1956), trade and other ancillary variables will affect the equilibrium level of aggregate output but not its rate of growth. Recently, the "new" endogenous growth models have made major modifications to neoclassical growth theory to handle trade and other policy effects on growth (see Romer, 1986; Lucas, 1988; and, Grossman and Helpman, 1991). Such studies have made an important contribution towards providing a more convincing conceptual support for the analysis of the relationship between trade and growth, especially in Romer (1989). In these "new" growth models, it is possible to establish a long run equilibrium relationship between trade openness and economic growth, as opposed to Solow's model, which was a closed economy model.

Romer's (1989) representation of endogenous growth describes a productive process, which uses capital, labour and other specialised inputs which will positively affect long run growth[29]. In this model, a more open trade regime allows countries to specialise in the production of several intermediate inputs in which they have a comparative advantage. Thus, under a liberalised trade regime, a larger number of inputs are accessible at a lower cost, giving as a result a higher equilibrium growth. Also, Quah and Rauch (1990) have developed an endogenous growth model with intermediate goods where freer trade results in an acceleration of the rate of growth in equilibrium.

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[29] For instance, firms can either engage in production of final goods or invest in research and development (R&D), where resources employed in R&D result in a greater range of intermediate inputs and higher marginal product of capital.

Grossman and Helpman (1991), and Edwards (1992) have extended a different approach, emphasising the role of free trade in generating technological progress. In their models, a higher degree of openness allows smaller countries to absorb technology developed in the advanced nations at a faster rate, and thus to grow more rapidly than with a lower degree of openness. Grossman and Helpman also emphasise the role of international competition in enhancing R&D in advanced economies.

Many studies have focused on the sources of total factor productivity growth (TFP), for instance, Chenery *et al* (1986). Their findings suggest that in periods of trade liberalisation TFP growth was unusually high. Also, Salvatore and Hatcher (1991), Coe and Helpman (1995), the World Bank (1991), and Harrison (1996) present supportive evidence.

To a certain extent, because of concerns related to data quality, the recent literature on openness and growth has chosen to develop more creative empirical approaches. These strategies include: 1) the construction of alternative indexes of openness (Dollar, 1992; Sachs and Warner, 1995); and, 2) testing robustness by using a wide range of measures of openness, including subjective indicators (Edwards, 1992, 1998)[30]. This recent surge of empirical research is generally acknowledged to have provided more convincing results on the beneficial consequences of openness than earlier investigations.

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[30] Many authors have also compared the convergence experience among groups of liberalised and non-liberalised countries (Ben-David, 1993), and the problems with productivity growth and income distribution (e.g. Ocampo and Taylor, 1998), but these issues lie outside the present investigation.

2.3.2 The robustness of economic openness indexes

The issue of robustness has been analysed extensively by empirical work in the field of economic growth (a selection of such studies is presented in Table 2.6). In this connection, the recent empirical literature on economic growth has identified a significant number of variables that are partially correlated with the rate of economic growth. The basic methodology consist of running cross-sectional regressions of the form:

$$\gamma = \alpha + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + \varepsilon \qquad (2.4)$$

where γ is the vector of income (or economic growth) indicators, and X are the vectors of explanatory variables, such as the initial level of per capita income, investment rates, various measures of education, some policy indicators, trade ratios, the trade liberalisation measures, and many other variables. The use of such variables varies across researchers and across papers.

For example, Levine and Renelt (1992) undertook a robustness study where they use different measures of trade policies, and do not find a robust or even consistent positive relationship between trade openness and growth[31]. Their measures of trade orientation include the black market premium, Dollar's (1992) real exchange rate index of protection, trade volumes, and two other indexes compiled by Leamer (1985). On the other hand, they do find a robust, positive

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[31] As a test for robustness, they apply the extreme-bounds approach developed by Leamer (1985).

relationship between investment and trade shares, as well as between investment and the Leamer Index. The correlation between investment and trade allows them to conclude that the beneficial effects of trade reform may operate through enhanced capital accumulation rather than through a more efficient allocation of resources, which is usually identified as one of the positive features of trade liberalisation.

However, Sala-i-Martin (1997) disagrees with Levine and Renelt's test of robustness, arguing that it is "too strong". He proposes an alternative test that leads him to construct confidence levels for the entire distribution of coefficients for different determinants of growth. When he tests for robustness the only openness measure that is robust is the Sachs and Warner index.

In addition, Edwards' (1998) article takes the approach of analysing the robustness of the relationship between openness and growth by using different indicators. Edwards' premise is that the imperfections in some indicators would not seem to be very relevant if the estimated positive coefficient on openness is found to be robust to differences in the way openness is measured. To conduct his analysis, regressions of total factor productivity (TFP) growth on nine alternative measures of openness, controlling for the initial level of per capita income and education[32] are performed.

The estimates of TFP growth are the Solow residuals from panel regressions of growth on changes in capital and labour inputs. Edwards also assumes that there are two sources of TFP growth: a domestic source – associated with

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[32] Edwards (1992) executed a similar analysis for growth rates of real GDP per capita using a different set of nine alternative indicators of trade policy distortions.

innovation – and an international one, related to the rate at which the country is able to absorb (or imitate) technological progress originating in the leading nations. The rate of domestic innovation is assumed to depend on the level of human capital (education). Imitation, on the other hand, depends on the 'catch-up' term (i.e., countries with a lower initial stock of knowledge will tend to imitate faster than those with a higher initial stock)[33]. This assertion can be regarded as an empirical question.

The results presented by Edwards are weighted least squares (WLS) regressions of TFP growth (the weighting variable is GDP per capita in 1985). Six of the nine indicators are significant, and all but one has the expected sign. He repeats the examination using instrumental WLS and finds five indicators significant and all having the correct sign. Thus, the results suggest that there is a significant positive relationship between trade openness and productivity growth. Edwards has performed an exercise, which is very comprehensive and state of the art. However, the "robustness" of his econometric scrutiny could be affected by the anomalies and subjectivity bias, which characterise most of the liberalisation indicators employed, which were discussed in the previous section.

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[33] The author defines the rate of growth of knowledge or total factor productivity (B) as: $\frac{\dot{B}}{B} = \frac{\delta + \theta(W - B)}{B}$; where W is the world stock of knowledge assumed to grow at a rate of g, δ is the domestic rate of innovation assumed to depend on human capital, and not to exceed g (that is $g \geq \delta$). If a country is the leading innovating nation $\delta = g$, and $W = B$. θ is the speed at which the country closes the knowledge gap, and is assumed to depend on national policies, including trade policy. In the spirit of the new growth theory, it is assumed that countries that are more open have a greater ability to absorb ideas from the rest of the world, and thus have a higher θ.

Rodriguez and Rodrik (2002) replicate Edwards' exercises, and according to their results, they do not concur with Edwards' conclusion that the cross-country data reveal the existence of a robust relationship between openness and productivity or GDP growth. The authors suggest that Edwards' findings are for the most part highly dependent on questionable weighting assumptions (as he uses the level of 1985 per capita GDP as weight and not the log) and identification assumptions (related to the instruments in the IV estimations).

On the other hand, Harrison and Hanson (1999) develop an empirical model, which establishes that there are three unresolved issues with respect to the impact of trade reform. The puzzles are: first, the fragile results regarding the impact of trade reform on growth; second, the small impact of trade reform on employment in developing countries; and third, the relationship between trade reform and increasing wage inequality focusing on the 1985 Mexican trade liberalisation. The authors examine the measure of openness introduced by Sachs and Warner (1995) and show that it fails to establish a robust link between more open trade policies and long run growth, because of the composite measure of the index. They also point out that while most of the early studies on the relationship between free trade orientation and growth find a consistently positive correlation, their results are significantly inconsistent.

Table 2.6

Cross-country (selected) evidence on the link between trade liberalisation and economic growth

Source and country coverage	Trade orientation index	Results
World Bank (1987), developing countries.	Countries classified in four groups: *strongly inward, moderately inward, moderately outward,* and *strongly outward oriented.*	Outward oriented countries tend to grow faster.
Dollar (1992), developing countries.	*Real exchange rate (RER)* distortions.	Average per capita growth in the least distorted quartile of (mostly Asian) countries was higher: 2.9%; the next quartile had a growth rate of 0.9%, the third quartile -0.2%, and the most distorted quartile -1.3%. Reduction of the *RER* distortion to the Asian level would add 0.7 percentage points to Latin American growth and 1.8 percentage points to African growth.
Edwards (1992), developing countries.	*Deviation between predicted and actual trade.*	Less interventionist countries tend to grow faster. Eight out of nine trade policy indicators confirm the result.
Levine and Renelt (1992), mixed country coverage.	Sensitivity analysis for *multiple indexes* with cross-country regressions.	Robust (positive) correlation between growth and the share of investment in GDP. Robust (positive) correlation between the share of investment in GDP and the share of trade in GDP. Two-link chain between trade and growth through investment.
Matin (1992), Sub-Saharan Africa.	*Trade shares, black market premium, trade liberalisation index,* and *real exchange rate distortion.*	All indexes are statistically significant, and show a positive relation between a liberal (less distortive) trade regime and growth. The openness-growth performance link for Sub-Saharan Africa is as strong as in a control sample of other African countries.

Easterly (1993), mixed country coverage.	Index measuring *how much domestic relative prices are distorted away from world market relative prices.*	Increased distortion reduces growth. One unit increase in distortion reduces growth by 12 percentage points.
Lee (1993), mixed country coverage.	Index measuring the extent to which *trade is distorted away from its free-trade level by real exchange rate and tariff distortions.*	Less distortion is associated with higher growth. Trade distortions reduce growth relatively more in small, resource-scarce countries than in large, resource-rich countries.
Sachs and Warner (1995), mixed country coverage.	A *dummy variable (0,1) based in 5 socio-economic and political criteria.*	Open economies grow faster than closed economies by 2 to 2.5 percentage points. Open economies have higher investment ratios, better macroeconomic balance, and a larger role of the private sector as the engine of growth.
Harrison (1996), developing countries.	*Trade liberalisation (1960-84), (1978-88), black market premium, trade shares, RER distortions, movements toward international prices,* and *bias against agriculture.*	All statistically significant indexes show a positive relation between a liberal trade regime and GDP growth. There is a bi-directional causality between a liberal trade regime and growth (lagged values of growth and openness).
Balasubramanyam, *et al* (1996), developing countries.	*World Bank (1987) openness indicator*, and *trade intensity ratios.*	Low trade barriers enhance the efficiency of FDI and indirectly growth.
Greenway, *et al* (1997), developing countries.	Smooth transition analysis of growth, *SALs* episodes, and *liberalisation timing.*	Growth rates experiences have undergone a smooth non-linear transition through time between two distinct values.
Rodrik (1997), Sub-Saharan African countries.	*Trade ratios*, ratio of *duty revenue in international trade and transactions to total trade*, ratio of *import duty revenue to total imports*, ratio of *export duty revenue to total exports*, *Sachs and Warner (1995)* index, *black market premium*, and own import weighted *non-tariff frequency on intermediate inputs and capital goods.*	The variation in long run growth performance is explained by: human resources, fiscal policy, demography and catch up factors. Trade policies have played a lesser role, although there is evidence that excessive taxation of exports was partly responsible for poor growth.

Edwards (1998), mixed country coverage.	*Sachs-Warner (1995), World Bank (1987), Leamer (1988), black market premium, average import tariff on manufacturing, coverage of NTBs, Heritage Foundation index of trade distortions, collected trade taxes ratio,* and *Wolf (1993).*	The openness indexes are positively correlated with TFP growth, and the mirror images of trade distortion indexes are negatively correlated. Initial GDP and human capital are more important than trade in explaining growth differences across countries.
Gallup and Sachs (1998), mixed country coverage.	*Sachs-Warner (1995)* index.	The openness index is positively Correlated with growth, controlling for other factors. Geographical factors that make trade more costly reduces growth. Land-locked countries grow 0.9 percentage points slower than coastal economies.
Proudman, *et al* (1998), mixed country coverage.	*Closed/open index* based on a number of measures of the stance on international trade policy.	Open economies are found to converge to higher levels of income. These differences remain even after making allowance for differences in relative levels of investment.
Harrison and Hanson (1999), developing countries.	*Sachs-Warner (1995)* index.	The results fail to establish a robust link between openness and long run growth.
Greenaway, *et al* (2002), developing countries.	*Sachs-Warner (1995), Dean et al (1994) liberalisation index* (changes in tariffs, quotas, etc.), *World Bank SALs dummy.*	Liberalisation has a lagged effect on growth. The findings are robust to changes in specification, sample size and data period.

Sources: Ben-David, Nordström, and Winters (1999), and cited references.

With respect to detailed micro-data country studies, the evidence is not conclusive either. For instance, Pack (1988) indicates that comparisons of TFP growth between countries pursuing different trade orientations do not reveal systematic differences in productivity growth in manufacturing. Tybout (1992) presents a wide review of the literature on trade and productivity for developing countries, and concludes that because of the diverse, ambiguous theoretical literature on the relation between trade and productivity, it is not surprising that stable correlations have not emerged.

The apparent empirical support for the hypothesis that liberalisation is a major engine for growth, and that such reforms played a significant role in the outstanding performance of the outward oriented countries, has also been challenged by others. Sachs (1987) has reservations about the premise that trade liberalisation is a necessary component of successful outward oriented strategies. He argues that the success of the East Asian countries was to a large extent due to an active role of the government in promoting exports in an environment where imports had not been fully liberalised, and where macroeconomic equilibrium was fostered (see also Sachs 1989). Taylor (1991) has questioned trade liberalisation strategies, arguing that there are not great benefits from trade liberalisation. On the contrary, he found that there are some losses derived from pursuing open trade and capital market strategies.

On the same lines, Greenaway (1993) questioned the results of the Michaely *et al* (1991) project, on the basis that the underlying measure of liberalisation is unsound. Also, the Greenaway *et al* (1997) article, which models growth and structural changes as smooth transition processes, shows that in all the cases

considered (except Brazil), the growth rates are described as having undergone a smooth non-linear transition over time between two distinctive values rather than staying constant or having switched values instantaneously at any particular point in time. Looking specifically at the liberalisation episodes described by Michaely *et al* (1991), no systematic evidence of a relation between trade reforms and growth acceleration is found. The evidence is inconclusive given that in some cases a positive correlation is found whilst in others there is evidence of negative correlation.

As we have seen, Rodríguez and Rodrik (2000) demonstrate that many of the results are not very robust to changes in specification and/or sample structure. This is reasonable given the diversity in the liberalisation experiences, in the components of the reforms, as well as the range of indicators used, which most of the time are not considered on the empirical modelling.

In sum, although these new growth theory models portray a better understanding of the relationship between trade liberalisation and growth, the empirical work still lacks suitable indexes and data analysis, specifically in the case of cross-sectional studies. The majority of such models are based on large cross-country regressions and aggregate data, rather than on analysis that is more specific. Furthermore, some researchers do not employ suitable econometric techniques, so that the results might be biased (e.g. the application of cross-section analysis). One important challenge is to define more reliable measures of trade orientation and investigate with a more eclectic approach the channels through which trade liberalisation affects economic growth, based on more detailed country-specific information about the instruments of trade policy used. In

addition, all these studies have been approached from the supply side, neglecting the demand determination of the growth process, and the impact of trade liberalisation from such perspective.

2.4 Trade liberalisation and exports

Export promotion strategies have constituted a superior development policy for most developing countries. However, the empirical literature about the benefits of trade liberalisation and export promotion have provided conflicting results, as discussed in section 2.2.1. The World Bank (1987) study argued previously is one of the most significant attempts to link higher rates of economic growth to export expansion. This positive relationship between export growth and GDP growth is often ascribed to the positive externalities of competition in world markets, for example greater efficiency in resources allocation, economies of scale, and technological spillovers.

There are three main approaches that have been used to assess the relationship between trade liberalisation and exports: the neoclassical supply-side model; the export supply approach; and the demand for export approach[34]. Such models have been tested using different methodologies, as for example, time series analysis, including OLS, Granger causality, cointegration and equilibrium

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[34] Thirlwall (2000) reviews the different export led-growth models such as the balance of payments constrained model (Thirlwall, 1979), which considers export demand as one of the arguments of the balance of payments equilibrium growth rate; and the virtuous circle model. However, the impact of trade liberalisation in these frameworks has not been studied.

correction modelling, rank correlation, simultaneous equations, etc.; cross sectional, and more recently panel data analysis.

2.4.1 The neoclassical approach

Various investigations have formulated a conceptual framework based on the neoclassical production function, as a way of overcoming the criticisms of rank correlation studies (see Edwards, 1993). The main argument of the neoclassical approach to trade is that exports contribute to aggregate output in two basic ways. First, it is assumed that the export sector generates positive externalities on the non-export sectors, through more efficient management modes and improved production techniques. Second, it is argued that there is a productivity differential in favour of the export sector. Therefore, export expansion relative to other sectors will have a net positive effect on aggregate output.

Feder (1983) provides the first formal analysis on this subject, presenting a model with an export (X) sector and a non-export sector (N). The output of the export sector is assumed to be a function of labour and capital in the sector. The output of the non-export sector is assumed to be a function of labour, capital and the output of the export sector (to capture externalities), and the ratio of respective marginal productivity in the two sectors is assumed to deviate from unity by a factor δ . Feder derived an augmented neoclassical growth equation of the form:

$$G=\alpha(I/Y)+\beta\left(\dot{L}/L\right)+\left[F_x+\left(\delta/(1+\delta)\right)\right](X/Y)\left(\dot{X}/X\right) \quad (2.5)$$

where I/Y is the investment-output ratio; $\dot{L}/L$ is the growth of labour force; $\dot{X}/X$ is the growth of exports; X/Y is the share of exports in GDP; $\delta/(1+\delta)$ is the differential productivity effect, and F_x is the externality effect.

The model was applied to a sample of 31 semi-industrialised countries to estimate ordinary least squares of (2.5)[35]. First, the model was tested without export growth, and then with the export growth included. The inclusion of $\dot{X}/X$ considerably improves the explanatory power of the equation, and the effect of exports growth is always statistically significant. The coefficient on export growth, however, is an combination of an externality effect and a productivity differential effect. To discompose the two, equation (2.5) can be formulated without the export share term (X/Y), which isolates the externality effect. The difference between the total effect of export growth and the externality impact is the productivity differential effect. When this is done, Feder finds substantial differences in productivity between the export and the non-export sector and also evidence of externality, i.e. the marginal factor productivities in the X sector are higher than in the N sector. Nonetheless, he does not explain why these effects are not internalised by economic agents, or why the productivity differentials tend to persist over time.

A number of authors have tried to expand Feder's two-sector formulation, while others have formulated simpler one-sector models where exports enter the production function as an additional factor of production. A crucial problem with

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[35] All variables were measured as 1964-73 averages.

this simpler formulation is that the channels through which exports are supposed to affect GDP are not specified. Also, it is not clear whether his findings hold for all developing countries, or if they were confined to middle income economies. In this regard, Helleiner (1986) has argued that a minimum level of development is required before the benefits of export promotion can be accomplished. For instance, Helleiner stresses that export-promotion policies would have doubtful effects in Africa. In order to address this matter, a number of studies have estimated GDP growth equations for both poor and middle-income economies.

The subsequent literature focused on explaining the impact of liberalisation on export performance, alongside external demand conditions and price variations. Table 2.7 presents a selection of empirical studies in this regard. For instance, in relation to the possible externalities of competition in world markets, Esfahani (1991)[36] shows that such effects have been due mainly to the contribution of exports to a reduction of "import shortages", which, according to the author, restrict output growth in many semi-industrialised countries (SICs). Export promotion is particularly important for countries that cannot obtain sufficient foreign aid or capital. Furthermore, contrary to the predictions of previous studies, increases in the share of manufactured goods among exports do not seem to aid the export externality effect. The paper also provides a

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[36] The study includes a sample of 31 countries identified by Chenery (1980) as semi-industrialised and "marginally" semi-industrialised. This sample excludes the SICs that are major oil exporters (Algeria, Iran, Iraq, and Venezuela). The strictly SICs are: Argentina, Brazil, Chile, Colombia, Costa Rica, Greece, Hong Kong, Israel, Korea, Malaysia, Mexico, Portugal, Singapore, South Africa, Spain, Taiwan, Turkey, Uruguay, and Yugoslavia. Taiwan was not included in Esfahanis' study because a lack of data. The "marginally" SICs are: Dominican Republic, Ecuador, Egypt, Guatemala, India, Ivory Coast, Kenya, Morocco, Peru, Philippines, Syria, Thailand, and Tunisia.

contribution in terms of econometric techniques, since a simultaneous equation model is developed to deal with the simultaneity between GDP and exports.

Salvatore and Hatcher (1991) introduce both exports and industrialisation as additional inputs into a general production function, to assess the relationship between trade strategy and economic development. Their econometric results partially support the hypothesis that "international trade benefits most developing countries, and that an outward orientation leads to a more efficient use of resources and growth".

Greenaway and Sapsford (1993, and 1994) present time series analysis for a range of developing countries, but they do not find the export variable significant. The main conclusion is that there is scarce evidence on how trade liberalisation is supposed to influence output growth via export expansion. Although the authors employed a time series analysis, they do not provide verification about structural breaks in their sample.

One of the major limitations of the earlier time series studies is that they do not provide an explanation for the lagged effects that exports have on growth. In addition, the use of more advanced techniques (as, for example, cointegration analysis) is absent from this literature. Thus, the results are very sensitive to the choice of samples and econometric techniques.

Table 2.7

Selected studies on the relationship between trade liberalisation, exports and economic performance

Author (s)	Export growth/trade orientation index	Results
Kavaoussi (1984), developing countries.	Decomposes sources of export growth using Kravis (1970) technique. Constructs *outward-orientation* ranking. Classifies countries between those facing "favourable" and "unfavourable" world market conditions. Computes Spearman rank coefficients between outward orientation and GDP growth in the periods 1967-73 and 1973-77.	Countries facing favourable market conditions exhibited a significantly stronger correlation between exports growth and GDP growth than those facing unfavourable conditions.
Balassa (1985), developing countries.	Trade orientation index defined on basis of difference between actual and predicted exports.	Outward oriented countries grow faster.
Kohli and Singh (1989), developing countries.	Estimate Feder's model on 41 countries for the periods 1960-70 and 1970-81. The sample was also divided between "*outward oriented*" and "*non-outward oriented*" countries.	The coefficients of export growth are always significant for the period 1960-70; but not always for 1970-81.
Syrquin and Chenery (1989), mixed country coverage.	Export shares of GDP controlling for country size and export specialisation.	The growth rate is higher for outward oriented countries in all sub-groups: small primary-good exporters, large primary-good exporters, small manufacturing exporters, and large manufacturing exporters. Outward orientation growth premium between 0.2 and 1 .4 percentage points.

Bahmani-Oskooe and Shabsigh (1991), Times series analysis for 20 countries. The period of analysis varies across countries ranging from 1951 to 1987.	Real export growth.	Support for the export promotion hypothesis, especially in the case of the NICs.
Esfahani (1991), 31 semi-industrialised countries.	Exports share to GDP.	Significant correlation between export expansion and GDP growth (because externalities of competition in world markets). Exports also contribute to the reduction of import shortages.
Harrigan and Mosley (1991), developing countries.	SAL dummies, IMF financing, export growth, import growth, terms of trade, and inflows of private foreign finance.	Liberalisation and exports are positive related.
Salvatore and Hatcher (1991), 26 developing countries.	Real export growth; countries divided in 4 groups by trade policy orientation.	Support for the export growth hypothesis
Greenaway and Sapsford (1993), Cross-section 104 countries Average of 1960-73, 1973-90, 1980-88.	Growth in export ratio.	Support for the export growth hypothesis. Indirect evidence of threshold effects.
Greenaway and Sapsford (1994), Time series 19 countries included in the World Bank (1987) study.	Rate of growth of real exports.	Results suggest that though exports and growth are positive related, the relationship is not robust.

Source: Edwards (1993), and cited studies.

2.4.2 The demand and supply of exports and trade liberalisation

As explained above, most of the studies that have investigated the impact of trade liberalisation on export growth in developing countries, under the neoclassical production function convention, have reached conflicting conclusions. Moreover, there is limited evidence on how trade liberalisation affects exports, from the demand side standpoint (exceptions are, Krueger, 1978; and Bleaney, 1999).

A typical export growth function, which incorporates the impact of income and price elasticities, together with a set of trade liberalisation indicators, may be written as:

$$X_t = \beta_0 + \beta_1 REER_t + \beta_2 WY_t + \beta_3 \Pi_t + \varepsilon_t \qquad (2.6)$$

where $REER$ is the rate of change of real exchange rate or relative prices; WY is world income growth; Π is the set of trade liberalisation indicators, and ε_t is a stochastic error term[37]. For instance, Bleaney (1999) has used panel data techniques to estimate an export demand function for ten countries of Latin America, and the results confirm the positive relationship between liberalisation and exports.

On the other hand, the aggregate export supply function can be specified as follows:

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[37] A complete explanation of the derivation and specification of long and short run export demand functions is given in Chapter 4.

$$X_t = \alpha_0 + \alpha_1 P_t + \alpha_2 Y + \alpha_3 REER_t + \alpha_4 \Pi_t + \mu_t \qquad (2.7)$$

where X is the growth of exports (e.g. aggregate exports, merchandise exports, etc.); P is the rate of change of the relative price of exports (unit value index relative price measure); Y is the predicted growth of real GDP used as a proxy variable for the productive capacity of the economy; $REER$ is the rate of change of the real effective exchange rate; Π is the set (or single) trade liberalisation indicator (s); and μ is a random disturbance term with its classical properties. The results of Ahmed's (2000) cointegration and error correction modelling for Bangladesh suggest that the main arguments of the export supply equation, and the dummy that captures the effects of trade liberalisation, are the determinants of export supply.

2.5 Trade liberalisation and imports

The empirical investigation of import demand functions, at the aggregate and disaggregated levels, both for developed and developing countries, has been one of the most researched areas in international economics (see Goldstein and Khan, 1985 for a survey of the early studies).

Traditional import demand equations make imports a function of domestic income and the price of imports relative to the price of domestic substitutes. Additionally, the functions include the effect of trade liberalisation through a set of variables (e.g. import duties, non-tariff barrier measures, trade liberalisation

dummies, etc). The augmented import growth function, which also allows for the effects of trade liberalisation on import demand, can be expressed as:

$$M_t = \alpha + \beta_1 REER_t + \beta_2 Y_t + \beta_3 \Pi_t + \varepsilon_t \qquad (2.8)$$

where *REER* is the rate of change of the real effective exchange rate (or a measure of relative prices); *y* is the growth of domestic (real) income; Π is the array of liberalisation indicators, and ε_t is the error term[38].

The influence of trade liberalisation on import performance, and also the behaviour of import demand elasticities during the process of reform, have been analysed in other ways. For instance, Melo and Vogt (1984) propose two hypotheses, for which they found support by analysing the case of Venezuela. First, they suggest that as the degree of import liberalisation increases, the income elasticity of demand increases. That is, the relaxation of controls will tend to increase the income elasticity automatically. Second, as economic development proceeds, the price elasticity of import demand also rises as the ability to substitute domestic production for imports (import substitution) become easier.

Nevertheless, the subsequent empirical evidence regarding these hypotheses has not been conclusive. For instance, Boylan and Cuddy (1987) examined the two hypotheses for the case of Ireland and did not find empirical support for them. On the other hand, Mah (1999) examines the Melo-Vogt (1984) hypotheses during the process of economic development in Thailand showing that the income

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[38] The derivation of the import growth function is fully explained in Chapter 5.

elasticity increased as a result of trade liberalisation. However, the price elasticity was not found to be responsive to trade liberalisation.

Bertola and Faini (1991) analyse the response of imports to the elimination of tariff and non-tariff barriers. Through the development of a theoretical model and empirical application to Morocco, the authors confirm that quantitative restrictions (QRs) had a significant impact not only on the level of imports, but also on their sensitivity to income and price variations.

Finally, Faini *et al* (1992) study the impact of trade policy on import demand in developing countries. The authors focus on the impact of import controls, assuming two categories of imports, that is, those subject to quantitative restrictions, and those that can freely enter the country. The main finding is that when the lack of foreign exchange or, more generally, a restrictive trade regime effectively constrains import flows, the measured impact of price and income elasticities becomes less evident. The results of Faini *et al* suggest that the real effects of income and price changes (e.g. a devaluation) on import behaviour are more obvious when the impact of import controls and/or liberalisation policies is also included in the analysis.

2.6 Trade liberalisation and the balance of payments

In recent decades, post Keynesian economists have generalised Keynes' closed-economy analysis to an open economy context, based on the hypothesis that economic growth is normally demand-constrained rather than supply constrained, and that trade matters for demand as well as supply. The demand-orientated

approach tries to explain growth in terms of the rate of growth of the major autonomous components of demand to which other components of aggregate demand adapt. Harrod [1933 (1973)] first introduced explicitly the notion of a foreign trade multiplier as the mechanism by which a country's balance of payments is brought into equilibrium, which turns out to be a reduced form of the Hicks (1950) "super-multiplier" (see McCombie, 1985; and McCombie and Thirlwall, 1997). Kaldor (1970) further applied this concept to the analysis of growth rate differences between regions.

There is also a large literature on export-led growth models incorporating the notion of circular and cumulative causation (e.g. Myrdal, 1957). This process of circular and cumulative causation works through induced investment, embodied technological progress, learning by doing, among other externalities, that will produce rapid productivity growth in countries where exports and aggregate output are growing fast.

Also, Thirlwall (1979) developed a model, which explains the differences of the rates of economic growth between countries through the balance of payments constraint, specifically, through differences in the income elasticities of demand for exports and imports. Such a model is founded on a Keynesian perspective, where it is demand that drives the economic system to which supply (within limits) adapts. Thus, growth rates vary because demand growth varies between countries. The main explanation of demand-oriented growth models, in a open economy context, is the severity of the balance of payments constraint.

However, the analysis of the impact of trade liberalisation in the post Keynesian framework has been somewhat neglected. Other studies have

investigated the impact of tariff reductions using different models of balance of payments determination (i.e. the elasticity, absorption and the monetary approaches) but the results are conflicting[39]. Given this theoretical ambiguity, the impact of liberalisation on the trade balance and the balance of payments become an empirical issue. For instance, Ostry and Rose (1992) recognised this in their empirical analysis of five different data sets (including one for developing countries), and found not statistically significant effect of tariff changes on the real trade balance.

UNCTAD (TDR, 1999) presents panel data estimations (fixed and random effects) of the impact of liberalisation on the trade balance and growth in sixteen developing and industrialised countries[40]. The study uses the Sachs and Warner (1995) liberalisation shift dummy, which is also expected to capture the effects of capital account liberalisation, as well as the impact of import liberalisation. UNCTAD found that more favourable terms of trade and faster growth in industrial countries improved the trade balance of developing countries, whereas liberalisation worsened it considerably. The investigation also concludes that faster growth in liberalised economies is associated with greater trade deficits than in non-liberalised economies. Also, increases in the purchasing power of exports continue to improve the trade balance in liberalised economies but by less than before liberalisation.

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[39] This issue is discussed in more detail in Chapter 6.

[40] When the Sachs and Warner index is used as a proxy for liberalisation, the sample is extended to 52 developing countries (27 in Africa, 19 in Latin America and 6 in Asia).

2.7 Conclusion

In general, economists have welcomed the results of "trade liberalisation" experiences. For instance, Dornbusch (1992) identifies the following gains from trade liberalisation: 1) static gains from improved resource allocation, which is the classical source of gains from freer trade; 2) access to a greater variety of goods, which raises productivity by providing less expensive or higher quality intermediate goods; 3) the availability of imported intermediate goods and of technology, whether licensed or embodied in imported capital goods; 4) free trade also leads to a more economically rational market structure, that is, gains from liberalisation can also result from economies of scale that arise in wider markets; 5) an open trading system is also associated with a transfer of know-how, on the lines of new growth theory.

Most of the empirical research presented in the literature on trade openness through the late 1980s, mainly cross-section, has been conflicting, for the same reasons that more recent work may be evaluated with scepticism, namely: questionable data quality, empirical shortcomings, and a weak and simplistic theoretical framework. Moreover, the literature on the subject of trade liberalisation has not always been successful in providing the precise definition of a trade regime, nor of trade liberalisation. Nor has such literature been able to carry out (effectively) the issue of measuring trade orientation in the countries covered by it. Although new growth theory presents a more accurate explanation of the determinants of growth than the neoclassical models, it is supply orientated. That is, there are no demand constraints of any type, and there is no

acknowledgement of the balance of payments consequences of trade liberalisation.

APPENDIX A

Table A2.1

Initial overall rating and targeted change in trade policy restrictiveness rating in selected developing countries

Country/Agreement	Initial overall rating	Targeted overall change	Targeted NTB change	Targeted Tariff change	Targeted overall rating	Final overall rating
Mozambique (1990) ESAF	**10**	-4	-1	-2	6	**6**
Zimbabwe (1992) ESAF, EFF	**10**	-4	-1	-2	6	**8**
Burkina Fakso (1993) SAF	**10**	-3	-1	0	7	**7**
Bangladesh (1990) ESAF	**10**	-2	-1	0	8	**8**
Comoros (1991) SAF	**10**	-2	-1	0	8	**8**
Ethiopia (1992) SAF	**10**	-2	-1	0	8	**8**
Guyana (1990) ESAF	**10**	-2	0	-2	8	**8**
*Burkina Fakso I (1991) ESAF	**10**	0	0	0	10	**10**
*Jordan (1992) SB	**10**	0	0	0	10	**10**
Tanzania (1991) ESAF	**9**	-4	-1	-1	5	**5**
*Mauritania (1992) ESAF	**9**	0	0	0	9	**9**
*Panama (1992) SB	**8**	-4	-1	-1	4	**8**
Mali (1992) ESAF	**8**	-3	-1	0	5	**5**
*Lesotho (1991) ESAF	**8**	0	0	0	8	**8**
*Philippines (1991) SB	**8**	0	0	0	8	**8**
Sri Lanka (1991) ESAF	**7**	-5	-1	-2	2	**2**
Nepal (1992) ESAF	**7**	-4	-1	-1	3	**3**
Zambia (1992) ESAF	**7**	-3	-1	0	4	**4**
*Benin (1993) ESAF	**6**	-3	-1	0	3	**6**
Equatorial Guinea (1993) ESAF	**5**	-2	0	-2	3	**3**
Argentina (1992) EFF	**5**	0	0	0	5	**4**
Sierra Leone (1992) ESAF	**5**	0	0	0	5	**4**
Jamaica (1992) EFF	**4**	-1	0	-1	3	**3**
*Mongolia (1993) ESAF	**3**	0	0	0	3	**3**
*Peru (1993) EFF	**3**	0	0	0	3	**3**

Source: IMF (1999).

Notes: Each program's effectiveness date is indicated in parenthesis. The classification scheme for Overall Trade Restrictiveness is a combined index, which includes tariff and non-tariff barriers. The index ranks from 1 to 10, where 1 is the more open category and 10 is considered as restrictive. EFF means Extended Fund Facility; SAF: Structural Adjustment Facility; ESAF: Enhanced Structural Adjustment Facility; SB: Stand-By Agreement.

* Indicates that the country did not change (i.e. reduced) trade policy restrictiveness from the initial to the final overall rating.

Table A2.2

Outward orientation rankings for 95 developing countries

Most open quartile	Second quartile	Third quartile	Most inward quartile
Malta	Kenya	Gambia	Algeria
Thailand	Chile	Malawi	Paraguay
Colombia	Philippines	Suriname	Haiti
Sri Lanka	India	Senegal	Mauritania
South Africa	Tunisia	Zimbabwe	Zambia
Pakistan	Madagascar	Iran	Burundi
Bangladesh	Burkina Faso	Lesotho	Liberia
Malaysia	Togo	Central Africa Republic	Rwanda
Korea	Brazil	Trinidad and Tobago	Guinea
Mexico	Syria	Ecuador	Honduras
Singapore	Turkey	Swaziland	Guyana
Portugal	Burma	Ivory Coast	Tanzania
Nepal	Benin	Cameroon	Egypt
Cyprus	Mali	Venezuela	Nicaragua
Fiji	Indonesia	Dominican Republic	Angola
Hong Kong	Panama	Argentina	Zaire
Ireland	Barbados	Niger	Sierra Leona
Peru	Costa Rica	Yemen	Somalia
Spain	Greece	Congo	El Salvador
Papua New Guinea	Botswana	Jamaica	Iraq
Jordan	Uruguay	Mozambique	Ghana
Taiwan	Chad	Gabon	Uganda
Mauritius	Ethiopia	Guatemala	Bolivia
		Sudan	Nigeria

Source: Dollar (1992).

Chapter 3

DYNAMIC PANEL DATA MODELS

3.1 Introduction

Most of the empirical analysis undertaken in this thesis (i.e. Part II: Chapters 4, 5, and 6) is based on several dynamic panel data techniques. Dynamic panel data models have become one of the major features of recent econometric research, as evidenced by the theoretical articles on the subject, and empirical studies applying such techniques[1]. As stated by Hsiao (1986), the advantages of using panel data models, which allow for differences in the form of unobservable individual country effects, are that longitudinal data allow us to analyse a number of important economic questions that cannot be addressed using cross-sectional or time-series data sets[2]. Another significant advantage of panel data is that it controls for omitted variable bias arising from individual heterogeneity. Moreover, the two dimensional nature of panel data increases the amount of variation, and hence information, in the data set, leading to gains in efficiency. In addition, the problem of collinearity, which plagues time-series data, is greatly reduced.

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[1] For example, Greenaway *et al* (2002) estimates DPD using the GMM estimator to analyse the impact of trade liberalisation on economic growth. Bleaney (1999) applied fixed effects to assess the relationship between trade liberalisation and exports.

[2] For example, Islam (1995) criticises the use of conventional cross-section techniques for analysing economic growth, arguing that this type of study assumes identical aggregate production functions for all countries. He also pointed out the problems of correlation and omitted variables bias that arises in the single cross-section regressions.

In the thesis, three different panel data models are used. First, we employ Generalised Method of Moments (GMM) estimators applied to dynamic models using panel data. These estimators allow us to control for unobserved country-specific effects and potential endogeneity of the explanatory variables. The panel estimator controls for endogeneity by using 'internal instruments', that is, instruments that are based on lagged values of the explanatory variables. Second, the fixed effects (least squares) estimator is applied, which is based on the introduction of dummy variables to account for the fixed effects that are specific to each country but constant over time.

Finally, a time series/cross section panel data model is implemented. The TSCS is a fully general model, which is appropriate to analyse data observed for a relatively large number of periods and for a relatively small number of cross sectional units. This technique is particularly relevant because one of the objectives of the thesis is to assess the differences in performance across regions, and across countries disaggregated according to the initial degree of trade protection.

The rest of this chapter discusses the main characteristics and properties of these models, as well as the criteria for choosing the applied techniques[3].

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[3] Other panel data technique, such as panel cointegration is not used, because of the limited time series observations for most countries in our sample.

3.2 Generalised methods of moments

The methods of moments approach to parameter estimation dates back more than 100 years (see Stigler, 1986). The notion of moments is fundamental for describing features of a population. Generalised methods of moments (GMM) provides a way to weight the sample moments of a population efficiently, to derive consistent estimates of the desired population parameters. As Wooldridge (2001) explains, this technique can improve on the precision of ordinary least squares (OLS) estimates if the errors are heteroskedastic or do not fit the underlying assumptions of OLS estimation. In addition, the GMM approach provides a particularly useful method for deriving an estimate of the parameter if there is more than one way to assess the parameter from the sample statistics.

Some of the most interesting applications of the GMM method are to panel data (although it is also applied to cross-section and time series models). The standard estimator used to eliminate the potential bias caused by omitted heterogeneity is the fixed effects, or *within*, estimator. The fixed effects estimator, which is a methods of moments estimator based on the data after subtracting time averages, has as standard assumptions that the time-varying errors have zero means, constant variances and zero correlations, all conditional on the unobserved effect. The first assumption, which is also called strict exogeneity assumption for the covariates, is crucial for consistency of the fixed effect estimator. However, the assumptions about constant variance and no serial correlation are used mainly to simplify calculations of standard errors. If either heteroscedasticty or serial correlation is observed, a GMM procedure could be more efficient than the fixed

effects estimator. Extra moments conditions are available from the assumption that the covariates in all periods are assumed to be uncorrelated with each time-varying error.

GMM is also convenient for estimating interesting extensions of the basic unobserved effects model, for example, models where unobserved heterogeneity interact with observed covariates. GMM is also applied often to unobserved effects models when the explanatory variables are not strictly exogenous even after controlling for unobserved effects.

Another foremost application of GMM in panel data contexts is for models that contain a lagged dependent variable along with an unobserved effect. The regular method of estimating such models goes back to Anderson and Hsiao (1982), where first differencing is used to eliminate the unobserved effect and then two lags or more are used as instrumental variables for the differenced lagged dependent variable. Because the original time-varying errors are assumed to be serially uncorrelated, the differenced errors must contain serial correlation. GMM is the best technique for obtaining efficient estimators that account for the serial correlation (see Arellano and Bond, 1991; and Blundell and Bond, 1998).

The general model that can be estimated[4], and which is relevant to the applications made in this thesis, is a single equation with individual effects of the form:

$$y_{it} = \sum_{k=1}^{p} \alpha_k y_{i,t-k} + \beta'(L)x_{it} + \lambda_t + \eta_i + \upsilon_{it}, \qquad t = q+1,...,T_i; i = 1,...,N \quad (3.1)$$

[4] The explanation of the GMM model for dynamic panel data is based on Arellano and Bond (2001).

where η_i and λ_t are individual and time specific effects, respectively; x_{it} is a vector of explanatory variables, $\beta(L)$ is a vector of associated polynomials in the lag operator and q is the maximum lag length in the model. T_i and N_i refer to the number of time periods and the number of cross section units. Identification of the model requires restrictions on the serial correlation properties of the error term (υ_{it}) and/or properties of the explanatory variables (x_{it}). It is assumed that if the error term was initially autoregressive, the model is transformed so that the coefficients α's and β's satisfy some set of common factor restrictions. This implies that only serially uncorrelated or moving-average (MA) errors are explicitly allowed. The υ_{it} are assumed to be independently distributed across cross section units with zero mean, but arbitrary forms of heteroscedasticty across unit and time are possible. The x_{it} may or may not be correlated with the individual effects (η_{it}), and for each of these cases they may be strictly exogenous, predetermined or endogenous variables with respect to υ_{it}. Another possibility is that the levels x_{it} are correlated with η_{it} but where Δx_{it} (and possibly Δy_{it}) are uncorrelated with η_{it}. This allows the use of, suitably lagged, Δx_{it} (and probably Δy_{it}) as instruments for equations in levels.

The $(T_i - q)$ equations for individual i can be written as follows:

$$y_{it} = W_i\delta + \upsilon_i\eta_i + v_i \qquad (3.2)$$

where δ is a parameter vector including the αk 's, the β 's and the λ 's, and W_i is a data matrix containing the time series of the lagged dependent variables, the x 's and the time dummies. Finally, υ_i is a $(T_i - q) \times 1$ vector of ones. The dynamic data (DPD) program (see Arellano and Bond, 2001) can be used to compute various linear GMM estimators of δ with the general form:

$$\hat{\delta} = \left[\left(\sum_i W_i^{*'} Z_i \right) A_N \left(\sum_i Z_i' W_i^* \right) \right]^{-1} \left(\sum_i W_i^{*} 'Z_i \right) A_N \left(\sum_i Z_i' y_i^* \right) \qquad (3.3)$$

where

$$A_N = \left(\frac{1}{N} \sum_i Z_i' H_i Z_i \right)^{-1},$$

and W_i^* and y_i^* denote some transformation of W_i and y_i; for example, levels, differences, orthogonal deviations, combinations of first differences (or orthogonal deviations) and levels, and deviations from individual means. Z_i is a matrix of instrumental variables which may or may not be completely internal, and H_i is a possible individual-specific weighting matrix. In this study the estimations are specified as in the equations to be presented in Chapters 4, 5, and 6, i.e. without transformations (rate of growth of exports and imports, and the ratios of exports and imports duties, and the trade balance and current account GDP ratios).

3.2.1 Specification tests

When estimating dynamic models, we should be concerned with transformations that allow the use of lagged endogenous (and predetermined) variables as instruments in the transformed equations. The consistency of the GMM estimator depends on whether lagged values of the explanatory variables are valid instruments of the estimated model. To address this issue, three specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) are usually considered.

The first is **the Sargan test of overidentifying** restrictions, which tests the overall validity of the instruments by analysing the sample analogue of the moment conditions used in the estimation process. Failure to reject the null hypothesis gives support to the model. That is, if A_N has been chosen optimally for any given Z_i the statistic

$$S = \left(\sum_i \hat{v}_i^{*'} Z_i \right) A_N \left(\sum_i Z_i' \hat{v}_i^{*} \right) \tag{3.4}$$

is asymptotically distributed as *chi-square* under the null-hypothesis of validity of their respective instruments (Prob $J > \chi_p^2$). The number of degrees of freedom of the Sargan test is equal to the number of overidentifying restrictions of the system estimator.

For equations in first differences, the estimations provide the **difference-Sargan test**, which examines the null hypothesis that the lagged differences of the

explanatory variables are uncorrelated with the residuals (which are the additional restrictions imposed in the system estimator with respect to the difference in estimator). The 'differenced-Sargan' statistic has also a χ^2 distribution. The number of degrees of freedom of the test is given by the number of additional restrictions in the system estimator with respect to the difference estimator, that is, the difference between the number of the system estimator and that of the difference estimator. Another possibility is to compare these estimates with a Hausman (1978) specification test, where the test statistic is a **Wald test** of the hypothesis that the coefficients on these additional regressors are zero (see Arellano and Bond, 1991; and Arellano, 1995 for full details on these tests procedures).

In addition, there is another test, which examines the hypothesis that the error term ($\varepsilon_{i,t}$) is not serially correlated or, if it is correlated, that it follows a finite-order, moving-average process. We test whether the differenced error term is first-, and second-order serially correlated. **First order serial correlation** of the differenced error term is expected even if the original error term (in levels) is uncorrelated, unless the latter follows a random walk. **Second-order serial correlation** of the differenced residual indicates that the original error term is serially correlated and follows a moving-average process at least of order 1. If the test fails to reject the null hypothesis of absence of second-order serial correlation, we conclude that the original error term is serially uncorrelated and use the corresponding moment conditions.

3.3 Fixed effect models: least square dummy variable approach

The fixed effects model is a classical regression (OLS) model, which also leads to the well known *Within* estimation. The basic framework for the discussion of the fixed effects model is the following regression:

$$y_{it} = \alpha_i + \beta * X_{it} + \varepsilon_{it} \tag{3.5}$$

There are K regressors in X_{it}. The individual effect is α_{it}, which is taken to be constant over time and specific to individual country i, and ε_{it} represents the effects of the omitted variables that are particular to both the country and the time period. A usual formulation of this type of models assumes that differences across units (i.e. countries) can be captured by differences in the constant term. The α_i's are unknown parameters to be estimated. Also, it is generally assumed that:

- the X-variables are non-stochastic and uncorrelated with the disturbances, ε_{it};
- the disturbances have zero mean;
- the disturbances are uncorrelated;
- the individual effects are time invariant.

3.3.1 Fixed or random effects?

The fixed effect estimator ($\hat{\beta}_{WG}$, i.e. within group estimator) instead of random effects ($\hat{\beta}_{FGLS}$, or feasible generalised least squares) is applied in this thesis

because the institutional and economic structures of countries differ. This choice is also supported by the appropriate test statistic, **Hausman's test** of fixed versus random effects. Thus, the statistic is a test of

$$H_0 = E[\alpha_i / X] = 0;$$

against,

$$H_1 = E[\alpha_i / X] \neq 0$$

The Wald statistic for the **Hausman test** is represented as follows:

$$W = \left[\hat{\beta}_{WG} - \hat{\beta}_{FGLS}\right]' \left[var\left(\hat{\beta}_{WG}\right) - var\left(\hat{\beta}_{FGLS}\right)\right]^{-1} \left[\hat{\beta}_{WG} - \hat{\beta}_{FGLS}\right] \sim \chi^2(K) \quad (3.6)$$

under H_0. If the alternative hypothesis holds, we use the fixed-effects model.

An important issue when estimating least square models (fixed effect) with a lagged dependent variable is that some authors have suggested that such a technique for estimating panel data could generate results that are inconsistent in a dynamic setting (see Nickell, 1981; Harris and Mátyás, 1996; and Judson and Owen, 1999). This is particularly so when the time dimension of the panel (T) is small and $N \to \infty$. More specifically, the bias is of order ($1/T$). In the case of the studies undertaken in this thesis, T is relatively large (over 23 years of analysis in most of the cases), and thus the 'bias' is insignificant.

3.4 Time series/cross section panel

This section describes a form of panel data model in which data are conventionally observed for a relatively large number of periods (T) for a relatively small number of sectional units (N), or $T > N$ (see Greene, 1997)[5]. Rather than introducing individual and time-specific error components, the time series/cross section (TSCS) panels allow the distribution of the error term to have properties typical of time-series and cross-section data (e.g. cross-sectional heteroscedasticty, cross-sectional correlation, autocorrelation). The importance of doing this type of estimations is that the error term may not have the same property for each country. The TSCS model makes an allowance for the error term to be freely correlated across equations, as in the Seemingly Unrelated Regressions (SURE) case.

The model is represented by:

$$y_{it} = \beta' X_{it} + \varepsilon_{it}, \qquad i = 1,...,N, t = 1,...,T \tag{2.7}$$

where the i = indexes groups, t = indexes periods. The coefficient vector is assumed constant over time and for all groups.

The estimator is three stage GLS or iterated GLS, which produces a maximum likelihood estimator. The model allows for:

- groupwise heteroscedasticty, $E[\varepsilon^2_{it}] = \sigma_{it}$

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[5] The 'rule of thumb' is to consider using TSCS if $(T / N) > 3$.

- cross group correlation, Cov $[\varepsilon_{it}, \varepsilon_{jt}] = \sigma_{ij}$
- within group Autocorrelation, $\varepsilon_{it} = \rho_i \varepsilon_{i, t-1} + u_{it}$

Specifically, cross-sectional heteroscedasticty allows the variance ε_{it} to differ across countries but to remain constant within each country. Cross-sectional correlation allows ε_{it} to be correlated across i at given t. In the case of the model with autocorrelation, it allows ε_{it} to be correlated across t in a way which may differ between i. These three properties are tested by **Wald**, **Langrange Multiplier,** and/or **Likelihood Ratio** (LRS) tests.

In sum, the TSCS is a different specification of the generalised regression model. The properties of the estimators depend largely on the size of T in comparison to N. In terms of cross-sectional heteroscedasticty, examination of the data for the empirical analysis to be undertaken in Chapters 4, 5, and 6 suggest that the variance will be quite different in the 22 countries to be studied, thus homoscedasticity will be a very strong assumption. Uncorrelatedness across the cross-sectional units is also another tough assumption, particularly because the model assigns the same parameter vector to all units. Autocorrelation tends to arise naturally in time-series data, thus it is important also to account for such property in the modelling process.

3.5 Conclusions

The main benefit of using panel data models, as noted before, is that one can formally model the heterogeneity across groups that is typical when analysing a

diverse sample of countries/regions. The relevance of the panel data estimators chosen has been highlighted by leading researchers in the panel data econometric field. Moreover, as explained in the outset, they fit the economic problems that we try to explain, as well as our particular data set.

Part II

THE IMPACT OF TRADE LIBERALISATION ON EXPORTS, IMPORTS, THE TRADE BALANCE AND THE BALANCE OF PAYMENTS

Chapter 4

TRADE LIBERALISATION AND EXPORT PERFORMANCE

4.1 Introduction

The purpose of this chapter is to analyse the impact of trade liberalisation on export growth in a series of developing countries over the period 1972-98. Liberalisation is measured in two ways. Firstly, by the removal of export duties; secondly, and more important, by the careful analysis country by country of the timing of the introduction of trade liberalisation measures. The twenty-two countries are taken from Africa, East and South Asia, and Latin America and we examine the different responses of export growth to liberalisation across these continents. We estimate the impact of liberalisation with export duties, and the use of shift and slope dummies in a conventional export growth equation in which price competitiveness and the growth of income in importing countries are also assumed to be important determinants of export performance. A major feature of the chapter is the use of dynamic panel data techniques defined in Chapter 3, which considerably enlarges the data set compared with time series or cross-section analysis, and at the same time allows for country-specific effects.

The association between trade liberalisation and growth has been an important area of study in recent years, especially for developing countries[1]. The researches have put particular emphasis on the export growth/economic growth

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[1] Rodrik (1992) discusses the limits of trade reforms in developing countries. See also Rodríguez and Rodrik (2000), Harrison and Hanson (1999), and Thirlwall (2000).

relationship, since export promotion policies seem to have constituted a superior development strategy for most developing countries[2]. The main benefits from higher export growth are the positive externalities which result from greater competition in world markets, greater efficiency in resource allocation, economies of scale, and technological spillovers[3].

In the case of the link between trade liberalisation and exports, the basis for the analysis is the hypothesis that trade liberalisation reduces anti-export bias and makes exports (especially non-traditional ones) more competitive in international markets, mainly by reducing exchange rate distortions and export duties.

As discussed in Chapter 2, several studies have investigated the impact of trade liberalisation on export growth in developing countries, and have reached conflicting conclusions. Some have looked at individual countries; others have taken a cross section of countries. Only Bleaney (1999) has used panel data techniques – in his case manufactured and total exports for ten countries of Latin America. Individual case studies that show a positive impact of liberalisation on export performance include Weiss's (1992) cross-sectional study of Mexican

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[2] Various comparative studies analyse the impact of trade liberalisation on economic growth and exports (see Little *et al*, 1970; Balassa, 1978, 1982, 1985; Bhagwati, 1978; Krueger, 1978; World Bank, 1987; and, Michaely *et al*, 1991). Edwards' (1993) survey presents a detailed account of the studies on export growth and economic growth, as well as the literature on trade liberalisation and growth. Greenaway and Sapsford (1993, 1994) also provide empirical evidence regarding the links between trade liberalisation, exports and economic growth in a growth accounting framework.

[3] For instance, León-Ledesma (2000, 2002) analyses whether trade-related international R&D spillovers are an important factor determining export performance in a sample of OECD countries, and his findings confirm this hypothesis. He also shows that R&D spillovers increase the competitiveness of the trading partners. Also, he shows that the foreign stock of knowledge affects exports positively for the less advanced countries in the sample, and has no impact on exports for the G7.

manufactured exports; Jenkins's (1996) times series and cross section analysis for Bolivia's manufactured exports; Joshi and Little's (1996) analysis of India's economic reforms; and Ahmed's (2000) cointegration and error correction modelling for Bangladesh.

Multi-country studies for developing countries that confirm the positive relationship between trade liberalisation and exports include Thomas's *et al* (1991) cross-section analysis; Helleiner's (1994) collection of theoretical and empirical studies; and Bleaney's (1999) panel data study mentioned above. Multi-country studies that show a non-significant impact comprise UNCTAD's (1989) analytical assessment of the relationship between trade reform and export performance; Agosín's (1991) quantitative and qualitative analysis; Clarke and Kirkpatrick's (1992) cross-section study; Shafaeddin's (1994) analytical study; Greenaway and Sapsford's (1994) times series analysis; and Greenaway and Sapsford's (1997) smooth transitions analysis. Part of the reason for differences in results is not only context, but also the methodology employed, particularly the measure of trade liberalisation. Also, in some cases the samples are also small. The advantage of the current study is the relatively large sample taken using a consistent methodology.

The present chapter is organised as follows: Section 4.2 presents a brief review of trade policy reforms in the countries analysed. Section 4.3 develops the model to be estimated, and in Section 4.4 the empirical analysis is undertaken. Section 4.5 presents a summary of the effect of trade liberalisation according to the different estimations. Section 4.6 concludes.

4.2 Evolution of trade policy reforms in selected developing countries

The world has seen a major liberalisation of trade over the last fifty years. One of the most recurrent arguments for trade policy reform in developing countries was the debt crisis in the early 1980s. The World Bank and the IMF, the main lender institutions, began to recommend development strategies based on market-oriented reforms, as part of the structural adjustment programmes required to obtain the financial resources. Such reforms included as a basic component the reduction of trade barriers and the opening of international trade to foreign competition (among other long-term growth and development strategies)[4].

The membership and commitments to the World Trade Organisation (WTO) (formerly General Agreement on Tariffs and Trade, GATT) have also been an important determinant of trade reforms in developing countries. Furthermore, the change in intellectual thinking regarding the virtues of a more outward-oriented economy, and the failures of protectionist policies in some developing countries, have been crucial factors behind trade policy reform, as explained in Chapter 2. Additionally, the desire of countries for a greater degree of economic integration has played an important role in the trade liberalisation process of all the countries studied.

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[4] The most relevant programmes are the IMF's Structural Adjustment Facility (SAF) and its successor the Enhanced Structural Adjustment Facility (ESAF). By the end of 1994, 36 countries had drawn on the ESAF, in support of 68 multi-year programs (see IMF, 1998; and Bredenkamp and Schadler, 1999). The World Bank Structural Adjustment Loan Programmes also played an important role in some of the countries in this study. Of the 22 countries in our sample, only Indonesia, India and Malaysia did not have trade liberalisation supported by programmes with the IMF or World Bank adjustment loans.

There are some common elements that can be regarded as characteristic of the majority of developing countries prior to trade liberalisation. The most significant are: i) import substitution industrialisation (ISI) strategy, and its constituent policies, namely: high tariff barriers, import controls, credit and exchange rate subsidies to ISI industries, and protection of specific commodities via complex tariff structures; ii) tariffs as the main source of fiscal revenue; iii) the use of import tariffs and exchange rate controls, mainly to cope with balance of payments crises during the 1970s and 1980s, where external negative shocks resulted in the fall of commodity prices, a reduction of aid flows and general world recession; iv) the adoption of exchange controls to preserve fixed exchange rates; and, v) the coexistence of an anti-export bias and export-promotion, mostly in the form of infant industry protection of the manufacturing sector, overvalued exchange rates, and tax and credit concessions.

As far as exports are concerned, it is possible to identify several types of restrictions or anti-export bias (disincentives to exports) that have been liberalised or lifted. The most widely used trade policy instruments in the countries analysed, as outlined in table B4.1 in the Appendix, are export duties and taxes; administrative barriers (for example, export licensing); dual exchange rates; and very restrictive foreign direct investment (FDI) laws, which acted as a major deterrent to investment in the exporting (non-traditional) sectors.

Consequently, trade reform episodes encompassed the use of the following instruments used to promote export growth and diversification. Firstly, the reduction or elimination of *exports duties, and administrative and other non-quantitative barriers*. In almost all the cases studied, export duty reductions or

elimination (mainly on non-traditional exports) were undertaken as an export promoting measure, as can be observed in Table 4.1. Only Chile, Korea and Venezuela did not apply export duties before or after the liberalisation episodes identified. Costa Rica, Dominican Republic, Malaysia and Sri Lanka were the countries with the highest export duties/total export ratios.

Tax concessions and duty drawback schemes were introduced in, for example, Cameroon, Chile, Colombia, Costa Rica, India, Malaysia, Mexico, Morocco, Pakistan, Philippines, Uruguay, Venezuela and Zambia. Regarding *administrative barriers*, some countries simplified export procedures and lifted restrictions such as export licensing (for instance Costa Rica, Dominican Republic, Korea and Mexico). In addition, *tariff reforms* were made in all the countries to reduce the anti-export bias in the structure of import protection.

The allowance of foreign competition, mainly in the form of *liberalisation of FDI regulations* and *tax incentives for foreign firms* (multinational corporations, MNCs) was a relevant feature of export promotion strategies in countries such as Dominican Republic, Ecuador, Korea, Mexico, Morocco, Pakistan, Philippines, Thailand and Uruguay.

Furthermore, the establishment of *Export Development Agencies and Acts*, for export promotion and financing purposes, also acted as an export incentive instrument. Chile, Colombia, Malawi, Philippines, Sri Lanka, Thailand, and Tunisia are the main examples.

Table 4.1

Export duties and export growth before and after trade liberalisation

Country	Year of liberali-sation	Before liberalisation (from 1972)		After liberalisation (up to 1998)	
		Export duty	Export growth	Export duty	Export growth
		0 ≤ d < 1 percent			
Chile	1976	0.0	8.8	0.0	10.2
Indonesia	1986	0.6	4.6	0.5	9.4
Korea	1990	0.0	16.0	0.0	15.3
Malawi	1991	0.4	4.4	0.0	5.2
Paraguay	1989	0.7	11.6	0.0	9.5
Venezuela	1991	0.0	-0.7	0.0	6.4
		1 ≤ d < 3 percent			
Ecuador	1991	1.6	12.0	0.3	8.6
India	1991	1.4	6.5	0.2	12.2
Mexico	1986	2.0	9.5	0.02	12.8
Morocco	1984	2.1	4.3	0.5	7.3
Philippines	1986	1.4	6.4	0.1	10.9
Thailand	1986	2.7	8.8	0.3	14.6
Uruguay	1985	1.1	6.9	0.4	7.6
Tunisia	1989	1.2	7.4	0.3	4.9
Zambia	1990	2.4	-1.1	0.0	4.9
		3 ≤ d < 5 percent			
Cameroon	1991	4.2	9.1	1.8	-0.9
Colombia	1991	4.5	5.7	0.3	8.6
Pakistan	1991	4.0	6.0	0.0	6.3
		5 ≤ d < 10 percent			
Costa Rica	1990	7.9	6.2	2.6	8.7
Dom. Rep.	1992	5.3	6.6	0.01	29.3
Malaysia	1988	6.9	8.9	1.7	14.1
		10 percent or more			
Sri Lanka	1990	13.5	4.3	0.7	9.3

Sources: Dean *et al* (1994), UNDP/UNCTAD (1999), World Bank (1999), WTO Trade Policy Reviews (various issues).

Note: *d* denotes export duties. The values are period averages, and are the author's calculations.

In addition to trade policy, *exchange rate policy reforms* were an integral part of the liberalisation episodes. More specifically, in countries with extensive foreign exchange distortions the reform included the unification of the exchange rate regime and the removal (or relaxation) of exchange controls. Also, foreign exchange retention schemes (ERSs) for exporters were sometimes introduced under very restrictive import control regimes. The ERSs imply an incentive to exporters, given that they could retain a portion of their foreign exchange earnings to pay for imported inputs. While ERSs made it easier for exporting firms to import the inputs they required, the consequences of the schemes were not always positive. Their implementation had side effects associated with market distortions. For instance, some exporting firms had 'over-responded' to this kind of incentive by selling to export markets at a financial loss (at the official exchange rate) and by diverting a greater part of their output to exports even if the domestic market was deprived. Examples of countries that carried out exchange rate reforms or elimination of exchange restrictions are Colombia, Costa Rica, Dominican Republic, India, Malawi, Mexico, Pakistan, Paraguay, Sri Lanka, Venezuela, and Zambia.

Although the export promotion schemes outlined above were introduced as a serious attempt to eliminate distortions and anti-export bias, the policies have still not fully addressed the bias facing export industries in restrictive systems, and have proved difficult to administer. Only the export duties and tariff reforms have been relatively successful in terms of implementation and coverage.

Even though the countries analysed in this chapter undertook necessary reforms to reduce trade distortions, the extent and path of reform was diverse, and

in many cases reforms are still outstanding. However, there is a consensus that the economic reforms and trade liberalisation policies have contributed to improve economic performance in the regions analysed.

Another crucial element of the trade liberalisation reforms in developing countries is the liberalisation of import trade, as a mean of reducing the anti-export bias of the trade regimes (this issue will be evaluated in more detail in Chapter 5). In that sense, many developing countries have made good progress in the last two decades in liberalising their trade policies by removing quantitative import restrictions (QRs) and reducing tariffs (see Milner, 1989, 1990). However, most developing countries' tariffs are still high enough to create significant levels of anti-export bias. Moreover, tariff structures are typically escalated, with higher tariffs on final goods than on intermediate materials and components. Developing countries are also increasingly turning to anti-dumping actions and imposing anti-dumping duties above normal tariffs (raising both the nominal and effective protection of import substitution production and increasing anti-export bias), and QRs of various kinds are still imposed. Furthermore, the consequent reduction in imports, given these restrictions, leads to less demand for foreign exchange, and enables the country's exchange rate to be maintained at a higher level than otherwise. This in turn reduces the domestic currency value of export proceeds.

There are various export-facilitating measures that can help to reduce anti-export bias and to improve the environment for export growth. Basically, it is necessary to reduce protection of the domestic market, which means reducing tariffs, reducing or eliminating tariff escalation, and avoiding the use of anti-dumping and QRs. Access to imported inputs at world prices can be crucial for

export expansion, thus countries have been implementing a number of economy-wide measures to this end, such as duty drawback and special import licenses for exporters, as well as specialised schemes, like bonded manufacturing and export processing zones (for example Korea, Taiwan, and Thailand).

4.3 The model

To test for the impact of trade liberalisation on export performance, an export growth equation is specified which captures a mixture of demand-side and supply-side influences. Liberalisation is assumed to influence export performance from the supply side in a manner described below, but we do not make the small country assumption that countries face infinitely elastic demand curves and can sell any amount of goods they want at the going international price. All major studies of export growth (for example Khan, 1974; Goldstein and Khan, 1978, 1982; and Senhadji and Montenegro, 1999) [5] show this to be an unrealistic assumption. Export growth responds positively to world income growth and to improvements in international competitiveness. A typical export growth function, which incorporates these two demand-side variables, may be written as:

$$X = A\left(EP_d / P_f\right)_t^{\eta} WY_t^{\varepsilon} \qquad (4.1)$$

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[5] Export demand analysis has been applied to both industrial and developing countries. Goldstein and Khan (1985) survey the literature related to income and price effects in foreign trade.

where: X is export volume; A is a constant; E is the nominal exchange rate measured as the foreign price of domestic currency; $\left(P_d/P_f\right)$ is the ratio of domestic to foreign prices, so that $\left(EP_d/P_f\right)$ is a measure of the real exchange rate (RER) which Edwards (1988) calls the 'purchasing power parity rate of exchange'; and η is the price elasticity of demand for exports. A fall in the foreign price of domestic currency (devaluation), or a fall in domestic prices relative to foreign prices, reduces RER and thus is expected to raise the level of exports so that the expected sign of η is negative. WY is world income; ε is the income elasticity of demand for exports, expected to be positive, and t is a time subscript.

Taking logs of the variables in equation (4.1) and differentiating with respect to time, gives the growth of exports as:

$$x = \eta(e + p_d - p_f)_t + \varepsilon(wy)_t \qquad (4.2)$$

No distinction is made in equation (4.2) between the short and long run price and income elasticities of demand for exports. It is implicitly assumed that export demand in period t adjusts to the desired level without a lag. A more realistic assumption would be to specify lagged adjustment, so that exports in the current period are assumed to adjust only partially to the difference between equilibrium export growth in period t and the actual growth of exports in the previous period $(t-1)$, which then makes it possible to test for differences

between the short and long run price and income elasticities of demand. This yields an estimating equation (including a constant) of the form:

$$x_t = \beta_0 + \beta_1 px_t + \beta_2 wy_t + \beta_3 x_{t-1} + \mu_t \qquad (4.3)$$

where px_t is the rate of change of the RER; $\beta_1 = \eta$ and $\beta_2 = \varepsilon$ are the short run price and income elasticities, respectively, and μ_t is the error term. The long run price and income elasticities are given by $\beta_1/(1-\beta_3)$ and $\beta_2/(1-\beta_3)$, respectively.

Within this framework (which controls for demand side variables), there are several channels through which trade liberalisation can affect export growth, and such effects tested for. As mentioned in the Introduction, two measures of liberalisation are used in this study, which are complementary but separate. First, the ratio of export duties to total exports (d_t) is taken as a major indicator of the degree of distortion or anti-export bias in an economy. The selection of this variable is based on the fact that export duties represent one of the most widely used policy instruments in the countries analysed, and can be easily measured. A reduction in the ratio is expected to raise export growth for any given change in world income growth and the real exchange rate. Secondly, a liberalisation indicator is used (lib_t), defined as a dummy variable that takes the value of zero before the year of liberalisation and one afterwards (see Table 4.1 for the particular years of reform in each country and the Appendix for the range of reforms undertaken). To the extent that liberalisation reduces anti-export bias, there will be shifts in both the quantity and quality of resources into the export

sector, which may also be expected to improve export performance for any given growth of world income and the real exchange rate.

In addition, trade liberalisation can also affect the price and income elasticities of demand themselves. For instance, liberalisation might be expected to increase the sensitivity of exports to income and price changes by stimulating efficiency and inducing structural change; and making it easier for producers to shift resources. Such interaction effects between liberalisation and the price and income elasticities can be estimated by including two slope dummy variables in the estimating equation, $wy \times lib_t$ and $px \times lib_t$.

Taking account of all these liberalisation effects described above gives an augmented export growth function of the form:

$$x_t = \beta_1 px_t + \beta_2 wy_t + \beta_3 x_{t-1} + \beta_4 d_t + \beta_5 lib_t + \beta_6 (px \times lib)_t + \beta_7 (wy \times lib)_t + \varepsilon_t \quad (4.4)$$

where the expected signs of the coefficients are: $\beta_1 < 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 < 0$, $\beta_5 > 0$, $\beta_6 < 0$, and $\beta_7 > 0$.

The data for our sample of 22 countries for the period 1972-97 are taken from the World Bank World Development Indicators 1999, 2000 (CD), and Bahmani-Oskoowee and Mirzai (2000). See Appendix for detailed variable definitions and sources.

4.4 Empirical estimations

To estimate equation (4.4) two approaches are used. The first is the estimation of dynamic panel models by fixed-effects (FE), and by generalised method of moments (GMM). The second approach is the use of time-series/cross-section analysis for all the countries, as well as for the different geographic regions studied of Africa, East Asia, South Asia, and Latin America.

4.4.1 Fixed effects and generalised methods of moments

In this section, the two forms of panel data model mentioned above are estimated. First, the fixed-effects (FE) estimator, which is based on the inclusion of dummy variables to account for factors that are specific to each country but constant over time (Greene, 1997), as explained in Chapter 3; and, second, dynamic panel data models based on generalised methods of moments (GMM) (Arellano, 1993, and Arellano and Bond, 1998).

The GMM estimator is preferred by some authors to the fixed effects estimator to estimate dynamic panel data models, since the dynamic fixed effect model could generate results that are inconsistent if the number of 'individuals' tends to infinity while the number of time periods (T) is fixed (see Nerlove, 1967; Nickell, 1981; and Harris and Mátyás, 1986). More explicitly, the bias is the order (1/T). In the present case, the number of years is relatively large (T=26) and thus the bias should be minimal. The GMM estimator is based on first differencing and controls for the endogeneity of the lagged dependent variable

(and also controls for the potential endogeneity of other explanatory variables) (see Arellano, 1993; Arellano and Bond, 1998).

The results from both estimators are reported in Table 4.2. Columns (i) and (ii) present the fixed effect estimates. As can be observed in column (i), there is a clear relationship between export growth and the change in the real exchange rate (RER), world income growth and trade liberalisation. The long run income elasticity is 2.15, whilst the long run price elasticity is -0.11. These estimates are consistent with those of other studies for developing countries (see Athukorala and Riedel, 1996; Panagariya *et al,* 2001*: 327-334*). Such a low price elasticity raises concerns about the possibility of losing export revenues in the process of the countries making themselves more competitive (through the devaluation of the real effective exchange rate, for example). The export duty coefficient (-0.05), which accounts for the effects of the degree of distortions on export growth, is not statistically significant, although it has the expected sign. But the shift dummy shows that there is a significant export response to trade reform, raising the growth of exports by 0.85 percentage points. Regarding the slope dummy variables, the coefficients are not significantly different from zero, but they show the expected sign. Moreover, the two interaction variables are jointly insignificant, with an F-statistic of $F(2,418)=0.34$.

Table 4.2

Export performance in selected developing economies: 1972-98

Explanatory variables:	Dependent variable: export growth x_t			
	Fixed effects		*GMM*	
	(i)	*(ii)*	*(iii)*	*(iv)*
px	-0.11	-0.10	-0.14	-0.16
	(1.86) §	(1.87) §	(2.09)*	(2.45)*
wy	2.09	1.53	1.42	1.54
	(3.26)**	(3.09)**	(2.60)**	(1.99)*
x_{t-1}	0.03	0.03	0.11	0.15
	(2.25)*	(2.06)*	(4.78)**	(8.94)**
d	-0.05	-0.19	-0.16	-0.19
	(1.07)	(1.01)	(1.89) §	(2.16)*
lib	0.85	1.91	1.56	1.94
	(2.29)*	(2.45)*	(2.28)*	(2.49)**
$wy \times lib$	0.58		1.41	
	(1.40)		(3.58)**	
$px \times lib$	-0.06		-0.07	
	(0.62)		(0.32)	
wy_{LR}	2.15	1.58	1.60	1.81
px_{LR}	-0.11	-0.10	-0.16	-0.18
	Diagnostic statistics			
	0.53	0.51		
Omit $wy \times lib$, $px \times lib$	0.34		78.51	
Hausman test	11.38	24.03		
Heteroscedasticity test	[0.31]	[0.19]		
Wald test			[0.000]	[0.000]
Sargan test			[0.461]	[0.589]
1st-order serial correlation			[0.027]	[0.000]
2nd-order serial correlation			[0.793]	[0.356]
Number of observations	480	480	362	362

Notes:

1. Figures in parenthesis ( ) are absolute t-ratios; figures in brackets [ ] are p-values. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent, and 1 percent level respectively.
2. wy_{LR} and px_{LR} are the long run income and price elasticities, respectively.
3. Omit $wy \times lib$, $px \times lib$ is the F-statistic for the omission of these two variables from the regression.
4. Heteroscedasticity test is based on a regression of the residuals on the squared fitted values. The Wald test is for the joint significance of the regressors. The Sargan test is of over-identifying restrictions. The tests for 1st and 2nd order serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1991). The p-values report the probability of rejecting the null hypothesis of no serial correlation, where the first differencing will induce (MA1) serial correlation if the time-varying component of the error term in levels is a serially uncorrelated disturbance.
5. The GMM estimations were performed using the programme DPD98 for Gauss (Arellano and Bond, 1998).

In column (ii), where the slope dummies have been removed, the coefficients of the short run income and price elasticities retain their statistical significance. The price elasticity confirms that the response of exports is in the expected direction, but the magnitude of the coefficient is still small. The magnitude of the export duty coefficient is larger than the estimate in column (i) but it is still statistically insignificant. The liberalisation coefficient shows that there is a significant export response to trade reforms - the direct impact of liberalisation on export growth is 1.91 percentage points.

Turning now to the GMM estimates, column (iii) shows that the short run income and price elasticities (1.42 and -0.14) are both significantly different from zero. The long run income and price elasticities are 1.60 and -0.16, respectively. The impact of export duties on export growth now seems to be significantly negative. Also, the shift dummy coefficient (1.56) that accounts for the effects of liberalisation on export growth is significantly different from zero, indicating again that the elimination of major trade policy distortions has a strong positive influence on export performance. Column (iii) also includes the slope dummy variables defined previously. The interaction variable $wy \times lib$ is positive and significantly different from zero, suggesting that export growth becomes more responsive to world income growth as liberalisation takes place. In other words, the positive interaction between the income elasticity and external demand is a signal of successful trade liberalisation, since it suggests that the reduction and/or elimination of trade distortions, and hence greater openness to the world market, makes it easier to respond to world market conditions and induces structural change, as pointed out earlier. In contrast, $px \times lib$ is not significantly different

from zero, and the magnitude of the coefficient is very small, though it has the expected negative sign. The coefficients of the two interaction terms are jointly significant according to the F-statistic F(2,360)=78.51.

The results in column (iv) present a similar picture as the other estimations in Table 4.2. The estimates suggest statistically significant income and price elasticities. Additionally, the distortions indicator (that is, export duties) is a significant determinant of aggregate export performance. As in the previous columns, the trade liberalisation process (accounted for by the shift dummy variable) is a more important factor influencing export growth, where the shift in export growth due to liberalisation is 1.94 percentage points.

4.4.2 Regional disaggregation

The previous section presented dynamic panel data estimates for the total group of countries analysed in this study. However, the evaluation of trade policy reforms in the different regions suggests that there is a diversity of experience regarding trade liberalisation. Other studies of income and price elasticities of demand suggest that such elasticities vary significantly across regions (Senhadji and Montenegro, 1999: 265-72).

To examine whether the elasticities and trade liberalisation measures differ between geographical regions, the countries in the sample were classified into four zones: Africa, East Asia, South Asia, and Latin America. For this reason, a panel data model suitable to analyse data observed for a relatively large number of periods and for a relatively small number of cross sectional units is implemented,

that is the time-series/cross-section model defined in chapter 3. Thus, this section analyses the empirical relationship described earlier for the total group of countries, and compares the results with the regional estimates.

The estimator is a three-step generalised least squares with maximum likelihood estimates (MLE) interaction. The model allows for groupwise heteroscedasticity, cross-group correlation, and within-group autocorrelation. The relevance of this type of model is that the error term need not have the same properties for each country (see Greene, 1997, Ch.16). Table 4.3 portrays the groupwise heteroscedasticity regressions with contemporaneous correlation and autocorrelated disturbances.

The results for all the countries in column (i) confirm the findings of the dynamic panel data estimates. The changes in the real exchange rate and in world income have the expected effects on export growth. The results also suggest significant distortion and trade liberalisation effects. The shift dummy coefficient is 1.99 percentage points. Column (i) provides, as well, evidence that trade liberalisation increases the sensitivity of exports to world income changes. However, the effects of the interaction between liberalisation and relative prices is not statistically significant, as in the fixed effects and GMM cases.

The region-specific estimates provide more diverse results. With reference to the income and price elasticities, the East Asia region presents the highest long run income elasticity (1.98), although Latin America and Africa also show relatively high-income elasticities (1.68 and 1.44, respectively). High-income elasticities are a feature of export equations estimated for successful East Asian economies (see Athukorala and Riedel, 1996), which is both a result of the

composition of their exports, as well as an indication of very rapid improvements in product quality and efficiency driving export growth. Regarding the long run price elasticity, Africa seems to have the highest elasticity (-0.36), but it is still low, while East Asia has the lowest elasticity (-0.21). Another interesting result from the time-series/cross-section estimates is how the impact of trade restrictions (measured by the export duty variable) and liberalisation differ across the regions analysed. The estimated export duties coefficient is significantly different from zero in all the cases, except Africa. Specifically, the export duty coefficients are: Africa (-0.10), East Asia (-0.55), South Asia (-0.31) and Latin America (-0.81). For example, in the case of Latin America, Bleaney (1999) argues that there are significant reform effects (both on total exports and manufactured exports), for the case of ten Latin American countries. Moreover, his study shows that, after reform, exports seem to react more strongly to real exchange rate signals and the income elasticity of demand is higher.

The liberalisation of the trade regimes appears to be a more crucial determinant of export growth in all of the regions analysed. In all the regions studied, the shift dummy is statistically significant, where the coefficients are: for Africa (3.58), South Asia (2.54), East Asia (2.42), and Latin America (1.66). The results imply that the elimination and/or reduction of anti-export bias, as part of the process of trade reform (liberalisation), have contributed significantly to export growth, indicating the positive externalities that less restrictive trade regimes have on export performance.

Table 4.3

Three steps generalised least squares and maximum likelihood estimation

Explanatory variables:	Dependent variable: export growth x_t				
	All Countries	*Africa*	*East Asia*	*South Asia*	*Latin America*
	(i)	*(ii)*	*(iii)*	*(iv)*	*(v)*
Constant	-0.99	-6.54	0.30	3.73	0.39
	(0.66)	(1.44)	(0.14)	(2.27)*	(0.35)
px	-0.18	-0.35	-0.23	-0.21	-0.21
	(3.96)**	(2.16)*	(2.24)*	(3.49)**	(5.51)**
wy	1.76	1.39	1.71	0.32	1.41
	(3.82)**	(3.07)**	(2.63)**	(2.24)*	(4.99)**
x_{t-1}	0.10	0.04	0.14	0.23	0.17
	(2.62)**	(1.04)	(1.77) §	(1.99)*	(3.02)**
d	-0.19	-0.10	-0.55	-0.31	-0.81
	(2.02)*	(0.13)	(1.93) §	(3.08)**	(4.66)**
lib	1.99	3.58	2.42	2.54	1.66
	(3.76)**	(2.42)*	(2.53)*	(3.53)**	(6.37)**
$wy \times lib$	1.36	1.25	1.16	0.60	1.62
	(1.94) §	(0.58)	(2.31)*	(0.64)	(3.51)**
$px \times lib$	-0.04	-0.38	-0.09	-0.12	-0.13
	(0.66)	(1.19)	(0.69)	(0.65)	(2.44)*
wy_{LR}	1.95	1.44	1.98	0.42	1.68
px_{LR}	-0.20	-0.36	-0.21	-0.27	-0.25
	Diagnostic statistics				
LRS	167.72	8.33	18.54	10.17	67.90
	[38.93]	[12.59]	[25.00]	[7.81]	[58.62]
Number of observations	440	80	120	60	180

Notes:

1. Figures in parenthesis ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent, and 1 percent level respectively.
2. wy_{LR} and px_{LR} are the long run income and price elasticities, respectively.
3. Likelihood Ratio Statistic (LRS) is the test for serial correlation. The numbers in brackets [ ] are the critical values.

4.4.3 Testing for equality of the coefficients across regions

This section presents a likelihood ratio test (with a chi-squared distribution), where the four regions are compared in terms of the trade liberalisation effects, while still allowing the dynamics and price and income effects to differ between regions. Specifically, it requires comparing the restricted specification in which the regions have the same trade liberalisation coefficients (and different income and price effects and dynamics) with the unrestricted model where all the coefficients are allowed to vary. The restricted likelihood is a modification of the first column of Table 4.4 where the countries are pooled together, that is, a dummy for each of the four regions is interacted with the coefficients that are restricted and a *dummy for each of the regions*. In all the cases, the likelihood ratio tests are higher than the critical values, thus the restrictions that the coefficients are the same for all four regions are rejected.

Table 4.4

Restriction Test for Equality of the Coefficients across Regions

Restrictions (coefficients)	Likelihood ratio statistic
$d, lib, wy \times lib,$ and $px \times lib$	27.80 [26.29]*
d	29.22 [13.26]**
lib	29.12 [13.26]**
$wy \times lib$	33.90 [18.47]**
$px \times lib$	27.94 [13.26]**

Notes: Figures in brackets [] are critical values of χ^2. *, ** indicate that the test is significant at the 5% and 1% significance levels.

4.5 The Relative Impact of Export Duties and Trade Liberalisation: Summary of Results

The impact of export duty reduction and trade liberalisation episodes can be compared by calculating the elasticity of export growth to changes in the two variables, and a summary is given in Table 4.5. It is clear in all cases that the impact of liberalisation has been greater than the reduction of export duties alone. From the FE and GMM estimations, liberalisation has boosted export growth by roughly 25 per cent compared with growth pre-liberalisation, while the time-series/cross-section results suggest 30 per cent (except for Africa, which is much higher). The relative impact of export duties on export growth has been more marked in the Latin America region.

It is important to stress, however, that the impact of trade distortions and liberalisation varies considerably between regions, according to the results in the TSCS estimations. For example, Latin America is the most affected by the change in export duties (which is understandable considering the high average duties prevailing in some countries before the liberalisation episodes) while the impact of liberalisation has been greatest in South Asia. However, trade liberalisation emerges as a fundamental determinant of export performance in all the countries analysed.

Table 4.5

The relative impact of export duties and trade liberalisation on export growth

Estimation method	Export duties (ε_d)	Liberalisation (lib)
Fixed effects		
Equation 4, Column (i)	-0.01	0.13
Equation 4, Column (ii)	-0.05	0.28
GMM		
Equation 4, Column (iii)	-0.05	0.24
Equation 4, Column (iv)	-0.05	0.30
Time Series/Cross Section		
Equation (4)		
All Countries	-0.04	0.29
Africa	-0.04	0.79
East Asia	-0.07	0.38
South Asia	-0.12	0.32
Latin America	-0.15	0.24

Notes:

The export duty elasticity is calculated as $\varepsilon_d = (\bar{d}/\bar{x})(\partial x/\partial d) = (\bar{d}/\bar{x})\beta$, where $\bar{d}$ and $\bar{x}$ are the means of export duties and export growth, respectively. The proportionate impact of trade liberalisation is calculated as $\%lib = \beta/\bar{x}_{lib=0}$, where β is the coefficient of trade liberalisation and $\bar{x}_{lib=0}$ is the mean of export growth before liberalisation.

4.6 Conclusions

The argument for analysing the relationship between trade liberalisation and exports is that the reduction or elimination of trade policy distortions reduces anti-export bias, and therefore should improve competitiveness and export performance. The countries analysed in this chapter have undertaken serious trade reforms, either as a part of major macroeconomic reforms and commitments with international regulations, or by decisions driven by a process of internal adjustment. Apart from Bleaney's (1999) study of Latin American countries, the present study is the first major one of its kind to apply dynamic panel data techniques to the analysis of the impact of trade liberalisation on export performance. The sample here is much larger, however, and contains a broad spectrum of countries from across the world. Like Bleaney, it also looks at the impact of liberalisation on the price and income elasticities of demand for exports, and not simply at the shifts in the constant term of the equations.

The main empirical findings are:

- Export duties, as an indicator of trade distortions, appear to negatively affect export growth, although the magnitude of the effect is small;
- Trade liberalisation has a strong positive impact on export performance, increasing export growth by approximately two percentage points (or between 25 and 30 per cent of average export growth compared with the pre-liberalisation period);
- Exports react positively to real exchange rate depreciation, but the size of the elasticity is small and not statistically significant in most tests.

Trade liberalisation makes little difference to the sensitivity of exports to real exchange rate changes;

- External demand (that is world income growth) has a strong positive effect on export growth; and there is some evidence that trade liberalisation increases the sensitivity of exports to income changes;
- The majority of results appear to be robust across regions.

APPENDIX B

Data definitions and sources

Export Growth (*x*): Exports of Goods and Services; annual percentage growth (constant 1995 US$). Source: World Bank, *World Development Indicators* (WDI), 1999. The World Bank export volume figures are UNCTAD' Quantum Indices defined as the ratio of the export value index (with exports measured in US$) to the value (price) index (see UNCTAD *Handbook of Statistics*, 2001). The Export Value Index '*i*' is equal to export quantum index '*i*'*unit value of export index '*i*', with '*i*' referring to country *i*.

World Income Growth (*wy*): World GDP; annual percentage growth (constant 1995 US$). Source: World Bank, *World Development Indicators* (WDI), 2000. The activity variable is defined as the difference between world GDP and country GDP, that is:

$$WY_i = WorldGDP - GDP_i$$

Export Duties (*d*): Export duties (% of exports); includes all levies collected on goods at the point of export. Source: World Bank, *World Development Indicators* (WDI), 2000.

Real Exchange Rate (*px*): The Real Exchange Rate (RER) is defined as the nominal exchange rate (measured as the foreign price of domestic currency) multiplied by the ratio of domestic to foreign prices: $\left(EP_d / P_f \right)$. Data for the RER for Colombia, Costa Rica, Ecuador, India, Indonesia, Malaysia, Mexico, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Tunisia are from Bahmani-Oskoowee and Mirzai (2000). The RER for the remaining countries are constructed from the IMF's *International Financial Statistics* (various issues).

Table B4.1

Trade liberalisation and export policies reforms in selected countries

Region/ Country	Reform		Exports incentive instruments
	First	Most recent	
South Asia			
India	1989	1991	Duty exemption and drawback compensation schemes. Removal of restrictions on manufactured exports (between 1990-93).
Pakistan	1989	1991	Duty drawback scheme. Liberalisation of raw material and intermediate goods imports for export industries. In 1991, foreign companies were allowed to undertake export trade.
Sri Lanka	1987	1990	Elimination of exports duties, mainly in non-traditional exports. The Export Development Investment Support Scheme was established. A tax holiday on profit for exporters was introduced (for a limited period).
East Asia			
Indonesia	1985	1990	Promotion of non-traditional exports. Surcharges and VAT on imported inputs were introduced.
Korea	1984	1990 1998	Simplification of exports procedures. Elimination of export subsidies, including reserves for export losses or exporters; reserves for exporters' overseas market development; and tax incentives for foreign investment.
Malaysia	1986	1989	Duty drawbacks scheme, and tariff concession for raw materials and components used in manufacturing.
Philippines	1986	1989	Tax exemptions on imported and locally supplied inputs provided through bonded warehouses, and duty exemptions. Other tax incentives for export activities were provided by the Export Development Act of 1994. Sugar, textiles and clothing exports remain subject to special arrangements in foreign markets. Reform of foreign investment law to promote export oriented FDI.

Thailand	1982	1990	Remission of tariffs and business taxes on inputs used in exports, development of export processing zones, concessional export credits and assistance in marketing and promotion of exports. Removal of export taxes on major agricultural commodities.
Africa			
Cameroon	1989	1991	Export taxes were eliminated, principally on coffee and cocoa. Export duties and insurance and transportation taxes exemption. Reduction of five per cent of the value of export from their taxable income.
Malawi	1988	1991	Periodical adjustment of the exchange rate. Export promotion strategy and export financing facility. Reduction of the scope of exports licensing.
Morocco	1983	1989	Tariff and VAT concessions for export goods (including duties and levies, especially on imported inputs, and concessions with respect to the tax on exporter's profits). Industrial and free trade zones are allowed to operate. Except for hydrocarbons and certain services, duties and taxes on exports have been abolished. The taxes levied on agricultural and mining exports were abolished by the 1995 Finance Act.
Tunisia	1987	1990	Restructuring of the Centre to Promote Exports (CEPEX), reinforcement of the intervention of the Fund for the Promotion of Exports (FOPRODEX) to support the promotion of exports, amending the law on international trade companies to widen the scope of their activities. Liberalisation and easing the system of export insurance.
Zambia	1990	1990	Liberalisation of export retention scheme. Promotion of non-traditional exports. Reform of the duty drawback scheme, to permit drawback as a credit against import tax liabilities, and to reduce third-party exporters. Introduction of VAT, and exports were regarded as zero-rated.
Latin America and the Caribbean			
Chile	1985	1988	Extension of the drawback scheme; payments of duties of capital goods import could be delayed; establishment of a small fund for export financing.

Colombia	1985	1991	Tax Reimbursement Certificates (CERTs), the establishment of the export promotion agency (PROEXPO credit). Duty drawback scheme for imported inputs used for export production.
Costa Rica	1985	1990	Virtual elimination of exports licensing requirements. Export subsidies (prevalent prior 1986) have remained high: full tax exemption on income earned on non-traditional exports to non-regional markets and full tariff exemptions on imports used in export promotion, which take the form of certificates that can be traded.
Dominican Republic	1990	1992	Abolition of all export restrictions: licensing, minimum prices for agricultural products and taxes. Simplification of administrative procedures. All tax incentives and *ad hoc* measures, except those applied to free trade zones, were eliminated. Promotion of FDI.
Ecuador	1985	1991	Introduction of a new tax law, an in-bond industry law, liberalised foreign investment regulations. Introduction of new law that would simplify procedures for exporters. Subsidy through the exchange rate program "Advanced Sale of Foreign Exchange".
Mexico	1985	1988	Export regulations have been liberalised significantly. In 1986, exporters were allowed to keep foreign exchange equivalent to 100 per cent of future imports. In 1989, export taxes were eliminated and by 1990, official reference prices were removed. The coverage of export licenses declined from 48.9 per cent in 1985 to 17.6 per cent by 1991,were a substantial proportion of the remaining licenses apply to agricultural and agroindustrial products.
Paraguay	1989	1995	Reduction of duty rates, and industrial promotion.
Uruguay	1983	1985	Tax and duty exemptions to selected activities, temporary admission, duty drawback scheme and free trade zones. FDI, mainly in banking and tourism sectors was promoted. References prices were eliminated in 1994, but minimum export prices are still applied on a few items (textiles and clothing, and sugar).

Venezuela	1989	1991	Currency retention scheme for non-traditional exporters (between 1983-86). Introduction of a bonus scheme where exporters received a certificate applicable to any federal tax. The export subsidy rate was lowered, all export restrictions were eliminated and a duty-drawback scheme with a flat rate of five per cent was introduced.

Note: OGL = open general license; QRs= quantitative restrictions.

Sources: Balasubramanyam (1995); Dean *et al* (1994); IMF (1998, 1999); Musonda and Adam (1999); Rodrik (1997); Winglee *et al* (1992); WTO Trade Policy Review (1995a-d, 1996a-c, 1997a-d, 1998a-c, 1999).

Chapter 5

THE EFFECTS OF TRADE LIBERALISATION ON IMPORTS

5.1 Introduction

In the formulation of trade and/or exchange rate policies, one of the major concerns of policy makers is the responsiveness of trade flows to relative price changes and income variations. The effect of trade and exchange rate policies is highly dependent on the size of price and income elasticities of demand for exports and imports.

As far as import price and income elasticities are concerned, the empirical investigation of import demand functions has been one of the most researched areas in international economics[1]. Economists have dedicated a considerable amount of effort to the estimation of import demand functions, both at the aggregate and disaggregated levels. Estimated elasticities are of significant practical importance to policy makers, where the elasticities derived are a crucial link between economies, and help to determine the degree to which the external balance constraint affects a country's growth performance.

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[1] Some of the earlier studies that estimate import demand functions are surveyed by Goldstein and Khan (1985). Other early studies on import and export demand elasticities for different countries are: Kreinin (1967, 1973); Houthakker and Magee (1969); Khan (1974, 1975); Goldstein and Khan (1976, 1978); Murray and Ginman (1976); Wilson and Takacs (1979); Warner and Kreinin (1983); Haynes and Stone (1983); Bahmani-Oskooee (1986); and Marquez (1990). The literature on import demand functions is discussed in more detail in Section 5.2.

However, few studies have analysed the impact of trade liberalisation on import behaviour across developing countries (exceptions are, for example, Bertola and Faini, 1991, and Faini *et al* 1992). Knowledge of the major variables that affect import performance, and the prediction of import flows, can help policy-makers to design and assess the overall sustainability of structural reforms. They are employed, for example, as inputs into the configuration and implementation of structural adjustment programs for determining the appropriate speed of the trade liberalisation process, and for avoiding the possibility of unexpected foreign exchange constraints endangering the reform effort.

The prediction of import response following trade liberalisation measures is not an easy task, especially when extensive non-tariff barriers on imports are present. Quotas, for instance, affect the responsiveness of imports to real exchange rates, tariffs and activity levels (domestic output). However, the combined effects of import barriers, both quantitative and non-quantitative, are hard to gauge because of the constraints on data availability.

This chapter specifies an import growth function, and presents new evidence regarding import growth in the 22 developing countries of our sample, focusing on the impact of import controls, i.e. tariff and non-tariff barriers. Like Chapter 4, the research applies dynamic panel data models based on fixed effects and generalised methods of moments (GMM). Also, heterogeneous panels for the complete sample, as well as for the different regions of the world, are estimated using the time series/cross section technique. In addition, the countries are classified according the degree of trade policy distortion based on the Heritage Foundation Index of Economic Freedom (O'Driscoll et al, 1999), to see whether

the impact of liberalisation differs according to the initial degree of protection. The trade policy distortion score is based on a country's average tariff rate, non-tariff barriers, and corruption in the Customs Services.

The plan of the chapter is as follows. Section 5.2 presents descriptive evidence of trade policy in the 22 countries considered. Section 5.3 analyses the theoretical specification and empirical evidence on import demand functions. Section 5.4 states the import growth function to be studied, and reports the empirical results. Section 5.5 summarises the results on the relative impact of trade liberalisation and import duties on import growth. Finally, conclusions are summarised in Section 5.6.

5.2 Descriptive evidence on trade policy

One of the most important purposes of establishing the General Agreement on Tariffs and Trade (GATT) in 1947 was to achieve a substantial reduction of tariffs and non-tariff barriers to trade, and thus to secure freer access of countries to international markets. Since then, trade policy reforms in developing countries have been widely documented, mainly because trade reforms have become an integral part of structural adjustment programs, required by international organisations, as a result of international indebtedness (see IMF, 1998; Dean *et al* 1994; UNTACD 1999, 2000). Furthermore, the change in intellectual thinking, and the empirical evidence provided by multi-country studies (using different indicators of trade distortions), which analyse the virtues of a more outward-oriented economy, and the failures of protectionist policies in some developing

countries, were crucial factors behind trade policy reform. The obvious policy implication from this literature is that developing countries should abandon protectionist and restrictive trade strategies and open their foreign trade sectors[2].

In relation to tariffs, there have been important developments in terms of their application, and substantial reforms and reductions of tariffs have been achieved in the successive rounds of trade negotiations. However, it is difficult to contend that the same attainment has been reached regarding non-tariff barriers, which are considered as a significant impediment to trade, and which now attract most of the effort on trade negotiations and reforms.

Non-tariff barriers affecting imports can take various forms, amongst which can be mentioned: quantitative import restraints (the prohibition or restriction of imports maintained through import licensing requirements); standards and administrative requirements, applied for ensuring quality of goods seeking access into domestic markets (which countries use as a protectionist measure); anti-dumping and Countervailing Measures, used (and permitted by the WTO under special circumstances) to protect domestic industry from material injury according to GATT article VI, arising from dumped or subsidised imports; government procurement; services barriers; lack of adequate protection of intellectual property rights; etc. The existence of such barriers is a reason of concern, but the WTO accepts the application of some of them as a form of protection of domestic markets, especially for health and/or sanitary reasons. Nevertheless, there is a

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[2] See Edwards (1992, 1993); Krueger (1998); Ben-David *et al* (1999); Rodríguez and Rodrik (2000); Thirlwall (2000).

moral hazard that countries might abuse the application of non-tariff barriers, and such norms can become a disguised way of protectionism.

Table C5.1 in the appendix summarises the main trade policy reform measures undertaken in the countries analysed in this study. It also provides the timing of the reforms, where the 'most recent' year of reform is used as an indicator of trade liberalisation in the empirical analysis. Even though the countries reviewed undertook necessary reforms to reduce trade distortions (especially imports), the course of reform was diverse, and in many cases, reforms are still on going. The simplification of import procedures, the reduction or elimination of quotas, and the rationalisation of tariff structures are the most widespread reforms.

As far as trade policy indicators are concerned, import tariffs provide a convenient indicator of the negative impact that trade taxes can have on import growth in quantitative terms. Table 5.1 presents a summary of the behaviour of import taxes, as a percentage of total imports, before and after the identified date of the most significant trade reforms. In most of the cases, the reforms, specifically import liberalisation episodes, can be linked to reductions in import taxes. Countries like Colombia, Dominican Republic, Ecuador, India, Korea, Malaysia, Mexico, and Paraguay present notable reductions in import duties, coinciding with the periods of liberalisation. Other economies like Chile, Thailand, Morocco, Uruguay, Cameroon, Malawi and Tunisia also managed to reduce import duty receipts as a proportion of total imports. Import growth increased following the liberalisation policies in most countries. However, it would not be completely appropriate to try to establish a relationship between

trade liberalisation and import growth, based on import tariff reductions alone, because some countries adopted different approaches to the reform process, and there are non-tariff barriers to trade that might have also affected import growth. Moreover, in some countries import tariffs *increased* due to the fact that such economies decided to eliminate non-tariff barriers, and to convert these restrictions into tariffs.

Regarding non-tariff barriers, it is very difficult to express in a single number or indicator their weight as a trade policy measure, mainly because they are very country specific, and because the information is not always readily published, especially in the case of developing countries. Some authors have used different criteria to try to measure non-tariff barriers, and one of them is the use of dummy variables to present structural breaks in policy reforms (see Greenaway, 1993).

In connection to this, the Heritage Foundation has developed an Index of Economic Freedom, which provides an annual examination of the factors that contribute most directly to economic freedom and prosperity. The index, which was described in Chapter 2, includes the broadest array of institutional factors, and one of the key elements in measuring economic freedom is trade policy. The five broad categories of countries, based on the trade policy grading scale, are *very low, low, moderate, high* and *very high.*

Table 5.2 shows the trade policy scores, which are based on a country's average tariff rate – the higher the rate, the worse (or higher) the score. The other factors of trade policy are non-tariff barriers and corruption in the Customs Services.

Table 5.1

Import duties and import growth before and after trade liberalisation

Country	Year of liberalisation	Before liberalisation (from 1972)		After liberalisation (up to 1998)	
		Import duty	Import growth	Import duty	Import growth
		0 ≤ d < 5 percent			
Indonesia	1986	4.82	7.55	5.11	8.59
		5 ≤ d < 10 percent			
Costa Rica	1990	9.72	3.95	7.97	9.05
Korea	1990	8.68	12.53	5.55	9.35
Malaysia	1988	8.41	10.06	5.09	15.48
Mexico	1986	8.27	7.94	4.69	13.44
Paraguay	1989	8.59	11.02	4.88	22.88
		10 ≤ d < 15 percent			
Chile	1976	13.93*	2.49	12.42	9.88
Philippines	1986	13.48	2.84	13.97	13.12
Sri Lanka	1990	13.38	7.93	13.41	8.77
Thailand	1986	12.81	6.12	9.66	11.66
Venezuela	1991	10.05	6.40	10.11	12.71
Zambia	1990	10.07	-4.23	16.67	2.34
		15 ≤ d < 20 percent			
Colombia	1991	15.04	4.99	9.17	14.52
Dom. Rep.	1992	18.98	5.38	15.03	8.05
Ecuador	1991	15.81	1.78	8.89	6.69
Morocco	1984	19.11	3.31	16.65	6.49
Uruguay	1985	16.27	-1.53	10.65	11.39
		20 percent ≤ d			
Cameroon	1991	21.65	6.77	20.98	3.40
India	1991	38.59	6.79	27.77	10.93
Malawi	1991	21.47	2.28	21.36	1.83
Pakistan	1991	26.82	3.63	21.33	4.84
Tunisia	1989	23.83	6.01	21.29	4.63

Sources: Dean *et al* (1994), UNDP/UNCTAD (1999), World Bank (1999), WTO Trade Policy Reviews (various issues).

Note: *d* denotes import duties. The values are period averages, and are the author's calculations. The data for Chile's import duties 'before liberalisation' corresponds to the year 1975.

Table 5.2

Classification of countries according to the Heritage Foundation trade policy grading scale

Level of protectionism	Criteria	Countries
Very low	ATR ≤ 4 percent and/or very low non-tariff barriers.	
Low	4 < ATR ≤ 9 percent and/or low non-tariff barriers.	Chile Paraguay Uruguay
Moderate	9 < ATR ≤ 14 percent and/or moderate non-tariff barriers.	Colombia Costa Rica Ecuador Korea Malaysia Mexico Philippines Thailand Sri Lanka Venezuela Zambia
High	14 < ATR ≤ 19 percent and/or high non-tariff barriers.	Dominican Republic Indonesia Morocco
Very high	19 percent ≤ ATR and/or very high non-tariff barriers that virtually close the market to imports	Cameroon India Malawi Pakistan Tunisia

Source: Heritage Foundation Index of Economic Freedom, various issues (see Johnson and Sheehy, 1995; Johnson *et al* 1998a, 1998b; Johnson and Holmes, 1998, O'Driscoll et al, 1999).

Note: ATR denotes average tariff rate. The validity of the Heritage's classification of the countries was confirmed by comparing with the IMF (1998) trade policy rating (for those countries for which the scores were available).

This index takes values of one to five and tries to measure the extent to which government policy acts as a disincentive to trade. As can be observed from Table 5.2, on average, most of the countries considered in this study fall in the 'moderate' category, which coincide with the level of tariffs expressed in Table 5.1. Also, countries that were acknowledged as having 'very high' trade policy restrictions appear to apply very high tariff levels. However, given the mixed evidence regarding trade policy practices, it is better to rely on the empirical scrutiny which is undertaken in the following section to assess the relationship between trade liberalisation and import performance.

5.3 Import demand functions: theory and empirical evidence

5.3.1 Specification of the import demand function

Traditional import demand functions make imports a function of domestic income and domestic prices relative to the price of import substitutes. If the price and income elasticities of demand are assumed constant, the import function can be written as:

$$M = A\left(\frac{P_f E}{P_d}\right)^{\Psi} Y^{\pi} \qquad (5.1)$$

where M is the volume of imports; A is a constant; Y represents domestic income; P_f is foreign prices; E is the nominal exchange rate; P_d is domestic prices; ψ is the price elasticity of demand for imports; and π is the income

elasticity of demand for imports. The price elasticity of demand for imports is expected to be negative, while the income elasticity is positive.

Taking logs of equation (5.1) and differentiating with respect to time, the growth of imports can be expressed as:

$$m = \psi(p_f + e - p_d) + \pi(y) \tag{5.2}$$

The partial adjustment form of the traditional import demand equation, in which import growth is assumed to adjust only partially to the difference between equilibrium import growth in period t and the actual growth of imports in the previous period, is represented as:

$$m_t = \beta_0 + \beta_1 pm + \beta_2 y + \beta_3 m_{t-1} + \mu_t \tag{5.3}$$

where $\beta_1 = \psi$ and $\beta_2 = \pi$ (i.e. the short run price and income elasticities); pm is the growth in relative prices; y is the growth in domestic (real) income; and μ_t is the error term. The long run price and income elasticities are given by $\beta_1/(1-\beta_3)$ and $\beta_2/(1-\beta_3)$ respectively.

As mentioned earlier, there is a large number of empirical studies that estimate import demand functions for both developed and developing countries, and these studies have used mainly OLS and instrumental variable techniques,

assuming stationary data[3]. Examples of import demand studies for advanced economies are Kohli (1991), Urbain (1992), Deyak *et al* (1993), Clarida (1994), Mah (1994), Marquez (1994), Carone (1996), and Masih and Masih (2000). Deyak *et al* (1989) and Pattichis (1999) estimate disaggregated import demand functions. Examples of import demand studies for developing countries are Marquez and McNeilly (1988), Mah (1992, 1993, 1997), Bahmani-Oskooee and Rhee (1997), Bahmani-Oskooee and Niroomand (1998), Senhadji (1998), and Reinhart (1995). The conclusion of these studies is that, in general, income and relative prices are significant determinants of import performance, but the price elasticities tend to be low, in most cases way below unity. Income elasticities, however, tend to be above unity. Reinhart (1995) provides a set of interesting results for developing countries, where the elasticities differ considerably across regions. The price elasticities for the regions are: Latin America: -0.36; Asia: -0.40; Africa: -1.36; All countries: -0.53. The income elasticities are: Latin America: 0.96; Asia: 1.39; Africa: 1.14; All countries: 1.22.

5.3.2 Import demand and trade liberalisation

The influence of trade liberalisation on import performance, and the behaviour of import demand elasticities during the process of reform, have been analysed in different ways. Melo and Vogt (1984) propose two interesting hypotheses in this regard, for which they found support by analysing the case of Venezuela. First,

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[3] The unit root tests and cointegration technique is a more appropriate method of estimating long run elasticities in a time series framework (see Bahmani-Oskooee and Niroomand, 1998 for a discussion of the issue).

they suggest that as the degree of import liberalisation increases, the income elasticity of demand increases. That is, the relaxation of controls will tend to increase the income elasticity automatically. Second, as economic development proceeds, the price elasticity of import demand also rises as the ability to substitute domestic production for imports (import substitution) becomes easier.

Nevertheless, the subsequent empirical evidence regarding the hypotheses has not been conclusive. For instance, Boylan and Cuddy (1987) examined the two hypotheses for the case of Ireland and did not find empirical support for them. Mah (1999) argues that Boylan and Cuddy's findings are misleading because of methodological shortcomings. Mah (1999) examines the Melo-Vogt (1984) hypotheses during the process of economic development in Thailand using, according to the author, 'a more appropriate empirical technique'. The results support the hypothesis related to the income elasticity, showing that the income elasticity increased as a result of trade liberalisation. However, the price elasticity was not found to be responsive to trade liberalisation.

Bertola and Faini (1991) provide one of the earliest studies of the impact of trade liberalisation on import demand for a developing economy, accounting for the response of imports to the elimination of tariff and non-tariff barriers. Through the development of a theoretical model and empirical application to Morocco, the authors show that quantitative restrictions (QRs) had a significant impact not only on the level of imports, but also on their sensitivity to income and price variations. For instance, the authors demonstrated that, had QRs for consumption goods been lifted in 1985 (the date used for the prediction test), their income elasticity would have increased from 0.93 to 1.20.

Faini *et al* (1992) study the impact of trade policy on import demand in developing countries. The authors focus on the impact of import controls, assuming two categories of imports, that is, those subject to quantitative restrictions, and those that can freely enter the country. They show that estimated income elasticities in developing countries are generally higher than unity, and that relative prices are significant with an elasticity less than unity. Another finding is that when the lack of foreign exchange or, more generally, a restrictive trade regime effectively constrains import flows, the measured impact of price and income elasticities becomes less evident. The results of Faini *et al* suggest that the real effects of income and price changes (e.g. a devaluation) on import behaviour are more evident when the impact of import controls and/or liberalisation policies is also included in the analysis. Thus, import demand studies, which do not evaluate the effect of import policy changes, should be interpreted with caution, as far as the estimates of the income and price elasticities are concerned.

5.4 The model and results

5.4.1 The model

Traditional dynamic import demand functions relating import flows to relative price and domestic incomes are estimated. Additionally, the functions include the effect of import duties on import growth, and the effect of trade liberalisation through the use of dummy variables. Also, we test if the income elasticity of import demand changes with trade liberalisation, and also if the price elasticity changes as the ability to substitute domestic production for imports becomes

easier. The assumption is that trade liberalisation (i.e. the reduction and/or elimination of trade policy distortions) has a significant impact not only on the autonomous growth of imports, but on their sensitivity to income and price variations as well.

Using the dynamic specification of the import growth function presented in equation (5.3), the augmented import growth function which also allows for the effects of import duties and trade liberalisation on import growth, can be expressed as:

$$m_{it} = \alpha_i + \beta_1 pm_{it} + \beta_2 y_{it} + \beta_3 m_{it-1} + \beta_4 d_{it} + \beta_5 lib_{it} + \varepsilon_{it} \qquad (5.4)$$

where α_i are country-specific effects (when panel data are used), d_{it} is import duties, and lib_{it} is a shift dummy variable for the years following significant liberalisation. The rest of the variables are as defined earlier, and we expect $\beta_1 < 0$, $\beta_2 > 0$, $0 < \beta_3 < 1$, $\beta_4 < 0$ and $\beta_5 > 0$.

Trade liberalisation can also affect the price and income elasticities themselves, as suggested by the Melo-Vogt (1984) hypotheses discussed earlier. Such interaction effects can be estimated by including two slope dummy variables, $y \times lib$ and $pm \times lib$, to capture the joint effects of the elimination of import distortion measures on income and price elasticities, respectively. Thus, we also estimate:

$$m_{it} = \alpha_i + \beta_1 pm_{it} + \beta_2 y_{it} + \beta_3 m_{it-1} + \beta_4 d_{it} + \beta_5 lib_{it} + \beta_6 (pm \times lib)_{it} + \beta_7 (y \times lib)_{it} + \varepsilon_{it} \qquad (5.5)$$

5.4.2 Empirical estimations

To estimate the import growth functions presented in equations (5.4) and (5.5), which allow for the effects of import policy distortions and trade liberalisation on import performance, two approaches are used. The first is the estimation of dynamic panel models by fixed-effects (FE), and by generalised method of moments (GMM). The second approach is the use of time-series/cross-section analysis for all the countries, as well as for the different geographic regions studied of Africa, East Asia, South Asia, and Latin America. Dynamic panel data analysis is used because of the assumption of the lagged adjustment of import growth to the growth of the previous period, as outlined in Section 5.3.

5.4.2.1 Fixed effects and generalised methods of moments

The results from both estimators are reported in Table 5.3. The fixed effects results in column (i) show that all the arguments of the import growth function have the expected sign. However, the relative price indicator is not statistically significant. The coefficient on the lagged dependent variable is so small that there is virtually no difference between short and long run income and price elasticities. The import tariff coefficient (-0.20) and the trade liberalisation dummy (3.20) are statistically significant, showing that both the reduction of imports duties, as well as the reform of the trade policy regime, had a marked impact on import performance.

Table 5.3

Import performance in selected developing economies: 1972-98

Explanatory variables:	Dependent variable: import growth m_t			
	Fixed effects		*GMM*	
	(i)	*(ii)*	*(iii)*	*(iv)*
pm	-0.10	-0.15	-0.18	-0.16
	(1.28)	(2.89)**	(2.43)*	(2.66)**
y	1.65	1.91	1.31	2.60
	(10.03)**	(8.47)**	(5.48)**	(5.41)**
m_{t-1}	0.01	0.10	0.04	0.08
	(0.48)	(2.53)*	(0.43)	(0.20)
d	-0.20	-0.20	-0.35	-0.43
	(2.26)*	(2.34)*	(1.86)§	(3.60)**
lib	3.20	6.19	1.99	9.10
	(2.17)*	(3.03)**	(4.22)**	(2.12)*
$y \times lib$		0.59		0.93
		(1.81)§		(2.57)**
$pm \times lib$		-0.23		-0.40
		(2.12)*		(2.85)*
y_{LR}	1.67	2.12	1.36	2.82
pm_{LR}	-0.10	-0.17	-0.19	-0.17
	Diagnostic statistics			
R^2	0.48	0.59		
Omit $y \times lib$, $pm \times lib$		9.61**		15.92**
Heteroscedasticity test	1.93	24.5**		
Wald test			[0.000]	[0.000]
Sargan test			[0.452]	[0.482]
1st-order serial correlation			[0.000]	[0.008]
2nd-order serial correlation			[0.418]	[0.436]
Number of observations	504	504	386	386

Notes:

1. Figures in parentheses ( ) are absolute t-ratios; figures in brackets [ ] are p-values; §, *, ** indicates that a coefficient is significant at the ten percent, five percent, and one percent level respectively.
2. y_{LR} and pm_{LR} are the long run income and price elasticities respectively.
3. Omit $y \times lib$, $pm \times lib$ is the F-statistic for the omission of these two variables from the regression.
4. The Heteroscedasticity test is based on a regression of the residuals on the squared fitted values. The Wald test is for the joint significance of the regressors. The Sargan test is of over-identifying restrictions. The tests for first and second order serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1991). The p-values report the probability of rejecting the null hypothesis of no serial correlation, where the first differencing will induce (MA1) serial correlation if the time-varying component of the error term in levels is a serially uncorrelated disturbance.
5. The GMM estimations were performed using the program DPD98 for Gauss (Arellano and Bond, 1998).

In Column (ii), the short run income and price elasticities are both statistically significant, as are the import duty and trade liberalisation coefficients. The import duty coefficient is -0.20, and the shift dummy coefficient of 6.19 shows that there is a significant import response to trade liberalisation. Also, the Melo-Vogt (1984) hypotheses are confirmed, since both slope dummy the coefficients are significantly different from zero, and they show the expected signs. Moreover, the two interaction variables are jointly significant, with an F-statistic of $F(2, 475)= 9.61$.

Turning now to the GMM estimates, the results presented in columns (iii) and (iv) endorse the findings of the fixed effects estimations. Income and price elasticities are highly significant and the magnitudes are similar to the fixed effect estimates. More interesting are the results concerning import duties and trade liberalisation measures. As can be seen from column (iii), import tariffs negatively affect imports: the estimated coefficient is -0.35, and the independent impact of trade liberalisation as shown by the trade liberalisation coefficient (1.99) is statistically significant.

Column (iv) shows the GMM results, which consider the interaction effects involving trade liberalisation and income and price elasticities, proposed by the Melo-Vogt hypotheses. Looking at the import duty coefficient, it is statistically significant and the magnitude of the coefficient is higher than in the previous case (-0.43). Also, the estimated import duty elasticity (-0.82) verifies the strong negative impact that tariffs inflict on import growth. The trade liberalisation coefficient is 9.10, indicating that the lessening of trade policy barriers has more

than doubled import growth compared to the pre-liberalisation period. The Melo-Vogt hypotheses are again confirmed.

5.4.2.2 Regional and trade policy disaggregation

In this section, the time-series/cross-section (TSCS) model is implemented which is appropriate to analyse data observed for a relatively large number of periods and for a relatively small number of cross sectional units. It also allows for the error term of each cross section unit to be freely correlated across equations. The relevance of this type of model is that the error term does not need to be the same for each country[4]; thus, it is suitable to explore region or group specific estimations.

The evaluation of trade policy reforms in the different regions, and the classification of countries according to the degree of restriction of the trade policy regime, suggest that the impact of trade liberalisation on import growth might differ across those regions or groups of countries. Also, the price and income elasticities can vary across such groups, as suggested by studies, which deal with multi-country analysis of import demand functions (see Reinhart, 1995; Bahmani-Oskooee and Rhee, 1997; and Senhadji, 1998).

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[4] The estimator is a three-step generalized least squares estimator with maximum likelihood estimates (MLE) interaction. The model allows for groupwise heteroscedasticity, cross-group correlation, and within-group autocorrelation (see Greene 1997, Chapter 16).

(i) The impact of liberalisation according to regions

Table 5.4 presents the estimation of equation (5.5) for the different geographical regions that comprise this study. The countries in the sample were classified into four zones: Africa, East Asia, South Asia, and Latin America. The results for all the countries presented in column (i) validate the findings of the dynamic panel data estimates. The growth of real GDP proves to have a significant, positive impact on import growth, as shown by the short and long run income elasticity values (1.65 and 1.68, respectively). The import price elasticity has the expected sign, although is not statistically significant. The results also confirm the significant influence that import tariffs and trade liberalisation have on import growth. The shift dummy coefficient is 6.73 percentage points. Additionally, there is evidence that trade liberalisation raises the sensitivity of imports to real income growth, and to relative price changes.

As expected, the region-specific results present outcomes that are more mixed. Regarding the income and price elasticities, the East Asia region presents the highest long run income elasticity (1.98), although Latin America and Africa also show relatively high income elasticities (1.79 and 1.33, respectively). Regarding the long run price elasticity, Latin America possesses the highest elasticity (-0.17), while Africa has the lowest elasticity, (-0.01), (which is not statistically different from zero)[5].

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[5] For Africa and Latin America, the negative coefficient on the lagged dependent variable indicates a non-equilibrium (i.e. divergent) path for import growth.

Table 5.4

Three-step generalised least squares and maximum likelihood estimation: regional disaggregation (1972-98)

Explanatory variables:	Dependent variable: import growth m_t				
	All Countries	*Africa*	*East Asia*	*South Asia*	*Latin America*
	(i)	*(ii)*	*(iii)*	*(iv)*	*(v)*
pm	-0.11	-0.01	-0.16	-0.09	-0.19
	(0.60)	(1.40)	(1.84)§	(1.15)	(4.21)**
y	1.65	1.44	1.92	0.80	2.01
	(11.05)**	(4.27)**	(8.05)**	(1.87)§	(8.37)**
m_{t-1}	0.02	-0.08	0.03	0.03	-0.12
	(2.49)*	(0.91)	(0.48)	(0.23)	(2.59)**
d_m	-0.20	-0.15	-0.72	-0.20	-0.35
	(2.39)*	(0.69)	(2.68)**	(2.03)*	(1.78)§
lib	6.73	8.44	4.12	1.41	1.10
	(3.37)**	(3.13)**	(1.99)*	(2.97)**	(1.93)§
$y \times lib$	0.22	1.53	0.41	3.76	0.42
	(1.96)*	(3.26)**	(1.79)§	(3.82)**	(1.70)§
$pm \times lib$	-0.24	-0.34	-0.29	-0.05	-0.21
	(3.52)**	(2.34)*	(2.36)*	(0.18)	(2.03)*
y_{LR}	1.68	1.33	1.98	0.82	1.79
pm_{LR}	-0.11	-0.01	-0.16	-0.09	-0.17
	Diagnostic statistic				
LRS	232.92	13.98	8.90	4.31	45.48
	[38.93]	[18.31]	[18.31]	[7.81]	[51.00]
Number of observations	462	105	105	63	189

Notes:

1. Figures in parentheses ( ) are absolute t-ratios; §, *, ** indicate that a coefficient is significant at the ten percent, five percent, and one percent level respectively.
2. and pm_{LR} are the long run income and price elasticities respectively.
3. Likelihood Ratio Statistic (LRS) is a test for serial correlation. The numbers in brackets [ ] are the critical values.

The trade policy related indicators also provide diverse results across the regions studied. The estimated import duty coefficients are significantly different from zero in all cases, except Africa, and the magnitude of the coefficients is relatively high in the different regions[6]. Moreover, trade policy reforms emerge as a more important determinant of import growth in all of the regions. According to the estimations, trade liberalisation had the strongest impact on import growth in Africa, that is 8.44 percentage points, which implies that liberalisation increased import growth by more than 1000 percent in this region (starting from a very low base). The impact of liberalisation in East Asia, South Asia and Latin America is also comparatively high - 4.12, 1.41, and 1.10 percentage points respectively. The results show that the elimination, and/or reduction, of restrictive measures affecting international trade have played a major role in affecting import growth.

(ii) The impact of liberalisation according to degree of protection

Another set of time-series/cross-section estimations are presented in Table 5.5, which portrays the analysis of import growth in the sample of countries divided according to classification of the trade policy regimes based on the criteria discussed in Section 5.3 (see Table 5.2)[7]. The explanation is that the sensitivity of

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[6] However, as can be seen in Table 5.1, Cameroon, Malawi and Tunisia fall into the categories of countries with high import duties as a share of total imports, with duty ratios above 20 percent before and after liberalisation.

[7] The Heritage classification starts from 1995. Thus, in order to assess the impact of tariff and non-tariff barriers for the whole number of observations analysed in the present study, a new classification covering the complete period (1976-1998) was undertaken. This classification is based on the Heritage Foundation's criteria (see Table C5.2 annexed).

imports to liberalisation will be higher in countries which are most highly protected since the barriers to entry will be much greater. As in the region-specific case, the results vary according to the characteristics of the particular categories, providing insight into the differential impact that a country's trade policy (i.e. tariff and non-tariff barriers) has on import growth, and on the arguments of the import growth function.

The estimated import duties coefficient is significantly different from zero in all the cases except in the "low-moderate" category, and the coefficient is larger, i.e. more negative, in the "high-very high" classification, as expected. The estimates for the trade regime liberalisation, which involve the reduction and/or elimination of major import barriers, appear to be a more crucial determinant of import growth.

Moreover, the findings confirm the positive impact that trade reform has on import growth. According to the results, trade liberalisation has the strongest positive impact on import growth in those countries with initially "high-very high" restrictive trade regimes. The influence of trade liberalisation on import growth in this case is 4.93 percentage points, or in other words, liberalisation increased import growth by 145 percent compared to the period of pre-liberalisation. The relative impact of liberalisation in countries with "low-moderate" trade policy distortions is smaller in comparison to the other classifications, which is to be expected given the initial conditions regarding trade policy and the use of instruments that directly affect import flows. In this case, trade liberalisation has a relatively small impact of only 1.02 percentage points (a

19 percent increase). It is clear from the analysis that initial trade policy conditions affect the response of import growth in the liberalisation process.

Table 5.5

Three-step generalized least squares and maximum likelihood estimation: disaggregation according to the degree of protection (1972-98)

Explanatory variables:	Dependent variable: import growth m_t		
	All Countries	*Low-Moderate*	*High-Very high*
	(i)	*(ii)*	*(iii)*
pm	-0.01	-0.11	-0.01
	(0.42)	(2.66)**	(1.28)
y	1.66	2.00	1.03
	(11.03)**	(11.45)**	(4.82)**
m_{t-1}	0.01	0.10	-0.04
	(0.32)	(2.66)**	(0.62)
d_m	-0.25	-0.03	-0.16
	(2.75)**	(1.68)	(2.65)**
lib	5.94	1.02	4.93
	(2.76)**	(3.49)**	(1.85)§
$y \times lib$	0.36	0.41	0.60
	(3.26)**	(9.02)**	(2.18)*
$pm \times lib$	-0.24	-0.19	-0.33
	(3.33)**	(2.34)*	(1.34)
y_{LR}	1.68	2.22	0.99
pm_{LR}	-0.01	-0.12	-0.01
	Diagnostic statistic		
LRS	228.40	232.97	32.11
	[36.19]	[26.22]	[32.67]
Number of observations	420	273	147

Notes:

1. Figures in parentheses ( ) are absolute t-ratios; §, *, ** indicates that a coefficient is significant at the 10 percent, 5 percent, 1 percent level respectively.
2. y_{LR} and pm_{LR} are the long run income and price elasticities respectively.
3. Likelihood Ratio Statistic (LRS) is a test for serial correlation. The numbers in brackets [ ] are the critical values.
4. In this set of estimations, Indonesia and Zambia are not included because they switched regimes during the period. Hence, the sample size is slightly smaller than in Table 5.3 and Table 5.4.

(iii) Testing for equality of the coefficients across regions and according to the degree of protection

This section tests for equality of the coefficients across regions, as well as according to the classification based on the degree of trade policy distortions. To this end, likelihood ratio tests (with a chi-squared distribution) are calculated, where the four regions are compared in terms of the trade liberalisation effects, while still allowing the dynamics and price and income effects to differ between regions (see Table 5.6). Specifically, it requires comparing the restricted specification in which the regions have the same trade liberalisation coefficients (and different income and price effects and dynamics) with the unrestricted model where all the coefficients are allowed to vary.

The restricted likelihood is a modification of the first column of Tables 5.4 and 5.5 where the countries are pooled together, that is, a dummy for each of the four regions is interacted with the coefficients that are restricted and a *dummy for each of the regions and type of trade policy regime classification*. In all the cases, the likelihood ratio tests are higher than the critical values, thus the restrictions that the coefficients are the same for all the regions, and for the different degree of protection, are rejected.

Table 5.6

Restriction test for equality of coefficients across regions and trade policy regimes

Coefficient	Likelihood Ratio Statistic	
	Disaggregation	
	Regional	**According to the degree of protection**
d_m	30.02 [9.49]	52.60 [5.99]
lib	68.10 [9.49]	24.26 [5.99]
$y*lib$	50.02 [9.49]	32.08 [5.99]
$p*lib$	38.58 [9.49]	42.80 [5.99]
$d_x, d_m, lib, y*lib, p*lib$	78.86 [26.30]	65.26 [15.51]

Notes: Figures in brackets [] are critical values of χ^2. All the coefficients are significant at the 5 percent level.

5.5 The relative impact of import duties and trade liberalisation: summary of the results

The impact of import duty reduction and trade liberalisation episodes can be compared by calculating the *elasticity* of import growth to changes in the two variables, as in Chapter 4, and a summary is given in Table 5.7. It is clear in all cases that the impact of liberalisation has been greater than the isolated reduction of import duties. In all the estimations reported, trade liberalisation has raised

import growth by over 100 per cent, whilst import duty reductions increased import growth by about 50 percent. Tariff reductions and trade liberalisation, moreover, have a stronger positive effect on import growth in countries with initially highly restrictive trade regimes, as in the case of the African region, and countries classified as having high-very high degrees of protectionism.

Evaluating these findings in comparison to those obtained in Chapter 4, which analyses the relationship between trade liberalisation and export performance, it is apparent that the trade liberalisation process has a larger impact on import growth than export growth. Such findings do not come as a surprise, in the light of the trade policy practices in the countries before undertaking the reforms. The trade strategies prior to liberalisation included the use of development policies focused on restrictive trade practices such as import substitution, which concentrated on enhancing the ability to substitute domestic production for imports. The analysis above leads naturally to an investigation of the consequences of trade liberalisation on the trade balance and the balance of payments, and is the subject of Chapter 6.

Table 5.7

Import duty elasticities and relative impact of trade liberalisation

Estimation method:	Import duties (μ_d)	Liberalisation ($\%lib$)
Fixed effects:		
Equation (4)	-0.42	0.73
Equation (5)	-0.43	1.41
GMM:		
Equation (4)	-0.67	0.38
Equation (5)	-0.82	1.76
Time series/cross section (equation (5):		
Regional disaggregation		
All Countries	-0.42	1.53
Africa	-1.04	11.11
East Asia	-0.65	0.61
South Asia	-0.69	0.21
Latin America	-0.49	0.26
Disaggregation according to the degree of protection		
All Countries	-0.50	1.27
Low-Moderate	-0.04	0.19
High-Very high	-0.74	1.45

Notes:

1. The import duty elasticity is calculated as $\mu_d = (\overline{d}/\overline{m})(\partial m/\partial d) = (\overline{d}/\overline{m})\beta_1$, where $\overline{d}$ and $\overline{m}$ are the means of import duties and import growth respectively.
2. The proportionate impact of trade liberalisation is calculated as $\%lib = \beta_5/\overline{m}_{lib=0}$, where β_5 is the coefficient of trade liberalisation and $\overline{m}_{lib=0}$ is the mean of import growth before liberalisation.

5.6 Conclusions and policy implications

This chapter has examined, in a comprehensive and systematic fashion, import growth functions for a selection of developing countries. This is a detailed analysis of the major trade policies implemented in the 22 countries studied during the period 1972-1998, and dynamic panel data, and time series/cross section techniques have been applied to estimate the impact of trade reforms on import growth on average, and across regions.

Over the period considered, estimates of the income and price elasticities of demand for imports fall within the boundaries of the elasticities found in the previous empirical literature. The price and income elasticities have the expected sign and, in general, are statistically significant.

The main purpose of this chapter, however, has been to examine the extent to which trade-related measures affect import growth in developing countries. One of the indicators used to assess the impact of trade policy distortions on import growth is the level of import duties. It is found that import duty reductions raise import growth, but the effect varies according to the region and the type of trade policy regime prevailing in the country. The calculated import duty elasticities vary considerably amongst regions. Africa seems to be the most affected by tariff reductions, but the positive effect is also appreciable in the other regions. Also, the impact of import duties differs significantly according to the degree of protectionism and/or distortions of trade policy initially prevailing in the countries. Import duty reductions affect mostly countries classified as having high and very high levels of protectionism.

As described earlier, the countries under study have all undertaken profound trade reforms, in which the reduction and simplification of import tariffs, as well as the elimination of non-quantitative restrictions, were fundamental elements of the liberalisation process. The results here provide empirical evidence supporting the premise that the elimination of trade policy distortions has a strong, positive impact on import growth. Specifically, trade liberalisation has more than doubled import growth on average across all countries, but, as the regionally disaggregated estimations show, the import duty elasticities and the relative impact of trade liberalisation vary considerably across regions and types of trade policy regimes.

We also tested the Melo-Vogt (1984) hypotheses. The Melo-Vogt hypothesis concerning the increase of income elasticities following import liberalisation is supported by the different exercises undertaken in this study. The higher income elasticities after liberalisation reflect an increase in the degree of openness to international trade of the countries analysed. The hypothesis of an increase in price elasticities as a result of import reform is also confirmed in most cases.

The excessive import growth following trade liberalisation episodes has serious policy implications, especially for the balance of trade and balance of payments, because in most cases import growth has exceed export growth, causing trade imbalances. The balance of payments crises suffered by a large number of developing countries have revealed the extent to which growth rates have been constrained by their balance of payments positions (see Khan and Zahler, 1985). In many cases, trade policy reforms have not been accompanied by

an export promotion strategy, which would compensate for the higher imports generated by the relaxation of import barriers. Liberalisation needs to take place in such a way as to maintain a sustainable balance of payments position; otherwise, the resource gain from liberalisation can easily be offset by real resources losses arising from the need for balance of payments adjustments. We turn now to consider more precisely the balance of trade and balance of payments consequences of liberalisation for our sample of countries.

APPENDIX C

Data definitions and sources

Import growth (m): Imports of Goods and Services; annual percentage growth (constant 1995 US$). Source: World Bank, *World Development Indicators* (WDI), 2000.

Income growth (*y*): GDP; annual percentage growth (constant 1995 US$). Source: World Bank, *World Development Indicators* (WDI), 2000.

Import duties (*d*): Import duties (percent of imports). Import duties comprise all levies collected on goods at the point of entry into the country. They include levies for revenue purposes or import protection, whether on a specific or ad-valorem basis, providing they are restricted to imported products. Data are shown for central government only. Source: World Bank, *World Development Indicators* (WDI), 2000.

Real effective exchange rate (***pm***): The relative price of imports, $\left(\frac{P_f E}{P_d}\right)$, where P_f is foreign prices; E is the nominal exchange rate; and P_d is domestic prices, is calculated as the inverse of the REER. Data for the REER for Colombia, Costa Rica, Ecuador, India, Indonesia, Malaysia, Mexico, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Tunisia are from Bahmani-Oskooee and

Mirzai (2000), and the data file for such countries was kindly provided by Professor Bahmani-Oskooee. The REERs for the remaining countries are constructed from IMF's *International Financial Statistics* (various issues).

Table C5.1

Imports and exchange liberalisation in developing countries (1972-1998)

Region/Country	Reform: First	Reform: Most recent	Import and exchange policies reform measures
South Asia			
India	1989	1991	Some tariff increases and net additions to the OGL. Significant liberalisation of tariffs and QRs in the 1991 reform program. Unification of the exchange rate regime.
Pakistan	1989	1991	Replaced non-tariff barriers with tariff, reduction of maximum tariff rates and reduction of exemptions from tariff. Some restrictions in capital account transactions were removed in 1991, and new instruments are not subject to exchange controls.
Sri Lanka	1987	1990	Reduction of the range and number of goods requiring licensing. Exchange rate reform started in 1984. By 1994 most exchange controls were removed.
East Asia			
Indonesia	1985	1990	Reduction in the coverage of non-tariff import barriers. Tariffs were reduced to around 10 percent by 1993.
Korea	1984	1990 1998	Removed non-agricultural QRs. Reduction of unweighted average tariff.
Malaysia	1986	1989	Tariffs reductions were made between 1988 and 1992, in items including food, household goods, clothing, and electronic goods.
Philippines	1986	1989	Gradual replacement of QRs with tariffs. Reduction of tariff bands. Reform of customs procedures.
Thailand	1982	1990	Elimination of non-agricultural QRs. Tariffs reductions program, but later reversed.

Africa			
Cameroon	1989	1991	Elimination of QRs on imports.
Malawi	1988	1991	Reduction of import duties. Limitation of foreign exchange allocation to a small negative list. Transfer QRs to surtaxes.
Morocco	1983	1989	Reduction in QRs on non-competitive goods. Sharp reduction of maximum tariff; new tariff surcharge.
Tunisia	1987	1990	Gradual replacement of QRs with surcharges. Tariff reduction; increases in surcharges.
Zambia	1990	1990	Gradual increase of OGL and exchange rate unification. Reduction of maximum tariff rate and range.
Latin America and the Caribbean			
Chile	1985	1988	By 1985 Chile had virtually no QRs (and prohibited by the Constitution). Reduction of uniform non-tariff rate.
Colombia	1985	1991	Significant reduction in both levels and dispersion of tariff rates and expanded the number of tariff positions on the free import list. Reduction of the number of tariffs from 14 in 1990 to 4 in 1993. Elimination of import licensing. Liberalisation of the exchange rate. In 1991 all foreign exchange operations were to be transacted at the market determined exchange rate, and foreign exchange controls were relaxed, and foreign licenses were abolished.
Costa Rica	1985	1990	Reduction in average tariff rates and a decrease in the dispersion of rates. In January 1992 the foreign exchange system was deregulated, floated the exchange rate, opened the capital account, and eliminated foreign exchange controls.

Dominican Republic	1990	1992	Non-tariff barriers were largely dismantled. Tariffs reform (both number and rates). Customs modernisation. Simplification of the exchange rate system.
Ecuador	1985	1991	Segmented elimination of QRs. Tariff maxim reduced to 35 percent.
Mexico	1985	1988	Progressive removal of import restrictions and their replacement with tariffs. In 1986 import-licensing coverage was reduced, and in 1987 all minim prices were eliminated. The QRs have been almost eliminated from intermediate capital goods. In 1991 the foreign exchange markets were unified, and a band within the peso was allowed to fluctuate was established.
Paraguay	1989	1995	Simplification of the tariff structure and reduction of rates. Non-tariff barriers applied to few agricultural products were replaced by tariff. Exchange controls were abolished, establishing a free-floating exchange rate.
Uruguay	1983	1985	QRs and other barriers to trade were removed, trade regulations were simplified, and a gradual process of reducing import duties was established. Administrative controls have been reduced.
Venezuela	1989	1991	Virtual elimination of up front QRs (re-established by 1992). Reduction and rationalisation of maximum tariff. Unification of the four markets exchange rates. Foreign exchange controls were abolished.

Sources: Balasubramanyam (1995); Dean et al (1994); Greenaway (1993); IMF (1998, 1999); Michaely *et al* (1991); Rodrik (1997); Musonda and Adam (1999); UNCTAD (1999); Winglee *et al* (1992); WTO *Trade Policy Reviews* (1995a-d, 1996a-c, 1997a-d).

Note: OGL denotes open general license; QRs denotes quantitative restrictions.

Table C5.2

Classification of countries according to trade policy regime

Classification/Countries	
Low-Moderate	
Chile	Paraguay
Colombia	Philippines
Costa Rica	Sri Lanka
Ecuador	Thailand
Korea	Uruguay
Malaysia	Venezuela
Mexico	
High-Very high	
Cameroon	Morocco
Dominican Republic	Pakistan
India	Tunisia
Malawi	

Note: The classification presented in this table is based on the Heritage Foundation criteria in terms of tariffs and non-tariffs barriers. The background information is taken from Table 5.1, Table 5.2, and Table C5.1.

Chapter 6

TRADE LIBERALISATION, THE BALANCE OF TRADE AND THE BALANCE OF PAYMENTS

6.1 Introduction

Developing countries have experienced extensive and rapid trade liberalisation in recent years, undertaken both in the context of multilateral trade negotiations, and as part of the conditionality linked to structural adjustment and stabilisation programmes agreed with the International Monetary Fund (IMF) and the World Bank.

Following trade liberalisation, Krueger (1978) suggests that there is evidence that import flows respond more rapidly than exports to trade liberalisation, causing 'temporary' trade imbalances[1]. However, up to now there has been no in-depth systematic empirical study of the impact of trade liberalisation on the balance of trade and the balance of payments taking a large sample of countries.

The aim of this chapter is to examine the balance of payments consequences of trade liberalisation for the sample of 22 developing countries analysed in the

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[1] Also, Khan and Zhaler's 1985 study for some southern Latin American countries suggests that external shocks and inappropriate domestic policies played a significant role in undermining the trade liberalisation attempts. The authors show that the elimination of trade barriers and capital controls entail certain costs (i.e. rise in real interest rates, decline in output and employment, increase in foreign debt and a worsening of the current account), which can be reduced by an appropriate mixture of exchange rate, wage rate and demand management policies.

previous two chapters, for the period 1972-1998. The chapter will focus on examining what has been the impact of trade liberalisation on the trade and current account balances of the balance of payments; and the main question is whether there has been an improvement or deterioration in such accounts following the trade reform programmes. The liberalisation episodes are measured in two ways, as in Chapters 4 and 5. First, an indicator of the duties applied to exports and imports is used; second, a dummy variable is applied to the year identified as the main liberalisation episode, based on the criteria published by the World Trade Organisation *Trade Policy Reviews*, the World Bank and IMF country and region specific studies (and other sources).

The chapter also looks at differences in the performance in Africa, Latin America, East Asia and South Asia, and the countries are also classified according to the degree of protection of the trade regime. This is the first study to evaluate this matter systematically, employing different estimation procedures, including dynamic panel data analysis (using fixed effects and generalised methods of moments –GMM).

The rest of the chapter is presented as follows. The analysis of the trade performance and liberalisation in the different regions is introduced in Section 6.2. Section 6.3 reviews the different theories of balance of payments determination. The framework for the empirical analysis and the results are presented in Section 6.4. Section 6.5 provides the concluding remarks.

6.2 Trade performance and liberalisation

Foreign exchange shortages and balance of payments constraints have been a major consideration in the design of trade policies in developing countries. In many circumstances, highly protected trade regimes (in this case, characterised by tariffs as well as the wider use of other non-tariff instruments) have been established as a response to serious balance of payments difficulties (i.e. trade and current accounts deficits), and as a mean of preserving macroeconomic stability and economic growth.

Most of the countries comprised in this study reformed their trade regimes in the mid-1980s (Chile in the mid-1970s), easing trade policy controls (predominantly over imports) mostly in periods of trade surplus[2], and also opened their capital accounts afterwards.

In the specific case of export policies, there are a number of restrictions or anti-export bias (disincentives to exports) that have been liberalised or lifted. The elimination of export taxes, together with tariff reforms, were commenced in all the countries to reduce the anti-export bias prevailing as a result of the import substitution policies. Also, administrative and other non-quantitative barriers have been eliminated, as explained in Chapter 4. The allowance of foreign competition, mainly in the form of liberalisation of FDI regulations and tax incentives for

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[2]By contrast, as UNCTAD (1999) shows, the latest reforms in Latin American and African countries have diverged radically from this pattern, undertaking "big bang" types of liberalisation, and maintaining them despite increasing trade deficits. According to UNCTAD, only a small number of countries in East Asia followed a selective and gradual approach to trade liberalisation, customising the

foreign firms (multinational corporations, MNCs), was another feature of policies aimed at eliminating the anti-export bias.

In relation to import liberalisation, substantial reforms and reductions of tariffs have been achieved, as outlined in Chapter 5. However, the same target has not been attained as regards non-tariff barriers. Amongst the main non-tariff barriers affecting imports can be mentioned: import licensing requirements; standards and administrative requirements, applied to ensure the quality of goods seeking access to domestic markets (which countries use as a protectionist measure); anti-dumping and Countervailing Measures[3]; government procurement; barriers to trade in the service sector; lack of adequate protection of intellectual property rights; etc.

Also, exchange rate policy reforms were an integral part of the liberalisation episodes. More specifically, in countries with extensive foreign exchange distortions the reforms included the unification of the exchange rate regime and the removal (or relaxation) of exchange controls.

In relation to the previous discussion, descriptive statistics will now be set out, before doing detailed statistical analysis, holding other variables constant. Table 6.1 shows the behaviour of trade taxes and the trade balance before and after liberalisation, and the countries are classified according to the overall performance of the trade balance (averages of trade balance as a proportion of GDP), that is, whether it improved or deteriorated after liberalisation.

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process of trade openness to the level of economic development and macroeconomic performance, and the institutional capacity existing.

[3] These barriers are used, and permitted by the WTO under special circumstances, to protect domestic industry from imperfect competition arising from dumped or subsidised imports.

Table 6.1

Trade taxes and trade balance before and after trade liberalisation

Country	Year of liberalisation	Before liberalisation (from 1972)				After liberalisation (up to 1998)			
		Import duties	Export duties	Trade balance	Current account	Import duties	Export duties	Trade Balance	Current account
						Trade balance improvement			
TB ≤ 2									
Chile	1976	13.9	0.0	-1.2	-6.7*	12.4	0.0	0.2	5.1
Korea	1990	8.7	0.0	-0.9	-0.7	5.6	0.0	-0.1	-0.1
Dom. Rep.	1992	18.9	5.3	-7.4	-4.3	15.0	0.0	-6.6	-3.2
Ecuador	1991	15.8	1.6	0.1	-5.3	8.9	0.3	1.4	-4.3
Sri Lanka	1990	13.4	13.5	-10.6	-5.9	13.4	0.7	-9.1	-4.5
Tunisia	1989	23.8	1.2	-6.3	-6.0	21.3	0.3	-4.4	-4.2
Venezuela	1991	10.1	0.0	3.1	0.9	10.1	0.0	5.1	1.8
2 < TB ≤ 5									
Cameroon	1991	21.7	4.2	-0.9	-5.6	21.0	1.8	2.8	-2.8
Pakistan	1991	26.8	4.0	-10.1	-3.3	21.3	0.0	-6.5	-4.1
Paraguay	1989	8.6	0.7	-5.8	-5.6	4.9	0.0	-3.1	-1.4
Thailand	1986	12.8	2.7	-4.7	-5.3	9.7	0.3	-1.6	-3.4
Uruguay	1985	16.3	1.1	-1.3	-3.4	10.7	0.4	2.4	-0.7
5 < TB ≤ 10									
Morocco	1984	19.1	2.1	-14.0	-11.0	16.7	0.5	-9.0	-1.9

Country	Years of liberalisation	Before liberalisation (from 1972)				After liberalisation (up to 1998)			
		Import duties	Export duties	Trade balance	Current account	Import duties	Export duties	Trade balance	Current account
						Trade balance deterioration			
TB ≤ 2									
Costa Rica	1990	9.7	7.9	-2.8	-8.2	8.0	2.6	-3.1	-4.3
India	1991	38.6	1.4	-2.1	-1.0	27.8	0.2	-2.4	-1.1
Indonesia	1986	4.8	0.6	4.0	-1.7	5.1	0.5	2.4	-1.9
Malaysia	1988	8.4	6.9	3.4	-1.8	5.1	1.7	3.1	-3.6
Mexico	1986	8.3	2.0	2.1	-1.9	4.7	0.0	-0.3	-2.8
Philippines	1986	13.5	1.4	-2.9	-5.3	14.0	0.1	-4.3	-2.6
2 < TB ≤ 5									
Colombia	1991	15.0	4.5	0.4	-1.3	9.2	0.3	-3.3	-2.8
Zambia	1990	10.1	2.4	-1.1	-12.1	16.7	0.0	-5.7	-4.4
5 < TB ≤ 10									
Malawi	1991	21.5	0.4	-7.6	-10.1	21.4	0.0	-13.2	-58.3

Sources: Dean *et al* (1994), IMF (1998, 1999), Joshi and Little (1996), UNDP/UNCTAD (1999), Winglee *et al* (1992), World Bank (1999, 2000), WTO *Trade Policy Reviews* (various issues).

Notes: The values are period averages, and are the author's calculations. Trade Balance (*TB*) improvement/deterioration refers to percent of GDP.

Table 6.2

Growth of exports and imports and movements of the real exchange rate after trade liberalisation: 1976-98

Country	Years of liberalisation	First two years after liberalisation growth of			Subsequent years (to 1998) growth of		
		Exports	Imports	Real exchange rate	Exports	Imports	Real exchange rate
Africa							
Cameroon	1991	-5.6	-9.3	-2.9	2.1	7.7	-3.3
Malawi	1991	-4.0	3.6	-2.9	9.8	5.4	-4.1
Morocco	1984	6.0	0.01	-5.5	7.9	7.0	0.5
Tunisia	1989	1.8	2.5	-0.9	6.0	4.5	0.3
Zambia	1990	26.6	16.1	-5.4	-0.6	-2.3	3.5
Latin America							
Chile	1976	11.5	26.5	-3.8	8.6	9.4	-0.7
Colombia	1991	5.9	38.2	4.1	6.8	8.9	9.4
Costa Rica	1990	10.3	11.8	-0.5	8.0	8.1	1.9
Dominican Republic	1992	64.8	2.5	4.3	12.1	8.9	2.1
Ecuador	1991	7.0	0.9	6.9	5.2	4.6	2.7
Mexico	1986	8.4	20.9	9.5	12.0	14.1	2.7
Paraguay	1989	19.0	98.0	6.6	6.6	5.1	0.7
Uruguay	1985	1.5	22.6	-2.3	9.0	10.5	4.6
Venezuela	1991	5.0	9.9	4.5	7.6	4.1	11.8

Country	Years of liberalisation	First two years after liberalisation growth of			Subsequent years (to 1998) growth of		
		Exports	Imports	Real exchange rate	Exports	Imports	Real exchange rate
East Asia							
Indonesia	1986	7.8	-8.4	-16.2	9.1	12.0	0.15
Korea	1990	11.2	12.3	-2.9	17.0	7.6	0.3
Malaysia	1988	17.3	25.1	-1.1	13.5	10.5	-2.1
Philippines	1986	10.6	24.1	-6.2	10.3	9.5	1.7
Thailand	1986	24.5	36.6	-6.4	12.4	7.9	1.0
South Asia							
India	1991	11.0	14.9	-8.1	13.4	14.7	1.5
Pakistan	1991	7.6	22.8	-1.2	-1.1	-1.7	-0.5
Sri Lanka	1990	9.8	12.3	1.6	8.8	9.1	1.6
Averages		11.7	17.5	-1.3	8.4	7.5	1.6

Sources: Dean *et al* (1994), IMF (1998, 1999), Joshi and Little (1996), UNDP/UNCTAD (1999), Winglee *et al* (1992), World Bank (1999, 2000), WTO *Trade Policy Reviews* (various issues).

In almost half of the sample, there was a deterioration of the trade balance ranging from 0.3 to 13 percent of GDP, following the reduction in trade taxes, mainly on imports. Although in some cases there were improvements in the trade account, the deficits remained.

Table 6.2 provides figures on the performance of exports, imports and real exchange rates in the developing countries comprising the present study. A distinction is made between the growth of the variables in the first two years after liberalisation, and during the succeeding period covered by the study (that is, until 1998). In the first two years following trade liberalisation, imports grew faster than exports in all the countries except Cameroon, Morocco, Zambia, Dominican Republic, Ecuador and Indonesia, and the real exchange rate depreciated in nearly all countries during the same period. However, the effect of this devaluation in improving competitiveness and raising export growth is not clear in all the cases, and did not always compensate for the negative effect of a higher import growth on the trade balance in this initial post-liberalisation phase.

In the subsequent years, export growth accelerated in half of the countries. In some instances (Colombia, Mexico, Uruguay, Venezuela, Korea and India) this higher growth was complemented by slower import growth, while in others imports were sustained and continued to grow faster than exports. In Malawi, Morocco, Tunisia, Dominican Republic, Ecuador, Venezuela, Korea, Malaysia, Philippines, Thailand and Pakistan export growth exceeded import growth in the years after liberalisation.

Nevertheless, recalling the figures observed in Table 6.2, the trade deficit did not always contract after liberalisation, either because the pre-liberalisation

deficits were already very large, or the initial rise of imports was too strong, or exports did not react as much as imports to the lifting of trade restrictions. However, this remains very much an empirical question, and will be addressed in Section 6.4.

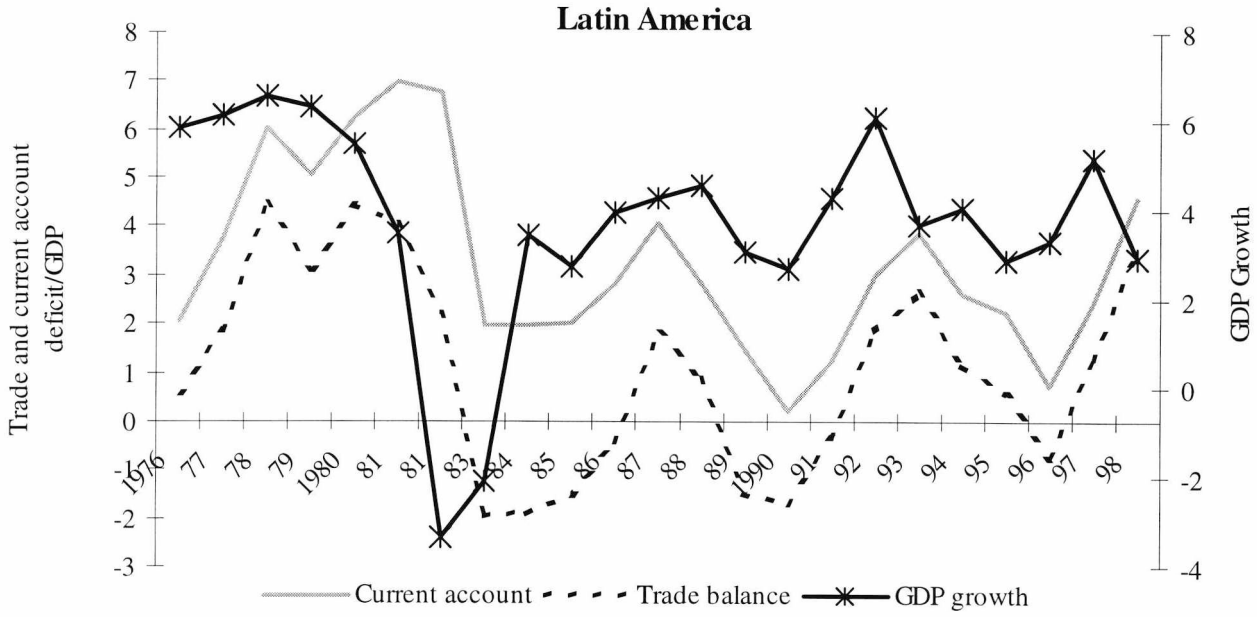
The change in the real exchange rate in this period is somewhat mixed, although in some countries of Latin America, East Asia, and South Asia an appreciation of the rate can be observed. However, it should be noted that because the figures presented correspond to long period averages (up to ten years), and also they embrace regional averages; specific events are not always illustrated by these results. In the case of the appreciation of the real exchange rate observed in some countries/regions following trade liberalisation, for example, the Mexican Peso continued to appreciate only until the crisis of 1994-95, and in the case of Malaysia and Thailand, the appreciation stopped with the collapse of the financial markets of 1997.

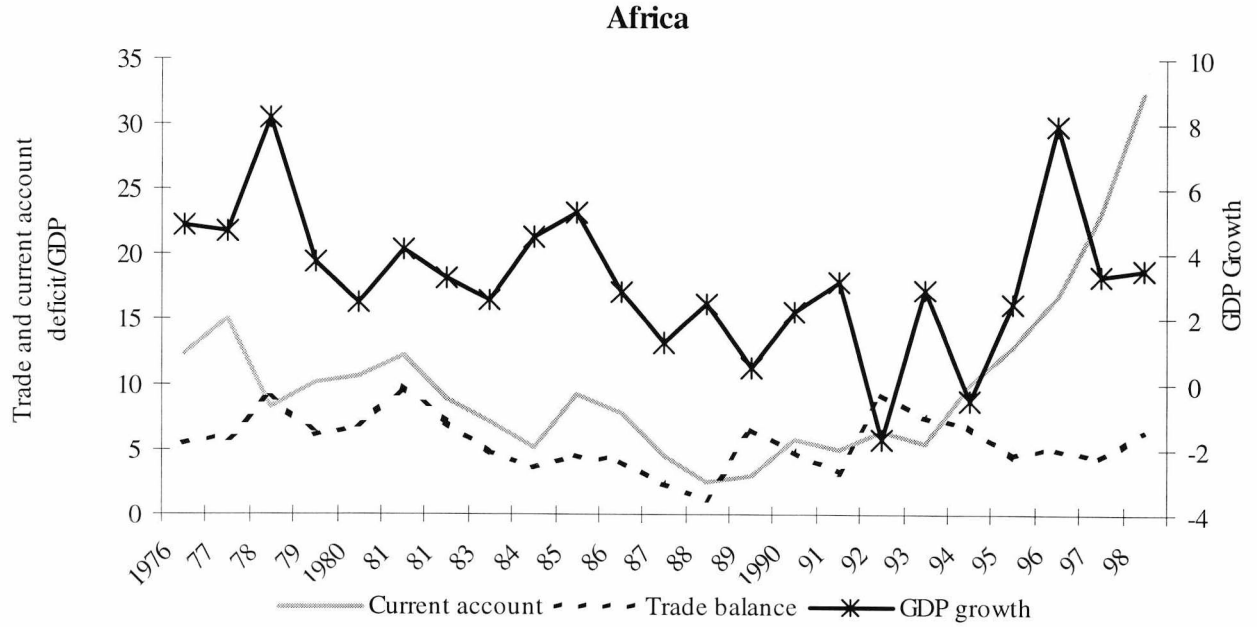
Figure 6.1 shows the trends on the current account and trade balance deficits as a share of GDP, as well as GDP growth in the sample under study. Since the beginning of the 1970s, the developing countries analysed in this study have evidenced current account deficits of between 2 and 10 percent of GDP on average.

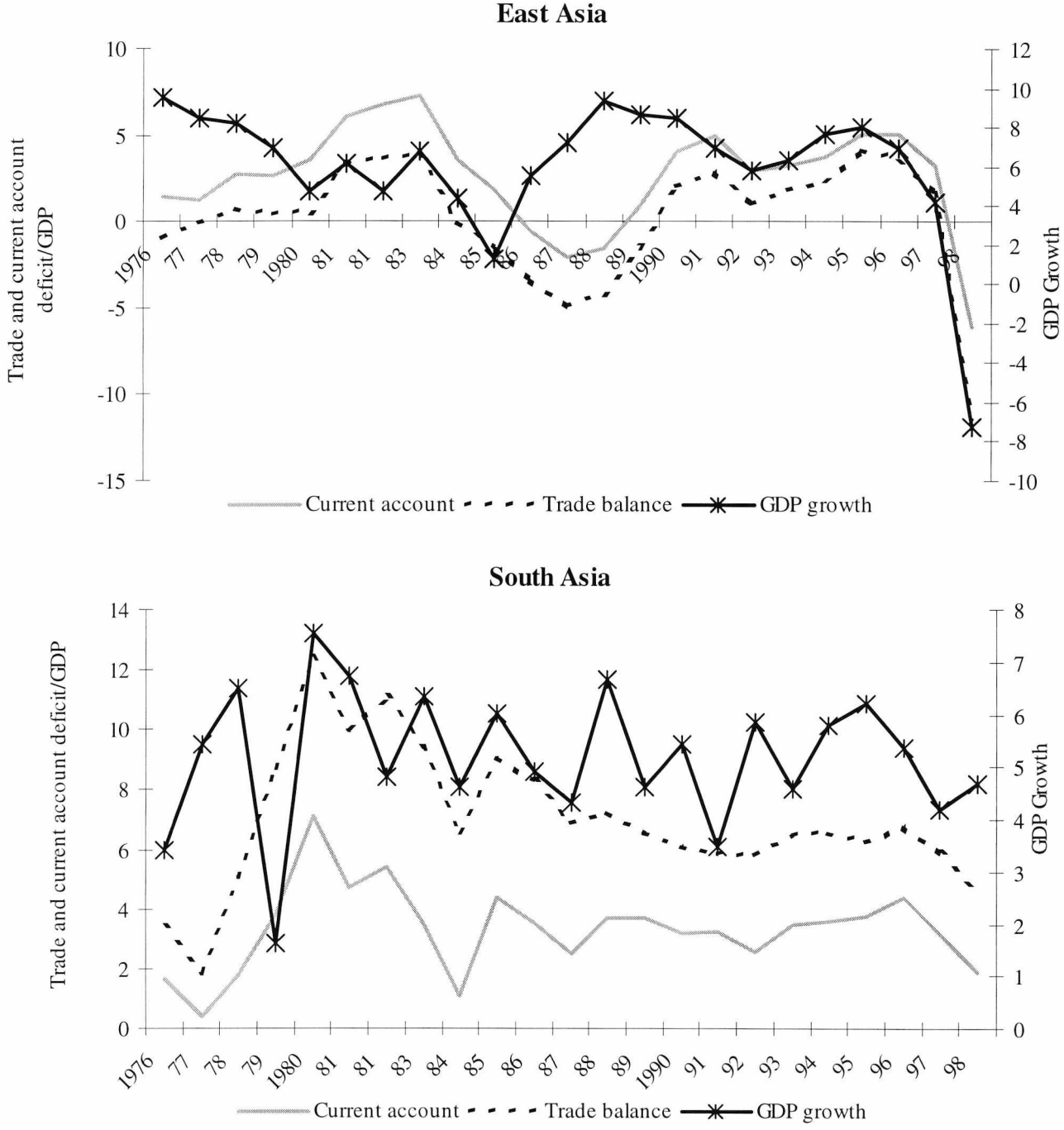
Figure 6.1

Current account and GDP growth in selected developing countries:

(1972-98)







Source: World Bank, *World Development Indicators*, 2000, CD.

Note: Positive values for the current account and trade balance indicate a deficit, negative values a surplus.

6.3 Trade liberalisation, the trade balance and the balance of payments: review of the theoretical modelling

This section reviews the different approaches to the theory of balance of payments adjustment, which provide an useful framework to analyse the effects of trade liberalisation on the balance of payments. In this case trade liberalisation is mainly understood as the reduction and/or elimination of export taxes and import tariffs.

After the collapse of the international gold standard in 1931, the analysis of balance of payments adjustment was dominated by the so-called 'elasticity approach'. The model focus was on the partial equilibrium effect of exchange rate changes and the price elasticities of demand for exports and imports in international trade, ignoring changes in income. Later on, when Keynesian economists introduced income analysis, new models of balance of payments adjustment were developed, which incorporated both the price and income effects of exchange rate variations. However, there were many criticisms of these models, mainly because of their partial equilibrium framework. This was the genesis of the so-called 'absorption approach to the balance of payments', which emphasised that movements in the balance of payments are explained by the policies that affect the total functioning of the economy, specifically how expenditure is affected in relation to output. Later on, the 'monetary approach' to the balance of payments was developed as an extension of the absorption approach, stressing balance of payments deficits as a monetary phenomenon to be rectified by monetary policy.

In what follows, these models will be introduced and modified to account for the effects of trade liberalisation, and more specifically of reductions in export

taxes and tariffs on the trade balance of the balance of payments and on the macro-economy (if there is any effect at all).

6.3.1 The elasticity approach

The elasticity approach to the balance of payments is based on several (restrictive) assumptions. Firstly, the analysis is founded upon partial equilibrium; that is, it only considers the effect of the real exchange rate variations in the market for exports and imports, holding everything else constant. Thus, the position of the demand curves for exports and imports themselves is held constant. However, in practice, changes on the exchange rate will have price and income effects elsewhere in the system affecting export and import demand curves. Secondly, all the relevant elasticities of supply of output are assumed to be infinite, so that the price of exports in the home country does not rise as demand changes; the price of foreign goods that compete with exports does not change as their demand varies; the price for imports in foreign currency does not change as the demand for imports changes; and the price of domestic goods does not change as the demand for import substitutes changes. Thirdly, the elasticity approach ignores the monetary effects of exchange rate changes. Fourthly, it is assumed that trade is initially balanced and that the change in the exchange rate is a small one.

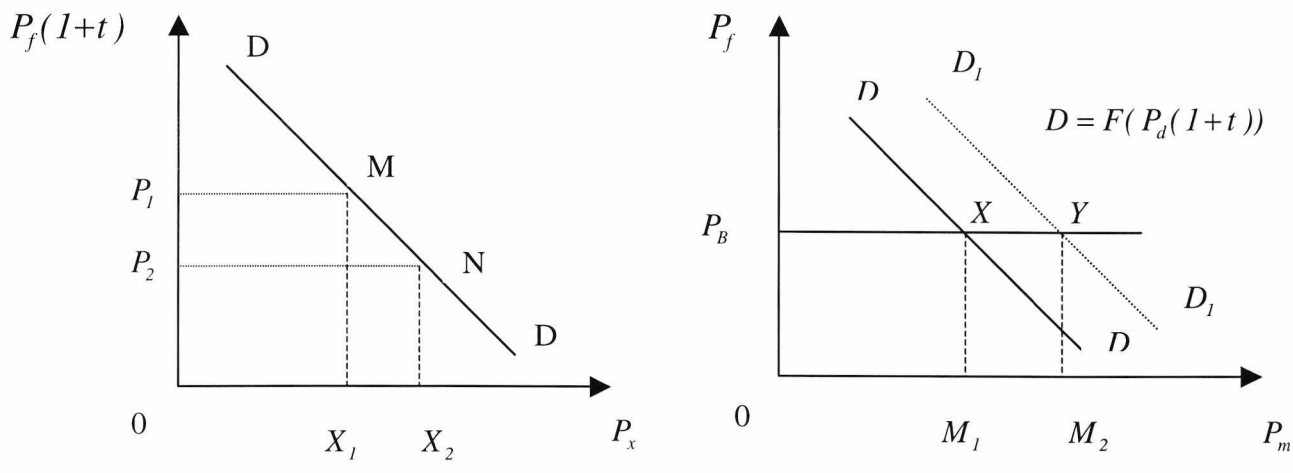
On the basis of the above assumptions, a reduction in taxes on international trade will improve or worsen the current account of the balance of payments depending on the elasticity of demand for exports and imports. Specifically, a reduction in export taxes reduces export prices in foreign currency. Export

earnings in foreign currency will improve if the price elasticity is greater than one, and fall if price elasticity is less than one. On the other hand, a reduction in tariffs reduces the price in domestic currency (with the foreign currency price the same), and import payments in foreign currency will rise if the price elasticity is greater than zero.

Figure 6.2 (a) for exports shows that a reduction in export taxes (t) which reduces price from P_1 to P_2 increases export earnings from $0P_1MX_1$ to $0P_2NX_2$ if the price elasticity is greater than unity. Figure 6.2 (b) for imports shows that a reduction in tariffs (t) will shift the demand for imports from DD to D_1D_1 and the slightest positive elasticity will increase import payments from $0PXM_1$ to $0PYM_2$.

Figure 6.2

The response of exports and imports to trade liberalisation in the 'elasticity approach'



(a)
Exports

(b)
Imports

Therefore, the balance of payments in foreign currency will improve/worsen if the price elasticity of demand for exports is greater/less than unity and will worsen if the price elasticity of demand for imports is greater than zero.

6.3.2 The absorption approach

The starting point of the absorption (income-expenditure) approach is the partial equilibrium weakness of the elasticity approach, and the view that the balance of payments can only be properly analysed in relation to the functioning of the economy as a whole. The absorption approach (AA hereafter) was originally developed by Alexander (1952), and subsequently elaborated on by Johnson (1958).

The AA regards the balance of payments not simply as the excess of resident's receipts from foreigners (R_F) over resident's payments to foreigners (P_F), but as the excess of resident's total receipts over total payments. That is:

$$B = R_F - P_F . \tag{6.1}$$

However, because all payments by residents to residents (P_R) are simultaneously receipts by residents from residents (R_R), B can be written as:

$$B = R_F + R_R - P_F - R_R . \tag{6.2}$$

Hence,

$$B = R - P \tag{6.3}$$

where R represents total receipts and P total payments by residents.

The AA can either be applied to the balance of payments as a whole or to the current account of the balance of payments. In the case of the current account, the balance of payments is defined as the difference between national income and national expenditure (or absorption, A):

$$B = X - M = Y - A. \tag{6.4}$$

Within this framework, any policy for balance of payments improvement can be evaluated in terms of whether it raises income relative to expenditure. Also, because $Y - C = S$ - where Y is income, C is consumption, and S is savings, the balance of payments can also be expressed as:

$$B = X - M = S - I \tag{6.5}$$

where any balance of payments correction policy can also be evaluated in terms of whether it raises savings relative to investment.

Policies aimed at increasing income are termed 'expenditure-switching' policies, and must not be accompanied by an equal raise in A if the balance of payments is to improve. Devaluation, tariffs, quotas on imports, subsidies to

exports, and price and quantitative adjustments to increase exports and reduce imports are all examples of expenditure-switching policies. At full employment, where Y is at its potential level, expenditure switching must be accompanied by a reduction in absorption if the balance of payments is to improve. Otherwise, there would be no resources to devote to the increased demand for exports and imports substitutes.

Policies to reduce A are called expenditure reducing and must not be accompanied by an equivalent fall in income if the balance of payments is to improve. Expenditure reducing policies complementary to expenditure switching policies at full employment must reduce expenditure on traded goods. If not, expenditure-reducing strategies will not be successful.

A reduction in trade taxes, within the AA framework, could have a direct effect on both income and absorption, plus an additional indirect effect through the change income $(\alpha \Delta Y_D)$, where α is the marginal propensity to absorb. Thus, from equation (6.5):

$$\Delta B = \Delta Y_D - \Delta A_D - \alpha \Delta Y_D , \tag{6.6}$$

or,

$$\Delta B = \Delta Y_D (1 - \alpha) - \Delta A_D . \tag{6.7}$$

The condition for a change in trade taxes to improve the balance of payments is:

$$\Delta Y_D (1-\alpha) > \Delta A_D \tag{6.8}$$

Within the absorption approach, there are three direct effects on income to consider: the idle resources effect, the terms of trade effect, and the resource reallocation effect. A reduction in export taxes which switches expenditure to home produced goods will increase income if there are under-utilised domestic resources. A reduction in tariffs, however, will have the opposite effect. The terms of trade will deteriorate if export prices fall relative to import prices and thus will reduce income and worsen the balance of payments. The resource reallocation effect should increase income if trade liberalisation reallocates resources according to comparative advantages (and assuming full employment of resources is maintained). Even if income does increase, however, the balance of payments will worsen if the propensity to absorb is greater than unity.

The direct effect of liberalisation on absorption depends mainly on price and income redistribution effects. If prices fall, absorption will increase through real balance effects, which worsen the balance of payments. On the other hand if income is redistributed to the traded goods sector with a higher propensity to save, this will reduce absorption and improve the balance of payments. Again, the effect of trade liberalisation on the balance of payments is ambiguous.

Changes in absorption will also be affected by fiscal changes. If trade liberalisation increases tax revenue, absorption decreases, but if tax revenues falls, this increases absorption. Changes in tax revenues will depend on the relative changes in export and import duties and the prices elasticities of demand for exports and imports.

Ostry and Rose (1992) have reviewed the macroeconomic effects of unilateral tariff changes in a variety of theoretical models, and they show that tariff reductions do not have clear-cut effects on the macroeconomy in the income-expenditure models. The results depend on how fiscal policy decisions affect income and expenditure, as well as on the repercussions of other policies, such as exchange rate management.

6.3.3 The monetary approach

The Monetary Approach to the balance of payments is an alternative model to the income-expenditure analysis described above, and is a modern version of the theory of international adjustment first introduced by David Hume in the eighteenth century (see Hume, 1752). The monetary approach to the balance of payments was expanded in the 1960s and 1970s by various models, which had different specifications but all reached the same conclusion. The intuition behind such a model is that the balance of payments is a monetary phenomenon and the appropriate focus for analysis of international adjustment is the money market, where the balance of payments is the mechanism whereby the domestic goods and money markets are cleared (see Johnson, 1972; and Mussa, 1974).

Frenkel and Johnson describe the model as follows: "In general, the approach emphasises the budget constraint imposed on the country's international spending and views the various accounts of the balance of payments as 'windows' to the outside world, through which the excesses of domestic flow demands over domestic flow supplies, and of excess domestic flow supplies over domestic flow

demands are cleared (Frenkel and Johnson, 1976, p.21)". In other words, the balance of payments is the outcome of a flow divergence between the growth of the demand for money and the growth of domestic credit, with the money stock effects of the balance of payments bringing the money market into equilibrium.

The focus of the model is on the balance of payments as a whole (i.e. current and capital account), so that balance of payments disequilibrium is equal to a change in the level of international reserves. The monetary approach is based on very strong assumptions. Specifically, it assumes exchange rates are pegged; that the economy is in long-run full employment equilibrium; that the demand for money is a stable function of income; that an increase in money supply does not affect real variables; that in the long run a country's price level and interest rate converge on the world level because of the high elasticity of substitution between goods in international trade and highly mobile capital, and that the changes in the money supply caused by changes in the level of international reserves are not sterilised by the monetary authorities.

From the national accounts, aggregate demand equates aggregate supply, thus:

$$X_g = (Y - A) + (M - X) = 0 \tag{6.9}$$

where X_g represents the excess of demand for goods, Y is income, A is domestic absorption (expenditure), and M and X are imports and exports, respectively.

Rearranging (6.9) to obtain the balance of payments gives:

$$B = (X - M) = (Y - A) \tag{6.10}$$

Considering first an economy where the only asset is money, then $(Y - A) = (M_D - M_S)$, which from equation (6.10) implies:

$$B = (M_D - M_S) = X_M \tag{6.11}$$

where M_D represents the demand for money, M_S is the supply of money, and X_M is the excess of demand for money. That is, a balance of payments surplus implies an excess of demand for money, and a balance of payments deficit an excess of supply of money.

The excess of demand for (supply of) money is the difference between the demand for money and supply of money of domestic origin (both defined as a stock). Thus,

$$X_M = k(Y) - \bar{M} \tag{6.12}$$

where $\bar{M}$ is the domestically determined component of the money supply controlled by the monetary authorities. Thus, an excess of demand for money, related to a balance of payments surplus, leads to an increase in the money supply through the accumulation of international reserves, assuming that the effect of an increase in money supply is not sterilised by the monetary authorities using open-market operations. As the money supply rises, the excess of demand for money is

eliminated and the balance of payments surplus tends to zero. Conversely, an excess of supply of money, associated with a balance of payments deficit, leads to a fall in the money supply through the loss of international reserves, again assuming no intervention of the monetary authorities. In this framework, the level of reserves is the only variable the excess of money supply can affect because long run equilibrium in the goods market is assumed, the interest rate is given and the demand for money is stable.

From the above discussion it can be seen that changes in trade taxes, exchange rates, the terms of trade, the level of income and other real variables are not considered as determinants of balance of payments disequilibrium, or as a means of adjustment, unless they affect the balance between money demand and money supply.

Considering the impact of trade policy in this framework, the long run equilibrium is characterised by the condition of balanced trade. However, the adjustment path towards this equilibrium is typified by changes in the economy's net borrowing position. In this sense, Mussa (1974) explains that the dynamic trade-balance effects of the tariff are ambiguous, under the following assumptions: the economy is completely specialised in the production of the export good, the government decreases the pre-existing export taxes and/or tariff on imports, and finally the demand for nominal money balances is proportional to the value of nominal income (in domestic currency) and the monetary authorities hold the domestic component of the money supply fixed. The demand for money will be affected by a reduction in trade taxes. On the one hand, a reduction in tariffs switches demand to imported goods, and therefore the demand for money

decreases. This worsens the balance of payments. Also, falling prices will raise the real value of the money supply, worsening the balance of payments. On the other hand, reducing export taxes will increase the demand for money, improving the balance of payments. The net effect will depend on the balance between the demand and the supply of money.

To sum up, the three theoretical approaches of determination of the balance of payments do not lead to a definite conclusion about the effect of trade liberalisation on the trade balance (or the balance of payments). The effect will depend on the price elasticities of imports and exports; how income and absorption are affected and how the demand and supply of money change. Given that the theoretical models provide ambiguous or fragile conclusions, the actual impact of reductions of trade taxes on the trade balance and the balance of payments becomes an empirical issue, which will be examined in the next sections.

6.4 Empirical framework and results

6.4.1 Empirical modelling

Given the theoretical ambiguity regarding the effect of trade liberalisation on the trade balance and the balance of payments, whatever framework of balance of payments analysis is used, the impact of liberalisation on the trade balance and the balance of payments becomes an empirical issue. For instance, Ostry and Rose (1992) recognised this in their analysis of tariff changes, and found in their

empirical study of five different data sets (including one for developing countries) no statistically significant effect of tariff changes on the real trade balance.

The impact of liberalisation on trade performance is measured here in monetary terms because it is the nominal gap between imports and exports which measures a country's shortage of foreign exchange, and how much countries need to borrow to sustain growth if liberalisation worsens the payments position. The effect of trade liberalisation on the trade balance and the balance of payments is measured by estimating two equations which control for income and relative price changes, and which also include a separate terms of trade variable, given that changes in the price of exports and imports automatically affect the monetary value of trade flows, independent of liberalisation. With this procedure it is also possible to separate the nominal and real (volume) effects of price changes on trade flows.

In order to investigate precisely the impact of duty reductions and liberalisation on the trade balance (TB) and the current account of the balance of payments (CA), both dependent variables are first normalised to take account of differences in the size of countries, taking the trade balance and current account as a share of GDP. The equations are derived from standard export and import demand functions in which the growth of exports and imports are a function of income and relative prices (see Chapters 4 and 5, and Thirlwall, 1999). The basic estimating equations are as follows:

$$\frac{TB}{GDP} = \beta_1 + \beta_2(w) + \beta_3(y) + \beta_4(p) + \beta_5(d_x) + \beta_6(d_m) + \beta_7(TOT) + \beta_8(lib) + \beta_9 y * lib \quad (6.13)$$

and,

$$\frac{CA}{GDP} = \delta_1 + \delta_2(w) + \delta_3(y) + \delta_4(p) + \delta_5(d_x) + \delta_6(d_m) + \delta_7(TOT) + \delta_8(lib) + \delta_9 y*lib \quad (6.14)$$

where w is the growth of world income; y is the growth of domestic income; p is the rate of change of the real exchange rate; d_x is export duties as a share of total exports; d_m is import duties as a share of total imports; TOT the nominal ('pure') terms of trade, measured as the ratio of export to import prices; lib is a liberalisation shift dummy, and $y*lib$ is an interaction (slope) dummy to take account of the impact that liberalisation may have on growth and therefore on the balance of payments[4]. The expected signs of the coefficients are $\beta_2, \delta_2 > 0$, $\beta_3, \delta_3 < 0$, $\beta_4, \delta_4 (?)$[5], $\beta_5, \delta_5 < 0$, $\beta_6, \delta_6 > 0$, and $\beta_7, \delta_7 > 0$. The signs of the lib (β_8, δ_8) and $y*lib(\beta_9, \delta_9)$ are expected to be negative.

The only previous work in this field is the study by UNCTAD (TDR, 1999), which presents panel data estimations (fixed and random effects) of the impact of liberalisation on trade deficits and growth in sixteen developing and industrialised countries[6]. The study uses the Sachs and Warner (1995) liberalisation shift

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[4] See Appendices B and C for definitions of the variables. The terms of trade ('net barter') is defined as: the ratio of the export unit value index to the import unit value index. Source: UNCTAD *Handbook of Statistics,* various issues.

[5] In equations without a separate terms of trade variable, the sign of p will depend on whether or not the Marshall-Lerner condition is satisfied. In equations with a separate terms of trade variable, the sign will be negative if there is substitution of foreign for domestic goods.

[6] When the Sachs and Warner index is used as a proxy for liberalisation, the sample is extended to 52 developing countries (27 in Africa, 19 in Latin America and 6 in Asia).

dummy, which is expected to capture the effects of capital account liberalisation, as well as the impact of import liberalisation. UNCTAD found that a more favourable terms of trade[7] and faster growth in industrial countries improved the trade balance of developing countries, whereas liberalisation worsened it considerably. The study also concludes that faster growth in liberalised economies is associated with greater trade deficits than in non-liberalised economies. Also, increases in the purchasing power of exports continue to improve the trade balance in liberalised economies but by less than before liberalisation.

6.4.2 Estimations and results

The estimation procedures used in this section are dynamic panel data techniques, based on fixed effects (least squares) and generalised methods of moments (GMM), and time-series/cross-section models. As explained in Chapter 2, the fixed effects (FE) estimator includes a dummy variable to allow for country specific effects that are constant over time. The GMM estimator, which is considered one of the best techniques for estimating dynamic panel data, also controls for the endogeneity of the dependent variables, and the potential endogeneity of other explanatory variables (Arellano, 1993; Arellano and Bond, 1998). In the relationships estimated in this research, there is particular concern about the endogeneity of the rate of growth of real GDP, as well as the lagged

[7] Note that the terms of trade variable used by UNCTAD's study is the value index of exports deflated by the import unit value index; that is, the income terms of trade not the barter terms of trade.

dependent variables; and, this issue is addressed by the use of the dynamic modelling by GMM.

Also, time-series/cross-section models are estimated, given the disaggregated analysis undertaken in this investigation, i.e. at a regional level and according to the type of trade policy regime, in which the number of observations is not very large in each group.

6.4.2.1 Fixed effects and GMM

The results of examining the impact of trade liberalisation on the trade balance applying FE and GMM models are presented in Tables 6.3A and 6.3B. Both methods of estimation provide very similar results.

Considering first the trade balance as a proportion of GDP resulting from the fixed FE and GMM estimations (Tables 6.3A and 6.3B), it can be seen that the effect of all explanatory variables on the trade balance is as expected. Specifically, world income growth has a significant positive effect; domestic income growth has a significant negative effect; the trade balance is negatively related to the real exchange rate (RER) (although the impact is minimal), and the pure terms of trade effect is positive.

Table 6.3A

Trade liberalisation and the trade balance: fixed effect (1972-98)

Explanatory variables:	**Dependent variable: trade balance/GDP** (tb)			
	(i)	***(ii)***	***(iii)***	***(iv)***
tb_{-1}	0.68 (2.41)*	0.67 (2.59)*	0.68 (2.13)*	0.67 (3.55)**
w	0.88 (2.02)*	0.74 (1.95)§	0.92 (2.01)*	0.89 (1.96)*
y	-0.21 (4.76)**	-0.19 (4.35)**	-0.22 (3.80)**	-0.19 (3.37)**
p	-0.06 (3.72)**	-0.07 (3.63)**	-0.07 (3.73)**	-0.07 (3.93)**
d_x	-0.28 (2.52)*	-0.26 (2.69)*	-0.21 (2.50)*	-0.23 (1.69)§
d_m	0.74 (3.53)**	0.83 (2.76)*	0.78 (3.50)**	0.81 (2.38)*
lib	-1.35 (2.77)*	-1.21 (2.52)*	-1.56 (2.42)*	-1.28 (4.48)**
TOT		0.27 (1.98)*		0.29 (2.57)*
$y * lib$			-0.26 (3.31)**	-0.23 (2.13)*
	Diagnostic statistics			
R^2	0.54	0.54	0.54	0.54
Hausman test	39.25	56.85	87.00	99.03
Heteroscedasticity test	28.05	9.05	18.93	15.71
Number of observations	506	506	506	506

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.

2. Heteroscedasticity test is based on a regression of the residuals on the squared fitted values. The Hausman test justifies 'fixed effect' estimations over random effects.

Table 6.3B

Trade liberalisation and the trade balance: GMM (1972-98)

Explanatory variables:	**Dependent variable: trade balance/GDP** (tb)			
	(i)	*(ii)*	*(iii)*	*(iv)*
tb_{-1}	0.92 (2.80)*	0.83 (2.64)	0.62 (3.96)**	0.61 (2.23)*
w	0.83 (2.24)*	1.12 (2.28)*	0.87 (2.92)*	0.73 (2.55)*
y	-0.26 (3.15)**	-0.30 (2.41)*	-0.21 (2.31)*	-0.18 (2.68)*
p	-0.02 (2.15)*	-0.07 (1.49)	-0.05 (1.36)	-0.01 (1.25)
d_x	-0.36 (2.27)*	-0.40 (3.44)**	-0.28 (2.68)*	-0.29 (2.88)*
d_m	0.88 (3.32)**	0.86 (3.37)**	0.85 (2.36)*	0.83 (6.52)**
lib	-1.76 (3.29)**	-2.20 (5.92)**	-2.52 (2.22)*	-3.57 (9.75)*
$y*lib$			-0.41 (4.39)**	-0.40 (6.77)**
TOT		0.21 (2.29)*		0.20 (1.45)
	Diagnostic statistics			
Wald test	[0.000]	[0.000]	[0.000]	[0.000]
Sargan test	[0.753]	[0.634]	[0.419]	[0.835]
1st-order serial correlation	[0.000]	[0.000]	[0.000]	[0.000]
2nd-order serial correlation	[0.491]	[0.552]	[0.623]	[0.128]
Number of observations	498	498	498	498

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. ; figures in brackets [ ] are p-values. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.
2. The Wald test is for the joint significance of the regressors. The Sargan test is of over-identifying restrictions. The tests for 1st and 2nd order of no serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1991). The p-values report the probability of rejecting the null hypothesis of no serial correlation, where the first differencing will induce (MA1) serial correlation if the time-varying component of the error term in levels is a serially uncorrelated disturbance.
3. The GMM estimations were performed using the programme DPD98 for Gauss (Arellano and Bond, 1998).

Table 6.4A

Trade liberalisation and the current account: fixed effects (1972-98)

Explanatory variables:	Dependent variable: current account/GDP (ca)			
	(i)	*(ii)*	*(iii)*	*(iv)*
ca_{-1}	0.71 (6.66)**	0.71 (7.33)**	0.71 (6.63)**	0.70 (7.29)**
w	0.53 (1.72)§	0.56 (1.85)§	0.53 (2.70)*	0.55 (1.84)§
y	-0.14 (2.33)*	-0.20 (1.96)*	-0.37 (2.34)*	-0.14 (1.62)§
p	-0.03 (0.94)	0.01 (0.25)	-0.02 (0.97)	0.01 (0.28)
d_x	-0.16 (2.46)*	-0.24 (2.66)*	-0.17 (1.78)§	-0.23 (2.65)*
d_m	0.36 (1.81)§	0.51 (3.98)**	0.39 (1.68)§	0.51 (3.95)**
lib	-0.72 (2.47)*	-0.78 (2.35)*	-0.73 (2.09)*	-0.75 (2.84)*
$y*lib$			-0.20 (1.73)§	-0.15 (2.73)*
TOT		0.24 (1.21)		1.08 (2.05)*
	Diagnostic statistics			
R^2	0.36	0.38	0.51	0.52
Heteroscedasticity test	17.13	9.83	9.99	10.44
Hausman test	45.71	18.62	26.85	46.78
Number of observations	506	506	506	506

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.

2. Heteroscedasticity test is based on a regression of the residuals on the squared fitted values. The Hausman test justifies 'fixed effect' estimations over random effects.

Table 6.4B

Trade liberalisation and the current account: GMM (1972-98)

Explanatory variables:	Dependent variable: current account/GDP (ca)			
	(i)	*(ii)*	*(iii)*	*(iv)*
ca_{-1}	0.78 (6.10)**	0.78 (6.05)**	0.73 (3.79)**	0.56 (2.06)*
w	0.88 (3.56)**	0.95 (2.81)*	0.65 (2.15)*	0.51 (1.68)§
y	-0.20 (2.34)*	-0.18 (1.89)§	-0.13 (2.17)*	-0.34 (2.33)*
p	-0.02 (0.95)	-0.02 (0.88)	0.02 (0.83)	-0.01 (0.74)
d_x	-0.16 (2.18)*	-0.26 (2.46)*	-0.14 (1.91)§	-0.19 (2.27)*
d_m	0.33 (1.95)§	0.36 (1.89)§	0.35 (1.73)§	0.22 (1.73)§
lib	-0.78 (2.24)*	-0.80 (2.83)*	-0.79 (2.35)*	-0.76 (3.33)**
$y*lib$			-0.39 (3.91)**	-0.69 (2.74)*
TOT		0.02 (0.88)		0.27 (0.72)
	Diagnostic statistics			
Wald test	[0.000]	[0.000]	[0.000]	[0.000]
Sargan test	[0.646]	[0.830]	[0.117]	[0.699]
1st-order serial correlation	[0.824]	[0.678]	[0.705]	[0.758]
2nd-order serial correlation	[0.000]	[0.000]	[0.000]	[0.000]
Number of observations	498	498	498	498

Notes:

1. Figures in parentheses ( ) are absolute t-ratios; figures in brackets [ ] are p-values. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.
2. The Wald test is for the joint significance of the regressors. The Sargan test is of over-identifying restrictions. The tests for 1st and 2nd order of no serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1991). The p-values report the probability of rejecting the null hypothesis of no serial correlation, where the first differencing will induce (MA1) serial correlation if the time-varying component of the error term in levels is a serially uncorrelated disturbance.
3. The GMM estimations were performed using the programme DPD98 for Gauss (Arellano and Bond, 1998).

A one percentage point reduction of export duties has significantly improved the trade balance by approximately 0.2 percent of GDP, whereas a one percentage point reduction of import duties has deteriorated the trade balance by nearly 0.8 percent of GDP. In addition to export and import duty changes, the process of trade liberalisation (*lib*) seems to have worsened the trade balance by at least a further one percent of GDP. This result is very relevant, when compared with the mean trade balance/GDP ratio for the complete sample, which is –2.76 percent. The negative coefficient on the interaction dummy ($y*lib$) indicates that liberalisation has improved growth performance which has deteriorated the trade balance by a further 0.20 – 0.40 percent of GDP.

Turning to the current account of the balance of payments, the results are weaker than for the trade balance, but they indicate that trade liberalisation has also worsened the current account for our sample of countries. The weaker results are not surprising, given that the current account balance includes not only goods and services but also other current transactions such as interest payments and profit flows. These items have more to do with financial liberalisation than trade liberalisation, and have no systematic relation with export and import behaviour. An alternative explanation is that the trade deficits generated by liberalisation were not sustainable through capital inflows and that the current account had to be adjusted to a sustainable level. This would suggest that the growth effect of liberalisation would have been more favourable if export and import growth could have been kept in better balance by appropriate sequencing of trade liberalisation.

Tables 6.4A and 6.4B report the results taking the current account as a proportion of GDP as the dependent variable. It is found that the effect of world

income growth is positive (though only weakly significant); domestic income growth has the expected negative effect; real exchange rate and terms of trade effects are insignificant; export duty reductions significantly improve the current account in both the FE and GMM estimates. Regarding the trade policy and liberalisation variables, import duty reductions are marginally significant in worsening the balance of payments, and trade liberalisation (i.e. the shift dummy) has had a significantly negative effect on the current account of the balance of payments in the range of 0.14 to 0.80 percent of GDP. Therefore, the impact of liberalisation on the current account appears to be relatively small when compared to the negative effects of trade liberalisation on the trade balance of the balance of payments. Finally, faster growth in the liberalised economies is associated with greater current account deficits, as shown by the negative and significant coefficient on the interaction dummy.

6.4.2.2 Time-series/cross-section

(i) Disaggregated analysis by region

We turn now to examine the impact of trade liberalisation on the trade balance and balance of payments in the four separate regions of Africa; East Asia; South Asia, and Latin America, to distinguish whether there are any significant 'regional' differences in terms of the relationship between trade liberalisation and the trade balance and the balance of payments (see Tables 6.5 to 6.8).

Focussing first on the trade balance (see Table 6.5), world income growth, domestic income growth, and real exchange rate changes all have the expected sign and are generally significant in each of the regions, and the 'pure' terms of

trade impact is very small. Export duty reductions have the expected effect of improving the trade balance, most distinctly in East Asia where the effect of a one-percentage point fall in duties has been to improve the trade balance by over 0.5 percent of GDP. Similarly, the impact of tariff reductions on imports has been the greatest in East Asia worsening the trade balance by around 0.7 percent of GDP for each one-percentage point reduction in the tariff rate. In all regions, however, export duty reductions have improved the trade balance, and import duty reductions have worsened the trade balance, but the negative impact of import duty reductions has been slightly stronger than the positive effect of export duty declines. The more liberalised trade regimes have worsened the trade balance in all the regions, most notably in Africa (as demonstrated by both the shift and interaction dummies).

Table 6.6 presents the analysis of the current account of the balance of payments. The conclusions are basically the same as for the trade balance, although most of the estimated coefficients are somewhat smaller. World income growth has a positive impact on the current account; domestic income growth worsens the current account; the impact of real exchange rate changes is diverse, and the 'pure' terms of trade effect is very small. Export duty reductions have generally improved the current account, while import duty reductions have worsened it, particularly in Latin America. The general impact of trade liberalisation in all the regions has been to worsen the current account, but by less than one percent of GDP in most cases, which is less than the impact on the trade balance. This negative impact is confirmed by the results for all countries aggregated, as well as for the different regions.

Table 6.5

Three-step generalised least squares and maximum likelihood estimation: regional disaggregation

Explanatory variables:	Dependent variable: trade balance/GDP									
	All Countries		*Africa*		*East Asia*		*South Asia*		*Latin America*	
	(i a)	*(i b)*	*(ii a)*	*(ii b)*	*(iii a)*	*(iii b)*	*(iv a)*	*(iv b)*	*(v a)*	*(v b)*
tb_{-1}	0.78 (2.77)*	0.69 (2.69)*	0.76 (2.77)*	0.67 (1.94)§	0.61 (2.17)*	0.43 (3.21)**	0.76 (3.85)**	0.74 (4.84)**	0.75 (3.58)**	0.72 (2.64)*
w	0.92 (2.18)*	0.83 (3.72)**	0.62 (2.51)*	0.71 (2.15)*	0.98 (2.86)*	0.75 (2.90)*	0.73 (2.02)*	0.76 (2.41)*	0.88 (1.99)*	0.72 (2.96)**
y	-0.27 (3.57)**	-0.31 (7.29)**	-0.16 (3.53)**	-0.17 (1.76)§	-0.43 (9.55)**	-0.40 (5.79)**	-0.16 (2.40)*	-0.14 (2.28)*	-0.25 (4.88)**	-0.24 (8.51)**
p	-0.01 (2.96)**	-0.02 (3.04)**	-0.02 (0.53)	-0.01 (2.68)*	-0.08 (4.10)**	-0.08 (3.65)**	-0.02 (1.27)	-0.01 (0.85)	-0.06 (3.35)**	-0.05 (6.03)**
d_x	-0.28 (2.16)*	-0.31 (2.07)*	-0.28 (2.41)*	-0.29 (2.10)*	-0.54 (2.00)*	-0.54 (3.43)**	-0.26 (1.66)§	-0.29 (2.25)*	-0.25 (2.65)*	-0.28 (2.74)*
d_m	0.37 (1.99)*	0.48 (4.76)**	0.67 (11.53)**	0.46 (2.09)*	0.77 (7.17)**	0.67 (8.89)**	0.56 (2.15)*	0.60 (4.16)**	0.34 (1.98)*	0.47 (3.80)**
lib	-1.61 (4.35)**	-2.31 (3.83)*	-1.59 (2.68)*	-2.77 (2.42)*	-1.43 (2.56)*	-1.44 (2.44)*	-1.44 (2.68)*	-1.94 (2.35)*	-0.99 (2.14)*	-1.51 (2.87)*
$y*lib$	-0.29 (3.59)**	-0.19 (2.40)*	-0.19 (2.17)*	-0.18 (2.50)*	-0.35 (6.49)**	-0.36 (2.79)*	0.18 (2.71)*	-0.26 (2.83)*	-0.28 (2.39)*	-0.28 (2.27)*
TOT		-0.07 (2.39)*		-0.03 (1.03)		-0.10 (1.75)§		-0.04 (0.71)		-0.19 (1.77)§
	Diagnostic statistic									
LRS	93.04 [38.93]	119.22 [38.93]	24.61 [13.28]	28.00 [13.28]	30.54 [23.21]	33.07 [23.21]	8.31 [7.31]	9.39 [7.31]	70.91 [20.09]	71.07 [20.09]
Number of observations	506	506	115	115	115	115	69	69	207	207

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.
2. Likelihood Ratio Statistic (LRS) is the test for serial correlation; the numbers in brackets [ ] are the critical values. The results provided are based on heteroskedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.

Table 6.6

Three-step generalised least squares and maximum likelihood estimation: regional disaggregation

Explanatory variables:	Dependent variable: current account/GDP									
	All Countries		*Africa*		*East Asia*		*South Asia*		*Latin America*	
	(i a)	*(i b)*	*(ii a)*	*(ii b)*	*(iii a)*	*(iii b)*	*(iv a)*	*(iv b)*	*(v a)*	(v b)
ca_{-1}	0.53 (2.25)*	0.60 (3.74)**	0.29 (2.09)*	0.26 (2.93)*	0.62 (2.77)*	0.57 (2.73)*	0.44 (3.79)**	0.45 (4.95)**	0.65 (5.88)**	0.59 (3.38)**
w	0.57 (2.95)*	0.55 (2.67)*	0.69 (3.47)*	0.46 (1.87)§	0.62 (2.60)*	0.66 (2.71)*	-0.28 (2.38)*	0.29 (2.14)*	0.49 (4.65)**	0.68 (3.73)**
y	-0.18 (2.48)*	-0.14 (4.64)**	-0.19 (3.23)**	-0.17 (1.91)§	-0.35 (7.58)**	-0.33 (6.68)**	-0.17 (1.82)§	-0.19 (1.67)§	-0.23 (9.04)**	-0.21 (7.24)**
p	0.03 (1.20)	-0.03 (2.16)*	0.01 (0.95)	-0.01 (0.64)	0.01 (0.31)	0.01 (0.51)	-0.03 (1.07)	-0.02 (1.25)	-0.06 (6.09)**	-0.05 (5.09)**
d_x	-0.19 (1.98)*	-0.15 (1.93)§	-0.15 (2.75)*	-0.19 (1.74)§	-0.10 (2.63)*	-0.18 (2.26)*	-0.12 (2.20)*	-0.14 (2.40)*	-0.23 (1.73)§	-0.29 (3.45)**
d_m	0.38 (2.07)*	0.37 (1.92)§	0.44 (7.44)**	0.53 (4.44)**	0.25 (4.42)**	0.38 (2.17)*	0.29 (1.74)§	0.21 (3.72)**	0.87 (1.70)§	0.65 (3.76)**
lib	-0.89 (2.39)*	-0.90 (2.17)*	-0.65 (2.77)*	-0.48 (3.12)**	-0.34 (2.55)*	-0.39 (2.63)*	-0.67 (2.07)*	-0.71 (2.12)*	-1.02 (2.23)*	-1.16 (2.49)*
$y*lib$	-0.22 (1.84)§	-0.19 (2.39)*	0.18 (2.35)*	-0.29 (5.04)**	-0.30 (6.74)**	-0.33 (6.01)**	-0.18 (1.82)§	-0.24 (2.17)*	-0.21 (1.72)§	-0.28 (2.03)*
TOT		-0.08 (1.58)		-0.04 (2.12)*		-0.10 (2.25)*		-0.06 (1.34)		-0.13 (0.87)
	Diagnostic statistic									
LRS	287.12 [38.93]	204.83 [38.93]	47.21 [18.31]	40.47 [18.31]	32.77 [23.21]	39.24 [23.21]	38.40 [11.34]	22.24 [11.34]	58.62 [20.09]	55.46 [20.09]
Number of observations	506	506	115	115	115	115	69	69	207	207

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.
2. Likelihood Ratio Statistic (LRS) is the test for serial correlation; the numbers in brackets [ ] are the critical values. The results provided are based on heteroskedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS

(ii) Disaggregation according to degree of protection

Finally, we consider the impact of trade liberalisation on the trade balance and balance of payments according to the degree of restriction and/or freedom of the trade regime of the countries; that is, whether countries are highly or lowly protected (see Tables C5.1 and C5.2 in the appendix of Chapter 5 for the definition and classification criteria)[8]. The estimation results are provided in Tables 6.7 and 6.8. If imports are generally more sensitive to liberalisation than exports, it is expected that the direct effect of liberalisation on the trade balance and balance of payments will be greater in the more highly protected group of countries than in those with more moderate degrees of protection (for equal changes in the degree of protection), and this is generally confirmed by the results.

Table 6.7 reports the results for the trade balance, and they show that the effect of changes in export and import duties is significantly higher in the highly protected countries than in the countries with already low to moderate degrees of protection. Similarly, the negative impact on the trade balance of a more liberalised trade regime is much greater in countries that start highly protected than in those with already low levels of protection. The effect of domestic income growth and real exchange rate changes is higher in countries with low-moderate levels of protection; moreover, the positive impact on the trade balance of world income growth is smaller in the high-very high category of countries.

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[8] In this set of estimations Indonesia and Zambia is not included because they switched regimes during the period covered by the classification.

Table 6.7

Three-step generalised least squares and maximum likelihood estimation: disaggregation according to the degree of protection

Explanatory variables:	Dependent variable: trade balance/GDP					
	All Countries		*Low-Moderate*		*High-Very High*	
	(i a)	*(i b)*	*(ii a)*	*(ii b)*	*(iii a)*	*(iii b)*
tb_{-1}	0.46 (2.06)**	0.78 (5.84)**	0.63 (4.73)**	0.67 (2.03)*	0.72 (4.71)**	0.49 (3.72)**
w	0.99 (2.58)*	0.89 (2.85)*	0.93 (7.55)**	0.80 (5.57)**	0.74 (2.91)*	0.73 (2.92)*
y	-0.14 (2.25)*	-0.23 (3.37)**	-0.19 (2.82)*	-0.22 (2.41)*	-0.10 (2.59)*	-0.16 (1.83)§
p	-0.01 (1.26)	-0.01 (2.85)*	-0.05 (7.07)**	-0.07 (4.36)**	-0.01 (0.43)	-0.01 (1.06)
d_x	-0.19 (3.41)**	-0.22 (2.45)*	-0.16 (9.39)**	-0.14 (11.05)**	-0.17 (1.69)§	-0.21 (2.17)*
d_m	0.22 (4.78)**	0.37 (4.18)**	0.29 (3.67)**	0.18 (12.39)**	0.69 (2.60)*	0.67 (6.12)**
lib	-1.20 (2.45)*	-1.11 (2.82)*	-0.68 (5.59)**	-0.49 (3.88)**	-1.74 (2.38)*	-1.77 (2.20)*
$y*lib$	-0.57 (3.57)**	-0.32 (6.10)**	-0.38 (2.82)*	-0.20 (4.39)**	-0.27 (2.61)*	-0.25 (2.85)*
TOT		-0.32 (2.85)*		-0.17 (1.78)§		-0.51 (5.02)**
	Diagnostic statistic					
LRS	202.94 [36.19]	194.97 [36.19]	91.40 [29.14]	110.65 [29.14]	76.61 [16.81]	75.30 [16.81]
Number of observations	460	460	299	299	161	161

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.
2. Likelihood Ratio Statistic (LRS) is the test for serial correlation. The numbers in brackets [ ] are the critical values. The results provided are based on heteroskedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.

Table 6.8

Three-step generalised least squares and maximum likelihood estimation: disaggregation according to the degree of protection

Explanatory variables:	Dependent variable: current account/GDP					
	All Countries		*Low-Moderate*		*High-Very High*	
	(i a)	*(i b)*	*(ii a)*	*(ii b)*	*(iii a)*	*(iii b)*
ca_{-1}	0.53 (2.29)*	0.48 (2.53)*	0.73 (3.90)**	0.55 (2.80)*	-0.02 (1.75)§	-0.03 (2.10)*
w	0.80 (2.48)**	0.72 (2.20)*	0.83 (10.65)**	0.77 (3.18)**	0.38 (4.14)**	0.30 (4.69)**
y	-0.18 (4.08)**	-0.13 (4.20)**	-0.23 (18.00)**	-0.22 (13.71)**	-0.19 (2.12)*	-0.16 (1.72)§
p	-0.03 (2.84)*	-0.03 (3.20)**	-0.05 (2.55)*	-0.02 (1.06)	-0.03 (3.09)**	-0.03 (3.01)**
d_x	-0.14 (2.20)*	-0.18 (2.65)*	-0.10 (1.78)§	-0.13 (1.65)§	-0.16 (1.93)§	-0.19 (1.70)§
d_m	0.16 (2.09)*	0.20 (2.39)*	0.23 (9.50)**	0.19 (2.59)*	0.21 (4.52)**	0.26 (4.09)**
lib	-1.50 (2.41)*	-1.14 (2.06)*	-0.57 (4.52)**	-0.55 (2.54)*	-1.79 (2.34)*	-1.66 (6.16)**
*y*lib*	0.17 (2.14)*	-0.19 (2.23)*	-0.26 (2.15)*	-0.31 (5.21)**	-0.24 (1.81)§	-0.19 (3.47)**
TOT		-0.01 (1.85)§		-0.14 (0.67)		-0.04 (0.62)
	Diagnostic statistic					
LRS	211.37 [36.19]	204.37 [36.19]	60.37 [29.14]	175.26 [29.14]	37.30 [16.81]	60.41 [16.81]
Number of observations	460	460	345	345	161	161

Notes:

1. Figures in parentheses ( ) are absolute t-ratios. §, *, ** indicate that a coefficient is significant at the 10 percent, 5 percent and 1 percent level respectively.
2. Likelihood Ratio Statistic (LRS) is the test for serial correlation. The numbers in brackets [ ] are the critical values. The results provided are based on heteroskedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.

Finally, in the case of the current account of the balance of payments (see Table 6.8), the impact of duty changes on exports and imports differ significantly between the countries with low-moderate and highly protected trade regimes, and the overall effect of the liberalisation process continues to be the strongest in those countries that started heavily protected. The effect of real exchange rate changes and domestic and foreign income growth is very similar to that observed for the trade balance.

(iii) Testing for equality of the coefficients

The likelihood ratio statistics (LRS), with a chi-square distribution, calculated for the different regions and trade policy regime classification are presented in Table 6.9. The results reject the restrictions that the export and import duties, the shift and the slope liberalisation dummies, and the four trade liberalisation indicators together are the same for all four regions, and for the low-moderate and high-very high categories of trade policy distortions. This clearly confirms the previous findings, which show the impact of trade policy reforms varies considerably across countries. The differences in the effects of the trade liberalisation indicators probably reflect institutional differences across countries, and the degree of restrictions existing before and after liberalisation, as well as the initial disparities in the balance of trade and current account performances.

Table 6.9

Restriction test for equality of coefficients across regions and trade policy regimes

Coefficient	*tb*	*tbg*	*ca*	*cag*
Regional disaggregation				
d_x	11.46 [9.49]	9.68 [9.49]	10.52 [9.49]	15.18 [9.49]
d_m	9.64 [9.49]	16.18 [9.49]	15.80 [9.49]	10.96 [9.49]
lib	9.74 [9.49]	13.36 [9.49]	30.59 [9.49]	15.56 [9.49]
$y*lib$	13.20 [9.49]	8.68 [7.78]§	13.08 [9.49]	9.27 [7.78]§
$d_x, d_m, lib, y*lib$	38.00 [26.30]	36.60 [26.30]	40.52 [26.30]	24.49 [23.54]§
Disaggregation according to the degree of protection				
d_x	6.41 [5.99]	6.70 [5.99]	6.24 [5.99]	12.03 [5.99]
d_m	11.85 [5.99]	12.18 [5.99]	9.38 [5.99]	6.16 [5.99]
lib	18.40 [5.99]	17.60 [5.99]	27.12 [5.99]	13.80 [5.99]
$y*lib$	7.94 [5.99]	5.83 [4.61]§	7.47 [5.99]	5.45 [4.61]§
$d_x, d_m, lib, y*lib$	26.00 [15.51]	15.22 [13.36]§	23.70 [15.51]	15.76 [15.51]

Notes: Figures in brackets [] are critical values of χ^2. § indicates that a test is significant at the ten per cent level. The other coefficients are significant at the 5 per cent level.

6.5 Conclusions

This chapter has been concerned with the effect of trade liberalisation on the trade balance and the balance of payments, taking 22 developing countries from Africa, East Asia, South Asia and Latin America that have undertaken extensive trade policy reforms over the last three decades, as in Chapters 4 and 5. The various estimation techniques used have provided results that are strong and robust to the different specifications estimated. The findings may be summarised as follows.

First, the effect of the trade liberalisation (abstracting from growth effects) has been to deteriorate the trade balance by over one percent of GDP on average, but the impact on the current account of the balance of payments has been less (increasing the average deficit by roughly 0.5 percent of GDP). The effects of liberalisation on the trade balance and the current account have not been the same across the regions of Africa, Latin America, East Asia, and South Asia, where Africa appears to have been more affected by the process of liberalisation. But, the trade balance and the current account balance have worsened, on average, in all the regions analysed. Furthermore, faster growth in the liberalised economies is associated with greater trade balance and current account deficits, as shown by the negative and significant interaction dummy, particularly in East Asia.

With respect to the estimations that distinguish between countries according to the degree of protection, the impact of liberalisation differs in relation to whether countries are initially highly protected, or already have relatively low levels of protection. The negative effects on the trade balance and the current

account of the balance of payments are larger in the more highly protected countries.

As suggested earlier, the effect of trade liberalisation on the balance of payments, basically in the trade account, has serious policy implications. Many countries face serious balance of payments problems originating, at least in part, from declining terms of trade, and this in turn leads to reduced income from their exports as well as increased costs for their imports. Moreover, the balance of payments crises suffered by a large number of developing countries have revealed the extent to which growth rates have come to depend on steadily rising export earnings and capital inflows and how disruptive an interruption to these sources of foreign exchange can be.

Part III

A CASE STUDY OF TRADE LIBERALISATION IN THE DOMINICAN REPUBLIC

Chapter 7

TRADE LIBERALISATION IN THE DOMINICAN REPUBLIC

7.1 Introduction: an overview of the Dominican Republic's economy

The Dominican Republic (DR) is situated in the Caribbean Sea, roughly between Cuba and Puerto Rico, occupying 48,730 square kilometres of the Hispaniola Island, which it shares with Haiti. The population, which has a life expectancy of 67.5, was estimated to be 8.5 millions in 2001. Highly dependent on imported oil and, despite diversification, the country retained its historical vulnerability to price fluctuations in the world sugar market. Although poverty continued to be acute for many rural citizens, the economy had progressed significantly since the 1960s.

The DR is a lower-middle- income country by World Bank standards, with a Gross National Product (GNP) per capita of US$2,230.0 (2001). Although the level of per capita income is above the poverty line, 55.7% of that income is held by the richest 20% of the population, while the lowest quintile receives only 4.2 percent. The Gini index was estimated to be 50.5 using data from a 1989 households survey.

In political and economics terms, the evolution of the DR as a sovereign nation has been very complicated. Before obtaining independence in 1844, the country experienced colonial/political domination of Spain, France, Great Britain, and Haiti. Additionally, in post-colonial times the DR has been closely related to the United

States (US). The DR has been twice under US military rule: from 1916 to 1924, and again during the 1965 civil war.

During the presidency of Joaquín Balaguer (1966-78), the country experienced a period of sustained economic growth characterised by relative economic diversification and the establishment of a developmental role for the state (through the establishment of the National Planning Council in 1966). During its peak growth period, from 1966 to 1976, the economy expanded at a rate of nearly 8 percent a year, one of the highest growth rates in the world at the time. The Balaguer administration increased spending on social services, introduced the Industrial Incentive Law (Law 299) to protect domestic manufacturing and to spur more import substitution industries, and promoted mining, assembly manufacturing, construction, and tourism. Land reform programs helped rural dwellers to improve their economic status somewhat, but government pricing policies and the trend toward urbanization inhibited growth in rural areas. The country's physical infrastructure--roads, ports, and airfields-- also expanded.

The climax of the Dominican economic 'miracle' occurred in 1975 when sugar prices peaked, other commodity prices were high, and gold exports became significant. Despite these fortuitous circumstances, the country still failed to register a trade surplus that year, an indication of structural problems in the economy. Economic growth slowed by the late 1970s as sugar prices fluctuated, and the quadrupling of oil prices, that began in 1973, turned the country's terms of trade sharply negative. Growing balance of payments shortfalls, declining government revenues resulting from widespread tax exemptions, and growing expenditures on

state-operated companies rapidly increased the country's debt. The symbolic, if not the real, end of the Dominican economic 'miracle' arrived in the form of Hurricane David and Hurricane Frederick in 1979. The two storms killed more than 1,000 people, and caused an estimated US$1 billion in damage.

From the late 1960s, the Dominican economy began the arduous task of diversifying its economy away from sugar. By 1980 the mining industry had become a major foreign exchange earner; exports of gold, silver, ferronickel, and bauxite constituted 38 percent of the country's total foreign sales. In the 1980s, the assembly manufacturing industry, centred in Industrial Free Trade Zones, began to dominate industrial activity. During this decade, the number of people employed in assembly manufacturing rose from 16,000 to nearly 100,000, and that sector's share of exports jumped from 11 percent to more than 33 percent. Tourism experienced a similarly striking expansion during the 1980s. Revenues from tourism surpassed sugar earnings for the first time in 1984, and by 1989 total foreign exchange earnings from tourism nearly matched earnings from all merchandise exports.

In the early 1980s, oil prices increased again, international recession stifled the local economy, sugar prices hit a forty-year low, and unprecedented high interest rates on foreign loans spiralled the economy into a cycle of balance of payments deficits and growing external debt. Because economic growth averaged slightly above 1 percent per annum during the first half of the decade, per capita income declined. Another devastating blow was dealt in the 1980s by reduced United States sugar quotas, in response to the lobbying efforts of domestic producers, which served to cut

the volume of Dominican sugar exports to the United States by 70 percent between 1981 and 1987.

The unstable economic situation prompted the administration of Salvador Jorge Blanco (1982-86) to enter into a series of negotiations with the International Monetary Fund (IMF) and to begin to restructure government economic policies. The macroeconomic adjustment policies and balance of payments crises were financed by structural adjustment loans (SAL) and extended structural adjustment facility (ESAF) programmes with the IMF[1] (see Coutts *et al* 1986, p.371). Even though such programmes required extensive discipline in the management of economic policy, most of the necessary reforms (including that of trade policy) were not implemented, mainly due to a lack of political consensus.

In the mid 1990s, another stabilisation and structural adjustment reform package was implemented, which included, amongst other measures, reforms of the tariff, tax and financial systems. The aims of the tariff and tax reforms were to increase the efficiency of the existing structure while maintaining fiscal equilibrium; to simplify the existing tariff structure and reduce the tariff dispersion, and to reduce

[1] In January 1983, the government signed an Extended Fund Facility program with the IMF for RD$375.21 millions, the main objective of which was to stabilise the balance of payments position. Later, this program was abandoned, and in August 1984 a transition agreement denominated the "Shadow Agreement" was endorsed, with the intention of re-programming adjustment policies, and to maintain the flow of United States aid to the country. In April 1985, another agreement (the "Stand By Agreement") was reached with the IMF aimed at improving the economic situation, specifically the strengthening of the balance of payments position, the reduction of inflationary pressures, reduction of the fiscal deficit, and to establish conditions for economic growth.

the effective rate of protection[2]. This attempt was regarded as successful and was followed by the deepening of structural reforms.

Since the restoration of macroeconomic stability in 1991, following the structural reforms prompted by the agreements with the IMF, the DR has entered a period of remarkable economic growth (see Table 7.1). This positive performance came after more than a decade of low and volatile growth dating back to the late 1970s. The resumption of strong economic growth has already had a beneficial impact on poverty according to studies by the Central Bank of the Dominican Republic which indicate that between 1992 and 1998 the incidence of poverty declined from 31.7 to 25.8 percent (that is the percentage of population living in poverty conditions).

In addition to the tariff and tax reforms, the country has also enhanced its trade relations, by entering into several bilateral free trade agreements, and as part requirements of the World Trade Organization (WTO) and other forums of multilateral trade negotiations. The increasing participation of Foreign Direct Investment (FDI) in the country's economic activity has also prompted the call for the elimination of trade restrictions.

The Dominican Republic (DR) provides an interesting case study of a developing country, which has undergone important reforms of its trade policy in the

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[2] The reform also targeted inflation control through restrictive monetary policy. For this purpose, the Central Bank engaged in a reduction of the money supply by contracting credit, and exerted a more pronounced control on the level of international reserves and started to repay the external debt. The first effects were contractionary (investment and public expenditure fell by 20 and 10 percent, respectively, and GDP per capita decreased by 5.5 and 7.4 percent, respectively).

last three decades, and has made important progress in liberalising its foreign trade regime. These reforms have mainly been part of structural adjustment programmes financed by the International Monetary Fund (IMF) and the World Bank.

Table 7.1

Dominican Republic: main macroeconomic indicators

	1981-85	1986-90	1991-95	1996-2000
Annual percentage changes (averages)				
Real GDP	1.9	2.9	4.2	7.7
Real GDP per capita	-1.3	0.9	2.5	5.4
Consumer prices (during the period)	18.0	39.5	7.9	6.9
Money and Quasi-money (M2)	16.5	43.2	22.6	20.1
In percent of GDP (averages)				
Consolidated public sector balance	-5.4	-5.4	-1.2	-2.2
Consolidated public sector primary balance	-3.8	-3.3	0.5	-1.2
Inflation tax	1.7	4.3	0.9	0.8
Agriculture value added	17.0	14.5	13.2	11.8
Industry value added	26.3	26.6	31.9	33.5
Services value added	56.6	58.9	54.9	54.7
External current account balance	-3.7	-3.7	-3.9	-2.7
Foreign Direct Investment	0.6	1.6	2.2	-3.1
External debt (end-period)	64.7	72.2	33.0	18.6
External debt service	7.5	9.2	4.2	2.6

Note: The inflation tax is calculated by the IMF as CPI inflation during the year times the stock of base money at the end of previous year.

Source: IMF (2001), Chapter I; World Bank World Development Indicators database 2000.

7.2 Objectives and organisation

The objective of this chapter is twofold. First, it aims to examine the trade policy reforms undertaken in the DR, and the regime switching process following the liberalisation attempts. Second, it provides the first empirical assessment of the impact of trade liberalisation on export and import growth, and the balance of trade. The rest of the Chapter is organised as follows. Section 7.3 analyses the evolution of the trade policy reforms in the last thirty years. Section 7.4 provides an overview of the international trade agreements subscribed to by the DR. The impact of the Free Trade Zones and FDI in the economy is analysed in section 7.5. The empirical analysis is undertaken in Section 7.6. The conclusions are presented in Section 7.7.

7.3 Evolution of trade policy reform

7.3.1 Trade policy before 1990

In the last fifty years, the DR has maintained high restrictions on both imports and exports. The trade policy regime prevailing before the 1990s was characterised by its complex structure and difficult administration, as well as by the discretionary nature of its application. Specifically, trade policy was typified by the use of import substitution policy based on a dense tariff code, additional duties applied to specific products, contingents, licenses, prohibitions, exemptions and concessions to specific industries, and a multiple exchange rate system with various rates applied to different

transactions. These instruments were applied through different laws, decrees, resolutions, and administrative dispositions. According to the WTO (1996), before the 1990 tariff reform, there were 27 fiscal laws that administered the regimes applied to imports, and 140 different taxes and duties. Imports were subject to three different types of exchange rates, namely: excise, ad-valorem, and composite rates.

Import prohibitions, which were notorious after 1979, included textiles, food and electronic products, shoes, cars and luxury items. These prohibitions were justified on the grounds of encouraging national production, and to enable the country to balance its trade account. Between 1979 and 1986 there were eight decrees that prohibited, amongst others, imports of textile products, shoes, belts, and pastas.

Export restrictions have experienced the same evolution as import barriers. During the 1980s, there was an increasing anti-export bias, associated with an overvalued and multiple exchange rate regime, administrative restrictions, and excessive protection of certain domestic economic sectors. Moreover, the legislation that supported export promotion lacked consistency. The promotion and industrial protection law exercised in the period 1968-1989 (Law 299) sought to develop an industrial sector oriented towards the internal market and the creation of a manufacturing sector oriented toward exports[3]. The latter was designed to have its

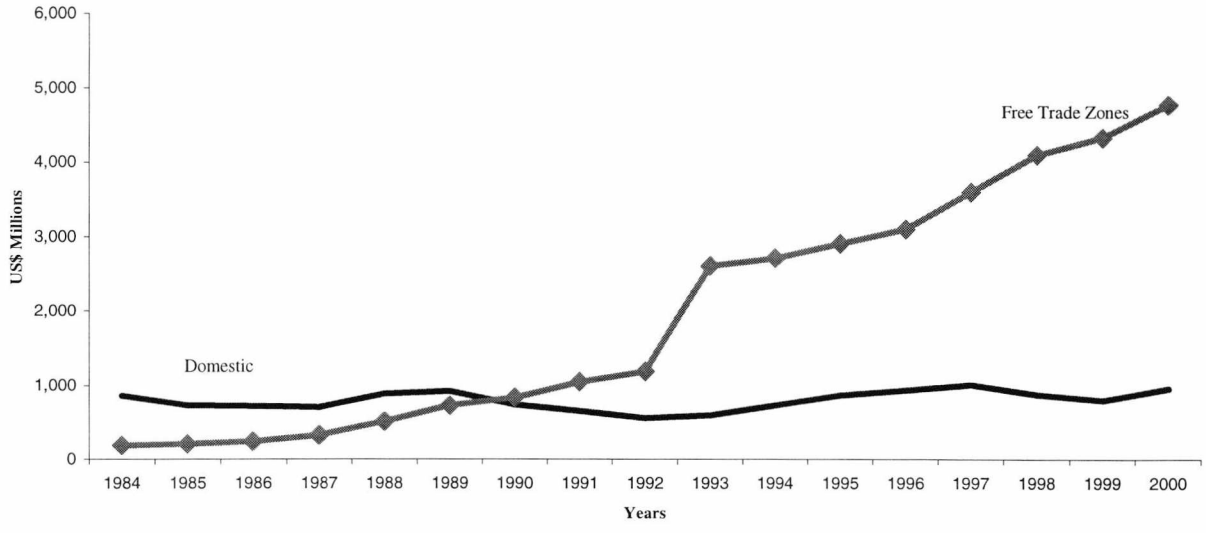
[3] Other export promotion laws, including these affecting the industrial firms under the free trade zones are: Law 597 of 1977, which granted duty exemption to the import of machinery and other equipment to the enterprises that were exporting 80 percent of their production; the 'Law 69' of Export Promotion that established a regime of fiscal incentives for non-traditional exports in 1979. In 1983, a new law (Law 145) was introduced to modify the previous legislation of industrial protection under the Law 299, basically duty exemptions for the import of raw materials and other industrial inputs (see Dahjuare hijo, 1994).

own export laws while the national sector was subject to a set of restrictions, some of which still exist.

Until recently, export duties were applied to basic commodities such as bananas, bovine meat, cocoa, coffee, fish and sugar. Additionally, there was an unfavourable exchange rate system for exports, with the exception of the non-traditional export sector. Particularly, the highly taxed domestic exports coexisted with a more liberalised service sector (i.e. tourism and free trade zones), where the government promoted these activities, creating a dual economy with dynamic and stagnant sectors. Figure 7.1 compares the performance of domestic and free trade zone exports, and it clearly shows the superior performance of the free trade zone exports in comparison to domestic exports.

Figure 7.1

Domestic and free trade zone exports



7.3.2 1990 Reform

In 1990, the DR started a program of macroeconomic reforms called the "New Economic Program", which had as a key element the improvement of trade policy regime. The fiscal and trade policy reforms were introduced in June and September, with the aim of increasing the efficiency of the existing tariff and tax structure and eliminating price distortions, reducing the sectoral asymmetries (particularly that between the industrial and agricultural sectors that compete with imports), and to maintain at the same time fiscal equilibrium. The authorities recognised the necessity of having a more neutral trade regime, suitable to increase the international competitiveness of Dominican exports, and to reduce the existing anti-export bias, as well as to achieve a better allocation of resources and a greater participation of the private sector in productive activities.

The September 1990 (Decree 339/90) tariff reform aimed to simplify the existing tariff structure and reduce the tariff dispersion, and to reduce the effective rate of protection. Specifically, the tariff range was initially reduced from 0-200 percent to 5-35 percent, and then to 0-35 percent. The tariffs applied to imported inputs and intermediate goods were reduced to 5, 10, 15 and 20 percent; and the tariffs applied to final goods were reduced to 25, 30 and 35 percent. Also, a new tariff code based on the 'Harmonised System of Goods Codification' was introduced, and the tariffs were to be applied on the cif value of the imported merchandise rather than on the fob value as was done prior to the reform. Tariff exemptions granted to specific sectors under special agreements with the government were eliminated.

Import prohibitions were also removed, with the exception of several products competing with local production[4].

Although there was a reduction in tariff rates, the government implemented a temporary tariff surcharge set at 30 percent for 1991, 20 percent in 1992, and 10 percent in 1993, to avoid an abrupt impact on the protective structure of certain sectors, and at the same time to allow them to adapt gradually to foreign competition. This multiplier tariff was suppressed in 1994. Also, a provisional tariff of 15 percent, which was eliminated by the second half of 1995, was applied to all imports with the exception of basic food products. Finally, a tax on foreign exchange transactions of 25 percent was implemented, which was eventually reduced to 20 percent and later to 15 percent.

Imports were also subject to VAT, with an 8 percent tax rate, and a selective tax on consumption products (STCP) (with a 5-80 percent tax rate interval). The main imported products that were subject to the STCP were: alcoholic beverages, tobacco products, and luxury goods. In 1995, the rates applicable to both domestic and imported products were unified to 20 and 25 per cent for alcoholic beverages. An additional import tax established in 1987 was eliminated in 1995.

The reform also eliminated most non-tariff barriers, such as import prohibitions, quotas, licenses and exemptions, in order to comply with the WTO agreements; consequently, the import tax base was extended. These non-tariff barrier changes were implemented through 31 decrees and 22 governmental resolutions and affected

[4] In 1995, these commodities represented around 40 percent of agricultural output and 12 percent of manufacturing production (see World Bank, 2000).

mainly rice, meat and chicken imports. However, there are still tariff contingents for some agricultural products (beans, corn, chicken, milk, rice, sugar, and garlic).

During the Uruguay Round of multilateral trade negotiations (1986-1994), a tariff of 40 percent was consolidated for agricultural products, and these tariffs and quotas and presented in Table 7.2. In 1998, the government established the quotas (approved by the WTO in February 1999), and the tariffs to be paid on imports in excess of the quotas. The government also stated the schedule under which these contingent tariffs will be reduced to between 40 percent and 99 percent by 2005 (see Table 7.2). This agreement raised the effective tariff (i.e. the tariff equivalent of non-tariff barriers) for these products, as can be seen in Table 7.3.

The government has reached agreement with the WTO on increasing until the year 2005, on year-to-year basis, the quantities that can be imported under the quota system. According to this settlement, the volumes of onions, red beans, sugar, garlic, and milk to be imported will be increased by 23 percent by the year 2005 compared to 1997 levels; the quota volumes for corn, poultry and rice will be increased by about 40, 53, and 23 percent, respectively. This overall reduction in tariff rates (and in prices of import-competing activities) will tend to reduce the demand for goods subject to the quota system because of a cross-substitution effect. The administration of these licenses does not follow clear procedures or criteria, and the government authorities have wide discretionary power. In general, imports are authorised or prohibited depending upon the conditions of the market and they are subject to statutory tariff rates.

Table 7.2

(a) Schedule of contingent tariffs for WTO technical rectification products

Years	Basic tariff	Tariff beyond the quota						
		1999	2000	2001	2002	2003	2004	2005
Rice	20	114	112	109	107	104	102	99
Garlic	25	111	109	107	105	103	101	99
Sugar	20	94	93	91	90	88	87	85
Chicken	25	137	131	124	118	112	105	99
Onions	25	97	97	97	97	97	97	97
Beans	25	95	94	93	92	91	90	89
Milk	20	84	79	74	70	65	61	56
Corn	5	60	57	54	50	47	43	40

Note: Tariffs are applied when imports exceed the pre-established quota (see part b below).

Source: McHugh and Keller (2001).

(b) Import quota before contingent tariff applies

(In metric tons)

Years	1999	2000	2001	2002	2003	2004	2005
Rice	15,344	15,755	16,166	16,577	16,988	17,399	17,810
Garlic	3,600	3,750	3,900	4,050	4,200	4,350	4,500
Sugar	24,000	25,000	26,000	27,000	28,000	29,000	30,000
Chicken	8,500	9,000	9,500	10,000	10,500	11,000	11,500
Onions	3,000	3,125	3,250	3,375	3,500	3,625	3,750
Beans	14,400	15,000	15,600	16,200	16,800	17,400	18,000
Milk	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Corn	858,200	897,000	935,800	974,600	1,013,400	1,052,200	1,091,000

Source McHugh and Keller (2001).

Table 7.3

Tariff equivalent of non-tariff barriers (%)

Commodity	Statutory rate	Tariff equivalent
Corn	5	85
Red Beans	25	70
Onions	25	38
Garlic	25	35
Poultry	25	75
Pasteurised Milk	20	48
Milk in Powder	20	53
Polished Rice	20	43
Raw Sugar	15	42
Refined Sugar	15	38

Source: World Bank (2000).

Another important component of the 1990 reform was the introduction of the so-called 'oil tax differential', which has been since then an important source of fiscal revenues (2 per cent of GDP on average, and 14 per cent of fiscal revenues in the period 1991-1995). Additionally, the exchange rate for different imports was unified, and the system of custom administration was improved reducing inefficiencies and corruption.

Regarding export restrictions, the 1990 reform reduced the anti-export bias, mainly through the elimination of exports taxes, and other restrictions such as export licensing and minimum export prices for all agricultural products. Moreover, the export administration system was greatly simplified, specifically through the

elimination of most special registration and documentation requirements[5]. However, there still exists a 15 percent commission, payable to the Central Bank, on all foreign exchange transactions. Additionally, traditional exporters must surrender their foreign exchange earnings to the Central Bank and obtain national currency at the official rate[6]. Non-traditional exporters were also subject to this requirement until 1994. This requirement represents an implicit tax on export activities and a quasi-fiscal source of revenues. The larger the spread between the official and the parallel exchange rates, the bigger is this implicit tax. By 1995, most minimum prices for export products were eliminated, with the exemption of those applied to domestic exports. Until 1992, the Centre for the Promotion of Exports (CEDOPEX) was in charge of export control, contingents, licenses and prohibitions. From 1992 these restrictions were eliminated.

As a result of the program of reforms established in 1990, most restrictions on exports and imports have been abolished, specifically through the elimination of import prohibitions, quantitative restrictions, and tax exemptions.

After the 1990 reform, the authorities implemented other policies directed to increase the neutrality of trade policy and to eliminate the remaining distortions. For example, in 1995 the Congress approved a new Foreign Direct Investment (FDI) law, which eliminated restrictions on foreign companies investing in certain economic sectors; allowed the repatriation of profits, and the channelling of long-term loans. Also, in 1991 the government added a 'zero rate' tariff to the prevailing tariff schedule, which was going to be applied to basic imports. In 1993, the authorities

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[5] Only minor obligations were kept for administrative purposes.
[6] Coffee, sugar, cacao, tobacco, and mineral products other than nickel.

increased the 'zero rate' tariff to 3 percent; to cover agricultural inputs that were subject to tariff rates equal to, or greater than 5 percent. Finally, in 1997, the 'zero rate' was reinstated on agricultural and textile inputs.

During the period 1995-1998, a variety of complementary reforms were introduced, with the aim of reducing tariff rates and to improve internal tax revenues. In 1997, the government implemented a zero percent tariff rate for imported inputs and machinery. Also, in 1997 and 1998 proposals for tariff and fiscal policy reforms were submitted to the Congress but without success. In addition to the government's proposal, the private sector proposed its own programme of tariff and tax reforms, with the aim of achieving a more neutral system.

7.3.3 2001 Tariff and tax reform

After several years of confrontation, in December 2000 the Congress approved a programme of trade and tax policy reforms, which intertwined the different existing proposals, under the name *Tariff Reform and Fiscal Compensation Program (Programa de Reforma Arancelaria y Compensación Fiscal).* The application of the program started in January 2001. It should be noted that the new tariff code is consistent with the WTO legislation.

The new program (Laws No.146-00 and 147-00) affected the tariffs, the value-added tax, and the tax on selective consumption[7]. Specifically, the tariffs on final

[7] The imported products that are still exempt from VAT are books, petroleum and oil products, milk, and corn, amongst others.

goods were reduced from 35, 30 and 25 percent to 20 percent. The rates applied to intermediate inputs were reduced from 20 and 15 percent to 14 and 8 percent, respectively. Besides, new tariff rates of 5, 3 and 0 percent for raw materials were introduced. There are also further tariff reductions stipulated, due to take effect in 2002. The reform also increased the tax on selective consumption for vehicles and alcoholic beverages, with marginal rates between 10 and 95 percent. This implies an increase in the operative costs of sectors such as tourism, which is one of the main importers of such goods, affecting the comparative advantage of the sector, and consequently, the demand for that service.

Finally, Table 7.4 reports the tariff schedule before and after the 2001 trade reforms. The reduction in tariff rates and in their dispersion is clear. However, it can be noted that the government still uses tariffs as a mean of protection for some industries/sectors, mainly agricultural products and raw materials that compete with imports. Table 7.5 also shows the reduction of taxes on international trade as a proportion of fiscal revenues, which is an indicator of the outward orientation of the trade policy regime. However, after 1990 an increase in import tariff collection was observed, because of the substitution effect generated by the conversion of some quantitative restrictions into tariff. This reduction in trade barriers has stimulated a higher growth of exports and imports; but the actual trade balance as a percentage of GDP has remained roughly constant (see Figure 7.2). However, the precise impact of liberalisation on these variables, controlling for other factors, will be estimated later.

Table 7.4

Tariff schedule before and after 2001 trade reform

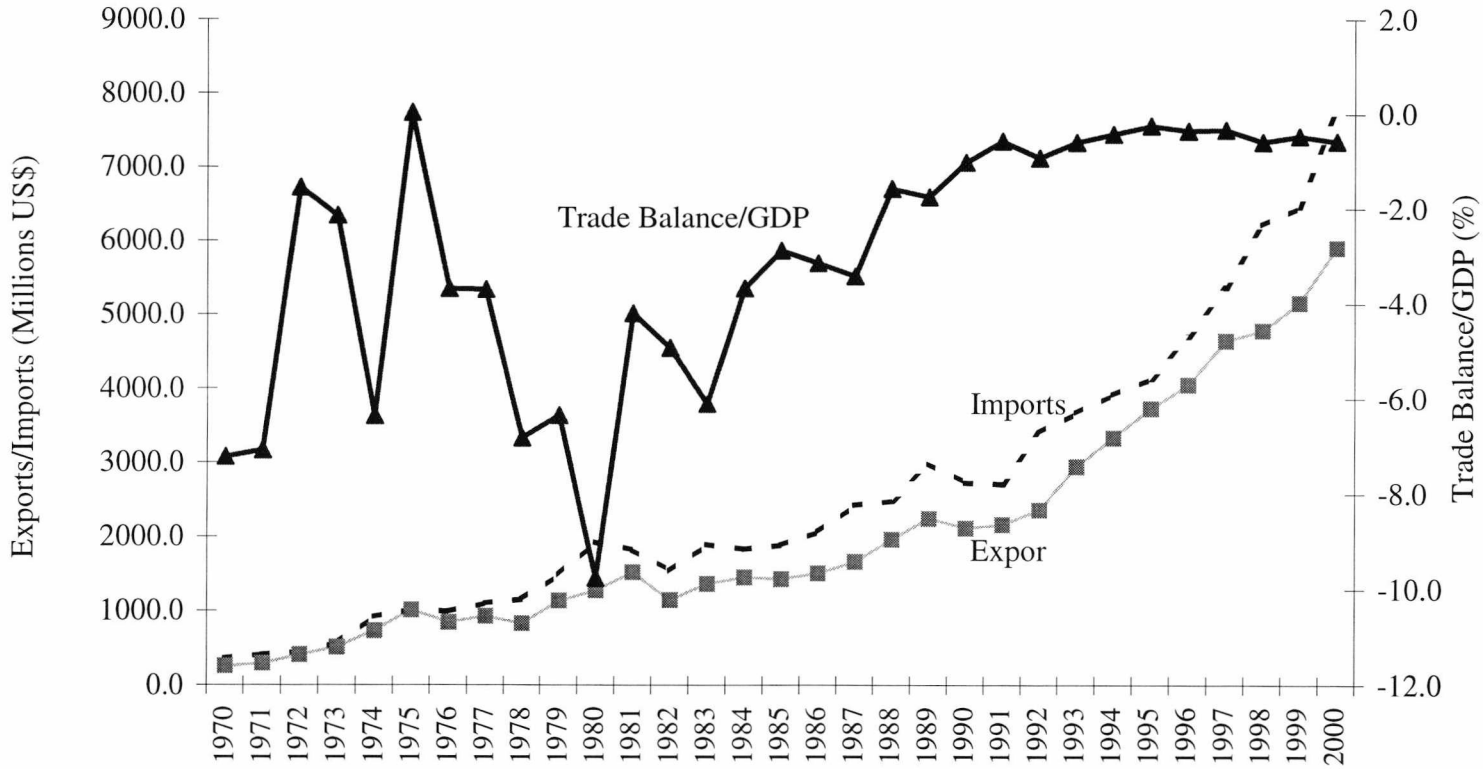
Type of imports	Tariff (%)	
	Before	**After**
Final consumption	20-35	20
Agricultural goods (final consumption or agro industrial).	30-35	20
Inputs (which are not produced in the country)	5	3
Inputs (which are produced in the country)	10-20	8
Capital goods	10-20	8
Inputs for construction (luxurious)	15-25	20
Inputs for construction (no luxurious)	15-25	14
Pharmaceutical products and inputs required for their fabrication	3-5	3
Vehicles for transport	30	20
Other vehicles for commercial use	10-15	8
Memorandum		
Average tariff rate (simple)		17.7
Average tariff rate (simple)**		18.6

Source: BCRD (2001).

Note: ** Includes the selective tax on consumption applied to imports.

Figure 7.2

Exports, imports and the trade balance (1970-2000)



Additionally, despite significant progress made in the 1990s and the reforms of 2001, and the elimination of export duties (see Tables 7.5 and 7.6), the DR still maintains policies that perpetuate anti-export bias. For example, the authorities continue to insist on surrender requirements for selected exports of goods and services. Foreign exchange proceeds from traditional agricultural products have to be surrendered totally to the Central Bank at the official exchange rate, as well as the receipts from certain services such as telecommunications, credit card transactions, and remittances from insurance claims (IMF, 2001).

Table 7.5

Structure of fiscal taxes (selected years)

Percentage of fiscal revenues

Tax	1985-89	1990	1992	1995	1996	2000	2001
Income tax	17.4	22.7	16.6	19.4	18.2	21.7	26.1
Property tax	1.7	1.6	0.9	1.1	1.4	1.8	1.4
Taxes on good and services (VAT)	29.6	25.2	32.5	40.1	41.6	34.3	44.0
Internal Oil tax	5.1	9.5	7.0	8.3	9.0	10.4	14.4
differential	...	0.1	10.4	11.8	10.7	5.1	12.8
Taxes on international trade	24.9	33.4	35.6	26.0	25.6	27.0	15.5
Import duties	22.1	33.3	35.5	26.0	25.6	27.0	15.5
Custom tariff	5.3	8.2	25.6	25.1	25.0	26.2	15.0
Complementary tax	16.8	13.8	4.0	0.6	0.5	0.8	0.6
ER commission	4.2	11.4	5.9	0.3	0.0	0.0	0.0
External VAT	3.9	3.4	6.4	8.2	8.1	9.0	9.1
Export duties	2.9	0.1	0.0	0.0	0.0	0.0	0.0
Other taxes	26.4	17.1	14.4	13.4	13.2	15.1	12.9

Source: BCRD, *Boletines Trimestrales* (various issues).

Table 7.6

Dominican Republic Trade Policy Reforms

(1990-2001)

Year	Reform
1990	(September) Introduction of the trade policy reform, which included: ▪ Elimination of specific tariff rates and introduction of ad-valorem tariffs. ▪ Use of the market exchange rate for international trade transactions. ▪ Imposition of duties over the cif value instead of fob. ▪ Reduction of tax exemptions. ▪ Elimination of quantitative restrictions to imports. ▪ Establishment of a new custom nomenclature based on the "Harmonised System", and modernisation of custom administration (e.g. introduction of computerised systems and simplification of custom procedures). ▪ Elimination of the main prices controls.
1991	Reduction of the exchange rate commission from 2.5 to 1.5 per cent.
1992	Elimination of exports administrative restrictions (e.g. licenses and special permits). (June) Approval of the fiscal reform.
1995	Elimination of the exchange rate commission on imports. The DR joined the WTO and consolidated a maximum tariff of 40 per cent.
1997	Introduction of a 'zero' tariff rate for inputs, equipments and machinery for the agriculture and textile sectors.
1998	Elimination of the agricultural non-tariff barriers *.
2000	(December) Approval of the trade and fiscal policy reforms, to be introduced from January 2001, which included: ▪ Tariff rates reductions for final goods to 20 per cent, and to 14 and 8 per cent to inputs and intermediate goods. ▪ Introduction of five, three and 'zero' tariff rates for raw materials. ▪ Increase of the value added tax from 8 to 12 per cent. ▪ Increase of the tax for selective consumption rate in the range between 10 and 95 per cent.
2001	(July) Application of the new system of custom valuations based on GATT's Article IV.

Note: *This does not include the eight agricultural products from the technical rectification in the WTO.

Sources: FEyD (1996); WTO (1996b); BCRD (2001); Dirección General de Aduanas (2001).

7.4 International trade agreements

In addition to the trade and fiscal policy reforms, the international agreements that the Dominican Republic has subscribed to, and the participation in the multilateral trade negotiation forums, have also influenced trade policy reforms in the country. The multilateral agreements of the Uruguay Round (the General Agreement on Tariff and Trade–GATT, the General Agreement on Trade and Services -GATS, the General Agreements on Trade-Related Aspects of Intellectual Property Rights (TRIPS), and the World Trade Organisation -WTO) have been a determinant raison d'être of the trade policy reforms of the DR since 1995, where the trade policy has to be responsive to the demands of an increasingly liberalised and integrated world economy. In this connection, Table D7.1 in the Annex shows a comparison of non-tariff barriers for all products in selected Latin American and Caribbean countries for the period 1989-98, and it can be seen that the DR has reduced such barriers significantly since 1995. These figures also demonstrate that the level of restrictions is now lower than in most other Latin American countries.

7.4.1 Free trade agreements

During the 1990s, the DR joined various regional organisations, including the Free Trade Area of the Americas (FTAA). It was a founding member of the Association of Caribbean States (ACS), a federation launched in January 1995, with the aim of

promoting trade liberalisation and regional economic integration within the Caribbean basin. In addition, the DR has observer status with the Caribbean Community (CARICOM), which endeavours to deepen economic integration among its member countries through the establishment of a common market, coordinating and regulating commercial and economic relations, and defining a common position in other regional initiatives such as the FTAA. In March 2001, the Congress ratified a trade agreement with CARICOM[8]. Also, in 1999 the DR joined the Central America Free Trade Agreement (CAFTA), which aims to deepen and diversify trade relations amongst its members. The Congress ratified the free trade agreement with CAFTA in the year 2000. These agreements encompass negotiations on services and investment and create a market of more than 50 million consumers[9]. Both CARICOM and CAFTA are consistent with the WTO laws; also, they are in harmony with the process of creation of the FTAA[10].

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[8] The FTA between DR and CARICOM does not include Haiti, which joined the Caribbean Community after trade negotiations between the DR and CARICOM member started.

[9] The DR has subscribed to bilateral free trade agreements with Costa Rica, Ecuador and Panama.

[10] In the case of CARICOM there are 62 products excluded from the free trade agreement. The agreement with the CACM contains 19 products in the negative list. In both cases, the application of the negative lists is symmetric. Also, the treaties exclude the eight agricultural products of the technical rectification with the WTO.

7.4.2 Market access and preferential trade agreements

The DR benefits from significant preferential access to some developed countries, particularly to the United States. In 1983, the DR signed, together with 27 other Central American and Caribbean countries, the Caribbean Basin Initiative (CBI), which is designed to promote trade relations and foreign investment between the Caribbean and the United States and provide duty-free access for most products. The CBI initially had a duration of twelve years from January 1984, and then in 1990 it was made permanent[11]. Additionally, since 2000, the United States has provided free access to Dominican textile exports with minimal or no USA components, provided they do not contain a third country component. This allows the Dominican textile industry to diversify further within the sector through increased production of intermediate goods and raw materials, and to integrate vertically. General quotas are maintained for access to the USA market for certain textile products, but the arrangement allows for yearly negotiations amongst competing Caribbean partner countries to determine their respective market share. However, new WTO declarations establish the elimination of all quotas by the end of 2004, requiring Dominican textile exporters to compete in a deregulated environment and the country to diversify its export base even more. Also, the United States grants preference to the DR under the Generalised System of Preferences (GSP) since January 1976, encompassing 26 different schemes through which developed countries grant

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[11] This agreement excludes textiles, canned tuna, leather, and plastic.

preferences (i.e. duty free status and/or tax reductions to the beneficiary countries' exports) to developing countries. Additionally, in October 2000 the USA granted Dominican exports parity with those of Canada and Mexico (until September 30, 2008). However, negotiations between the USA and other countries to obtain NAFTA parity may downgrade the benefits of this advantage to the DR.

Another preferential agreement that benefits DR's exports is the Lomé Convention, signed in 1989 (now Cotonou Agreement, which was signed on June 23, 2000 in Benin), composed of the European Union and the African, Caribbean and Pacific (ACP) States. This treaty regulates trade relations between the country members; the strategies of cooperation (e.g. aid and financial flows) in terms of development, and the political dimension of their relations, amongst other elements[12].

Additionally, since 1980 the DR has been a member of the 'San José Agreement' between the oil importing countries of Central America and the Caribbean, and Mexico and Venezuela. This settlement gives the DR access to a credit line of approximately 20 percent of the total cost of the oil supplied by Mexico and Venezuela. Such funds can be used to finance development projects in the productive sectors. Also, the DR participates in the credit agreements of the Latin America Integration Association (ALADI), founded in 1980, which are used to finance trade operations between the country members.

Another positive result of the process of economic openness in the DR is that the country has strengthened its institutional capacity regarding international trade

[12] The new ACP-EU agreement will be in force until 2020. The preferential agreement on tariffs expires in 2008.

negotiations. Previously, the responsibilities of representing the country in the international forums of trade arbitration were not defined and were segregated amongst different public institutions. In 1997 the National Commission for Trade Negotiations was established, an official organism which comprises several government agencies and also incorporates the stance of the private agents through the consultation committees of the civil society[13].

7.5 Free trade zones and foreign direct investment

The renewed interest in the analysis of the impact of foreign direct investment (FDI) on the economic performance of developing countries, mainly in South East Asia and Latin America, is to some extent explained by the growth in FDI flows to such countries since the beginning of the 1980s.

Amongst the main determinants of FDI flows to developing countries are (see Agosín, 1995; de Mello, 1997; and UNCTAD, 1996): 1) the acquisition of domestic firms by foreign ones; 2) the internationalisation of domestic production; and, 3) the ever-growing financial and economic integration in the global economy. Other important elements that explain the boom of FDI to developing countries in recent years have been the progress on macroeconomic stabilisation programs, and the

[13] The government institutions are: the Ministry of Foreign Relations, Technical Ministry of the Presidency, Ministry of Trade and Industry, Ministry of Agriculture, Ministry of Finance, Ministry of Tourism, National Office for the Management of European Funds, Legal Consultancy of the Executive Branch of the Government, Central Bank, General Directorate of Customs, Office for the Promotion of FDI, and the Centre for the Promotion of Exports.

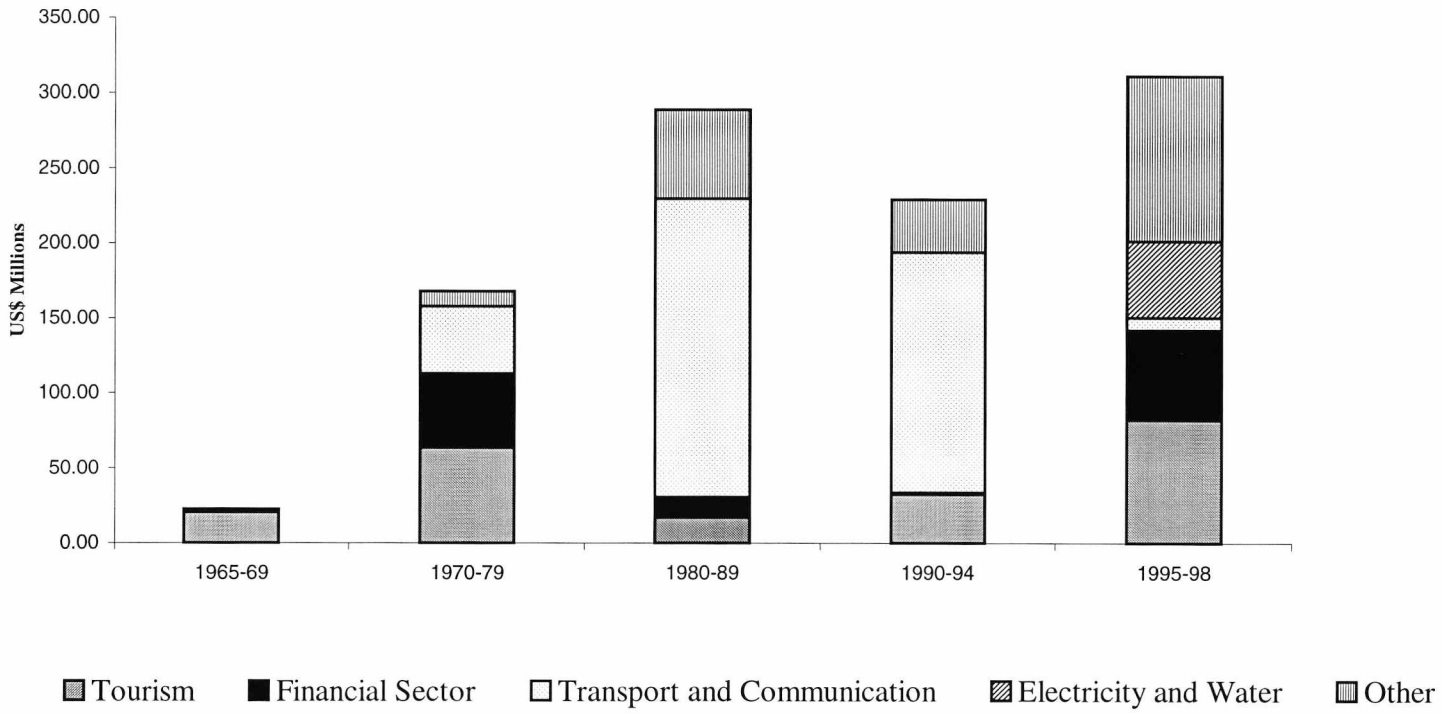
reduction of capital controls. However, there are still some worries about speculative (short run) capital flows.

As an example of the increasing FDI in a developing economy, the DR has experienced a transition in its commercial structure in the last three decades, that is, a switch from the production of primary commodities to manufacturing and services (mainly textiles, communications, and tourism). In fact, the macroeconomic reforms that started at the beginning of the 1990s, including trade reform, acted as a key determinant of the growing inflows of FDI into the DR. Also, the privatisation of most of the government's utilities and enterprises has contributed enormously to the inflows of foreign investment into the country, predominantly in the electricity sector. The allocation of the foreign investment has been focused mainly on tourism, transport and communication (predominantly on the Dominican Telephone Company), the financial sector, and electricity and water, as illustrated in Figure 7.3.

Moreover, over the last thirty years the country has developed an extensive system of industrial free trade zones (FTZ), specialising mainly in the production of textiles. The FTZ are regarded as extra-territorial with respect to the Dominican economy, but they can trade with the domestic economy subject to applicable tariffs and regulations, and through the generation of employment and payment of some operation costs. The FTZ enterprises are exempt from the payment of corporate income tax, construction taxes, fees related to the registration of loan agreements, charges concerning transfers of real estate, standard import duties (including duties on materials and equipment used in the establishment and operation of the company).

Figure 7.3

Allocation of net FDI in the Dominican Republic



Source: Banco Central de la República Dominicana (2001).

Table 7.7

Free trade zones economic activity

Year	Number of firms	Number of employees (thousands)	Foreign exchange generated*	Gross value of exports	Textile exports	Textile exports/ total FTZ exports (%)
			(In millions of US$)			
1980	71	16.4	45	276	...	...
1985	136	30.9	45	277	...	...
1990	331	130.0	196	850	...	...
1991	366	135.3	250	1,053	...	...
1992	404	141.1	306	1,195	...	...
1993	462	164.3	401	2,609	1,458	55.9
1994	467	176.3	441	2,716	1,616	59.5
1995	469	165.6	512	2,907	1,787	61.5
1996	436	164.3	545	3,107	1,802	57.9
1997	446	182.2	698	3,596	2,273	63.2
1998	496	196.0	827	4,100	2,395	58.4
1999	473	191.1	887	4,332	2,385	55.1
2000	491	206.3	1,018	4,771	2,571	53.9

Note: *The surrender requirements for the FTZ foreign exchange earnings were abolished in 1992. Afterwards, the foreign exchange generated is an estimation of local expenditures of FTZ enterprises.

Source: McHugh and Keller (2001).

This sector has also evidenced a rapid growth in terms of number of firms, employment and gross production, as shown in Table 7.7. The FTZ attracted most of the foreign capital invested in the DR, and by the year 2000 generated more than 80 percent of Dominican exports.

The rapid expansion of the FTZ is explained by three main factors (see McHugh and Keller, 2001). Firstly, the regulations of the operations and activities of the sector are generally regarded as stable and transparent, both by domestic and foreign investors, which is a result of the extensive reforms of the legal and trade systems. Secondly, the tax incentives granted to the enterprises of the FTZ are considered as attractive. Finally, the advantage of the DR's geographical location, close to the United States and Puerto Rico, in addition to the participation in regional trade agreements, has contributed to this growth.

However, in terms of regional integration, the FTZ exports have been strongly orientated to the US market (particularly because of the preferential arrangements described before), which imposes a high dependence on US economic performance and its trade agreements with other countries. Nevertheless, this high dependence on the demand for the DR's textiles by the United States has been partially offset by other sources of foreign exchange (and FDI) such as tourism, which represents the other most important productive sector for the Dominican economy. It can be expected that the scope for trade creation in the DR will depend on the degree of orientation of national production to exports (Bhagwati, 1978; Balasubramanyam *et al*, 1996).

7.6 The impact of trade liberalisation on exports and imports

The purpose of this section is to examine the impact of trade liberalisation on export and import growth in the DR. This is the first study to do so. It is important to know if the impact of trade liberalisation has been greater on export growth than on import growth or vice versa. The results may have influential policy implications for the future in relation to the sequencing of export and import liberalisation, given the balance of payments difficulties that might arise if imports are more responsive than exports to the elimination of trade barriers.

The main approach used to measure trade liberalisation is the identification of the year (s) of liberalisation, where the timing of liberalisation is assessed by a set of guidelines: trade (tariff and tax) reform, elimination of non-tariff barriers, export impediments and promotion, and exchange rate distortions. This indicator takes the form of a series of impulse and shift dummies to account for the possible lagged effect that liberalisation might have on export and import growth.

7.6.1 Import and export demand models

Following the literature (see Bahmani-Oskooee and Niroomand, 1998), export demand is specified as a function of foreign demand (income) and relative prices (see also Chapters 4 and 5). Thus, it is assumed that the export demand function for the Dominican Republic can be represented as follows:

$$LogX_t = a + bLogPX_t + cLogY_t^{US} + \varepsilon_t \qquad (7.1)$$

where X is the volume of exports; PX_t is a measure of the real exchange rate (RER); Y^{US} is United States income[14]; and ε is an error term. A fall in the foreign price of domestic currency (devaluation), or a fall in domestic prices relative to foreign prices, reduces RER and thus is expected to raise the level of exports. Thus, $b<0$. An increase in the US (world) income is expected to increase the country's exports; therefore $c>0$.

The main determinants of import demand are income (domestic) and relative prices. Thus, the import demand function takes the following form:

$$LogM_t = a' + b' LogPM_t + c' LogY_t + \varepsilon_t' \qquad (7.2)$$

where M is the volume of imports; PM is a measure of relative prices; Y is domestic income, and ε' is an error term. It is expected that an increase in import prices relative to the domestic price level will reduce import volume, resulting in a negative import

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[14] United States' income is considered, since on average, more than the 70 percent of the DR's total exports go to the USA.

price elasticity ($b' < 0$). Additionally, it is expected that an increase in domestic income will stimulate imports yielding a positive income elasticity ($c' > 0$).

7.6.2 Estimations and results

To establish whether there are long run equilibrium relationships among the arguments of the export and import demand functions, cointegration analysis is employed. Before proceeding to that stage, the univariate characteristics of the data have to be explored.

Using annual data, mostly over the period 1960-2000, the Augmented Dickey Fuller (ADF) test is used to determine the degree of integration of each variable. The results of the ADF test applied to the log level and to the first difference of the data are reported in Table 7.8[15]. The results of the ADF test cannot reject the null hypotheses of a unit root in the log levels of almost all the variables, which seem to be I(1) series or I(0) in first differences. These variables are displayed in Figures 7.4 and 7.5.

[15] The complete data definitions are presented in the Appendixes B and C. The Real GDP of the United States is in Billions of Chained 1996 Dollars, Seasonally Adjusted Annual Rate. Source: The Federal Reserve Bank of St. Louis, FRED (http://www.stls.frb.org/fred/data/gdp/gdpc96).

Table 7.8

Augmented Dickey-Fuller unit root tests

Variables	Level	First difference (Δ)
m	-2.198	-4.814**
x	-2.711	-5.097**
p	-2.233	-5.292**
y	-2.145	-3.632**
yusa	-2.406	-4.566**
Ratios		
tb		-4.575**

Notes: The ADF test is based on a regression of the form $\Delta y_t = \alpha + \phi y_{t-1} + \sum_{i=1}^{T} \Theta \Delta y_{t-i} + \delta t + \varepsilon_t$, where ε_t is a random error term, and α and t are a constant and time trend, respectively. The ADF test corresponds to the value of the t-ratio of the coefficient ϕ. The null hypothesis of the ADF test is that y_t is a non-stationary series, which is rejected when ϕ is significantly negative. Two lags, a constant, and a time trend were included in the ADF regressions of the levels of the variables. For the level variables, the sample is 1953-2000, with the exception of *m* and *x* 1963-2000, and *yusa* 1958-2000. For the first differences of the level variables, the sample is 1963-2000. For the *tb* ratio, the sample is 1962-2000.
** denotes significance of a test (i.e. rejection of non-stationarity) at the 1% level.

Figure 7.4

(a) Log of real US income, real exports, and real exchange rate

(b) Fitted log of real exports

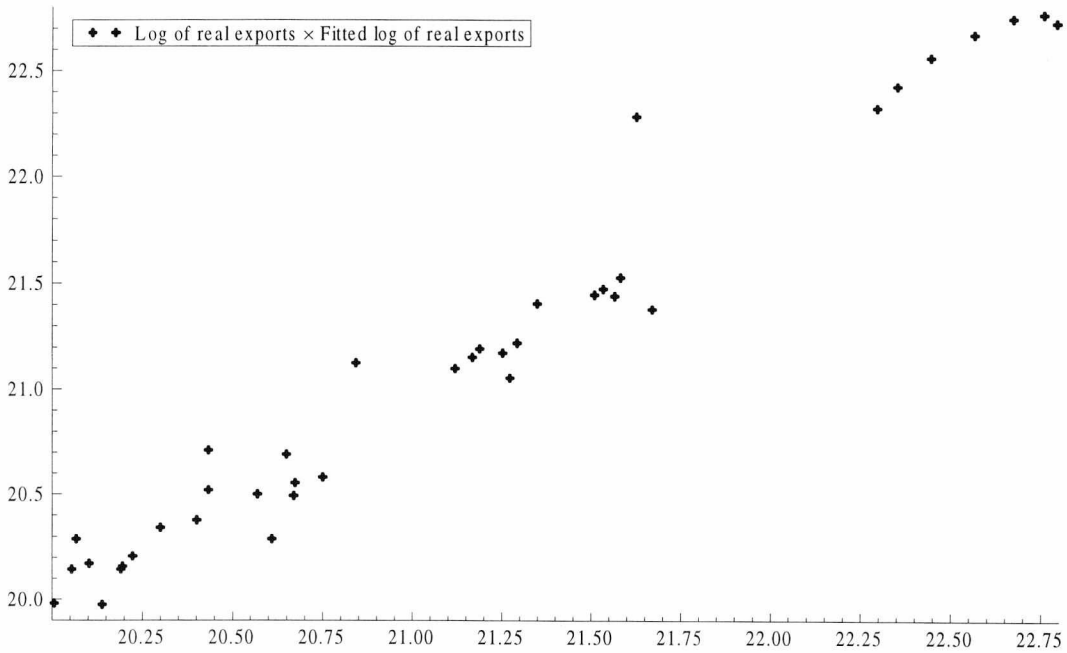
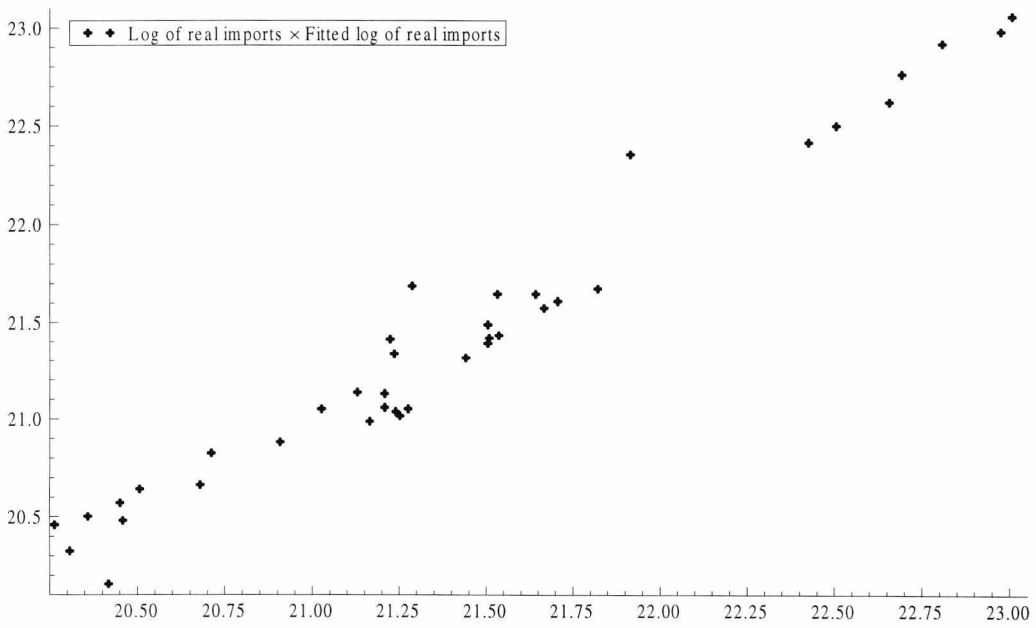


Figure 7.5

(a) Log of real DR income, real imports, and real exchange rate

(b) Fitted log of real imports



7.6.2.1 Cointegration analysis

The long run representation commences by estimating an Autoregressive Distributed Lag - $ADL(2,2)$ model that yields the following results:

$$lx_t = 0.68 + 0.65**lx_{t-1} - 0.05lx_{t-2} + 0.33**lyus_t - 0.98lyus_{t-1} + 1.42lyus_{t-2} \\ -0.12lpx_t - 0.09lpx_{t-1} - 0.22lpx_{t-2}. \tag{7.3}$$

After reducing the above general model, the long run solution to the preferred specification can be expressed as

$$lx = 2.53**lyus \tag{7.4}$$

$$WALD - \chi^2(1) = 2313.04**; ADF = -5.051(-4.52).$$

There appears to be a long run relationship linking exports to foreign (US) income, according to the *ADF* test reported. Note the absence of a relative price variable in this function. This could be signalling the fact that Dominican exports do not depend on their relative international prices, at least in the long run. Also, note that the *WALD* test of the null that all the long run coefficients are zero is rejected at the one percent level. Moreover, the augmented Dickey-Fuller test applied to the residuals of the equation reveal that these are stationary, according to MacKinnon's (1991) 5 percent critical values (shown inside parentheses).

For an analogous import demand function the empirical analysis produces

$$lm_t = 8.23^{**} + 0.56^{**} lm_{t-1} - 0.11 lm_{t-2} + 2.77^{**} ly_t - 1.71^{**} ly_{t-1} - 0.23 ly_{t-2} \\ -0.53^{*} lpm_t + 0.22 lpm_{t-1} - 0.49 lpm_{t-2}. \tag{7.5}$$

Due to the large number of coefficients that are not significant, this specification was reduced to a simpler model, which has the long run solution of:

$$lm = 14.71^{**} + 1.53^{**} ly - 1.39^{*} lpm \tag{7.6}$$

$$WALD - \chi^2 = 238.82^{**}; ADF = -4.494(-4.38).$$

Similarly to the outcome of the analysis of the demand for exports, this specification yields long run coefficients that are economically and statistically significant. Notably, significant long run income and price elasticities are estimated. In addition, the diagnostic statistics are satisfied and the augmented Dickey-Fuller test applied to the residuals of the equation reveal that these are stationary, according to MacKinnon's (1991) 5 percent critical values (shown inside parentheses). Henceforth, a long run cointegrating import demand function can be identified for the DR.

The elasticities presented in this study are between the boundaries of previous findings for developing countries, particularly the income elasticity. For instance,

Senhadji's (1998) study of import demand shows that the short-run income elasticities are on average less than 0.5, while the long-run income elasticities are close to 1.5. Also, in the case of export demand functions, Senhadji and Montenegro (1999) conclude that the average long run income elasticity is 1.5, and the price elasticity –1.

7.6.2.2 Short run analysis

The corresponding short run analyses of the export and import demand functions are estimated in this section, and the results are displayed in Tables 7.8 to 7.11. The salient feature of the single equation short run analysis is that it provides information on both long and short run parameters, the former captured through estimating equilibrium correction dynamic models (*ECM*) for the export and import demand equations. Specifically, the *ECM* incorporates an equilibrium long run relationship together with the introduction of past disequilibrium (i.e. lagged) as explanatory variables in the dynamic behaviour of current variables.

Equations (7.1) and (7.2) are modified to include the effects of trade liberalisation, using dummy variables (*lib*) to estimate the lagged effect of liberalisation and to see whether there has been a permanent shift in export and import growth[16]. Furthermore, trade liberalisation is expected to affect the price and

[16] Other estimations were done including a measure of duties applied to exports and imports. However, the results when including such variables were not sensible and failed to pass the diagnostic tests.

income elasticities of demand for exports and imports. With regard to exports, liberalisation could increase the sensitivity of exports to price and income changes by making it easier for producers to shift resources into the traded goods sector, by facilitating structural change, and by stimulating efficiency. These interaction effects can be estimated by including two slope dummy variables ($dlyus * lib$ and $dlpx * lib$) to depict the combined effects of the elimination of trade distortion measures on income and price elasticities, respectively. With regard to imports, liberalisation may also increase the sensitivity of imports to price and income changes, in line with the Melo-Voght (1984) hypotheses (see also, Mah, 1993 and 1999).

The existing empirical evidence for developing countries, regarding the reaction of exports and imports to trade liberalisation is conflicting. In the case of exports, some studies show that countries that have undertaken liberalisation programmes have improved their export performance (e.g. Bleaney, 1999), but others not (e.g. UNCTAD, 1989; Agosín, 1991; Clarke and Kirkpatrick, 1992; Greenaway and Sapsford, 1994; Shafaedin, 1994; and Jenkins, 1996). On the import side, most studies show a strong positive impact of trade liberalisation on the demand for imports, which also work through the sensitivity of import price and income elaticities, as advanced by the Melo and Voght (1984) study (see also, Bertola and Faini, 1991, and Mah, 1999).

Considering first the (augmented) export demand estimations, the equilibrium correction dynamic model results presented in Table 7.9 satisfy the various diagnostic statistics, but a more parsimonious representation can be achieved through further

simplification of the model. As column (1) shows, the short run income and price elasticities are not statistically significant. More interesting, it is shown a negative income elasticity of exports, which indicates that the demand for Dominican exports is not affected by the cycles in the US economy, which can be explained by the preferential trading system that the US grants to DR exports. However, the *ECM* shows that any disequilibria out of the long run 'steady-state' position of the augmented export demand equation is corrected within one year, and speed of adjustment implied by the *ECM* is around 100 percent per annum.

To look more closely at the impact of trade liberalisation, a set of impulse dummies is included, where the liberalisation indicator for 1991 indicates the impact of trade reform on export growth in the first year only, instead of an average post reform effect[17]. The other impulse dummies (*lib92*, and *lib93*) pick up the impact of liberalisation in subsequent years[18]. The results are interesting, as they reveal an insignificant (negative) effect of trade liberalisation on export growth in the first two years following the reform, but a large positive and significant coefficient in the third year (1993), suggesting a *J* curve-type effect of liberalisation on export growth. This lagged impact on export growth can be seen in Figures 7.2 and 7.4. This finding is consistent with the evolution of the DR's trade policy, where most export restrictions

[17] Although the trade liberalisation program was not approved by the Congress until September 1992, in practice the new trade policy started operating in January 1991.

[18] A similar approach was undertaken by Greenaway et al (2002) to analyse the relationship between trade liberalisation and GDP growth in developing countries. Using a panel data approach, and a set of different liberalisation indicators, it was found that liberalisation does appear to have an impact on growth, albeit with a '*J*-curve' type response.

survived until 1993. Even though export taxes were eliminated in the 1990 reform, there still existed a 15 percent commission, payable to the Central Bank, on all foreign exchange transactions, as noted in the section that analyses the reforms of trade policy in the DR. Non-traditional exporters were also subject to this requirement until 1994.

Concentrating now in Column (2) of Table 7.9, which provides a final, simpler specification supported by the diagnostic statistics, it is evident that DR exports were strongly affected by the set of liberalisation measures after 1992. In addition, export growth adjusts to its long run equilibrium level, as demonstrated by the *ECM* of 80 percent, which is statistically significant. Additionally, the $Omit - F$ test confirms that the interaction between trade liberalisation and the income and price elasticities of exports is not significant. This is understandable since Dominican's exports have been (historically) subject to preferential trading agreements such as the sugar cane quotas to the US market, the banana trading agreement with the European Union, and the textiles quotas granted by the United States.

Table 7.9

Short run analysis of the export demand function for the Dominican Republic

Variable	Dependent variable is dlx_t	
	(1)	(2)
dlx_{t-1}	0.76 (2.12)*	0.68 (2.05)*
dlyus	-0.99 (0.88)	-
dlpx	0.05 (0.20)	-
$ECMx_{t-1}$	-0.96 (2.43)*	-0.86 (2.44)*
lib91	-0.31 (2.33)*	-
lib92	-0.09 (0.63)	-
lib93	0.67 (5.06)**	0.69 (5.10)**
Diagnostic (test) statistics		
$AR-F$	0.91651	0.3801
$ARCH-F$	0.34958	0.1837
$NORM-\chi^2$	5.3848	3.9076
$RESET-F$	2.8174	0.2843
SCHWARZ	**-3.6819**	**-3.9598**
$Omit-F$: *dly*lib93*	-	2.1419
$Omit-F$: *dlmp*lib93*	-	3.2086

Notes:

Coefficients' absolute t-ratios are inside parentheses. The diagnostic statistics are described as follows: coefficient of determination (R^2); residual sum of squares (RSS); residual serial correlation ($AR-F$); autoregressive conditional heteroscedasticty ($ARCH-F$); normality ($NORM-\chi^2$); Ramsey's functional form mis-specification test ($RESET-F$); $SCHWARZ$ is a model selection information criterion; and $Omit-F$ is a test of the relevance of variables not included in the corresponding regression equation. The null distribution is given by $\chi^2(\cdot)$ or $F(\cdot,\cdot)$, where the degrees of freedom are inside parentheses. For AR, $ARCH$, and $RESET$ the first degree of freedom indicates the maximum lag length. The values of the tests are displayed. ** and * mean a diagnostic statistic is significant at the 1% and 5% levels, respectively. See Doornik and Hendry (2001) for further details of these tests.

Regarding the 'pure' effect of trade liberalisation on export growth discussed above, and from the coefficients on the set of impulse dummies reported, it is noted that 1993 represents the year when a shift in export growth occurred. Consequently, other estimations were undertaken to try to visualise the direct impact of trade liberalisation, using a shift dummy for 1993. These results are presented in Table 7.10.

The estimated coefficients for export price and income elasticities are very similar to previous findings. However, the more noteworthy findings are those related to the shift dummy for trade liberalisation, which confirms the change of pattern of export growth, that is, a movement to a higher rate of expansion. Specifically, liberalisation has increased export growth by 0.93 percentage points. In addition, it is interesting to note that the *ECM* coefficients (-1.44 and –1.43) show an overreaction of export growth, suggesting that the disequilibirum adjustment is more than 100 percent within one year. These results reinforce the previous findings in relation to the positive impact that trade policy reforms have had on the DR's export growth.

We now turn to the results for the augmented import demand estimations, which are reported in Table 7.11. Column (1) shows that the short run income and price elasticities have the expected signs, although the price elasticity is not significant, and there is little evidence of lagged response of import growth. The *ECM* , which portrays the long run relationship between import growth and income and prices, is not statistically significant.

Table 7.10

Short run analysis of the export demand function for the Dominican Republic

Variable	Dependent variable is dlx_t	
	(1)	**(2)**
dlx_{t-1}	1.09 (2.75)*	1.09 (2.24)*
dlyus	-0.07 (0.05)	-
dlpx	0.22 (1.00)	-
$ECMx_{t-1}$	-1.43 (3.19)**	-1.43 (3.52)**
lib93	0.93 (2.98)**	0.88 (2.89)*
Diagnostic (test) statistics		
$AR-F$	0.1444	0.2919
$ARCH-F$	0.2388	0.0620
$NORM-\chi^2$	1.2902	2.1413
$RESET-F$	39.649*	3.4300
SCHWARZ	**-3.1418**	**-3.5803**
$Omit-F$: *dly*lib90*	-	2.3527
$Omit-F$: *dlmp*lib90*	-	2.2403

Notes:

Coefficients' absolute t-ratios are inside parentheses. The diagnostic statistics are described as follows: coefficient of determination (R^2); residual sum of squares (RSS); residual serial correlation ($AR-F$); autoregressive conditional heteroscedasticty ($ARCH-F$); normality ($NORM-\chi^2$); Ramsey's functional form mis-specification test ($RESET-F$); $SCHWARZ$ is a model selection information criterion; and $Omit-F$ is a test of the relevance of variables not included in the corresponding regression equation. The null distribution is given by $\chi^2(\cdot)$ or $F(\cdot,\cdot)$, where the degrees of freedom are inside parentheses. For AR, $ARCH$, and $RESET$ the first degree of freedom indicates the maximum lag length. The values of the tests are displayed. ** and * mean a diagnostic statistic is significant at the 1% and 5% levels, respectively. See Doornik and Hendry (2001) for further details of these tests.

The variable *lib93* refers to the shift dummy.

The results also show that the liberalisation encouraged by the 1990 trade reform, and by other reforms undertaken in subsequent years, had a considerable impact on imports, as confirmed by the significant coefficients. The *lagged* impact of trade liberalisation is also apparent for imports, and again, the 1993 impulse dummy is positive and strongly significant. The rapid increase of import growth in 1993 can be seen in Figure 7.5. An additional dummy (equal to one in 1980 and zero otherwise), which is positive and significant in all the estimations, was included in the regressions to account for the large increase in imports evidenced at the beginning of the 1980s[19].

Moreover, given the test statistics, a model reduction was also undertaken yielding the results provided in Columns 2, and 3. The results show the strong impact of income growth on imports, as shown by the positive and significant income elasticities. Also, the 1993 impulse dummy demonstrates the lagged effect that the 1990 trade liberalisation had on import growth. Additionally, Columns (3) and (4) present the inclusion of the slope dummy $dly*lib$ (justified by the corresponding F statistic), where the coefficients are positive and statistically different from zero, supporting the Melo-Voght hypothesis. This implies that the process of trade liberalisation has increased the income elasticity, as trade liberalisation increases specialisation in production following comparative advantage. However, the direct impact of trade liberalisation on the price elasticity is not confirmed.

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[19] This is accounted for by the fact that even though a trade liberalisation policy had not been embarked on, nonetheless certain consumption goods were allowed in (e.g. vehicles, food, amongst others).

Table 7.11

Short run analysis of the import demand function for the Dominican Republic

Variable	Dependent variable is dlm_t		
	(1)	(2)	(3)
dlm_{t-1}	0.09 (0.05)	-	-
dly	2.35 (4.23)**	2.18 (4.00)**	1.86 (3.19)**
$dlpm$	-0.29 (1.42)	-	-
$ECMm_{t-1}$	-0.18 (0.82)	-	-
$D80$	0.56 (4.40)**	0.58 (4.66)**	0.60 (4.84)**
$lib91$	0.07 (0.49)	-	-
$lib92$	0.10 (1.60)	-	-
$lib93$	0.65 (4.78)**	0.69 (5.49)**	0.67 (5.34)**
$dly * lib93$	-	-	1.02 (2.42)*
Test statistics			
$AR-F$	0.2077	0.5324	0.0051
$ARCH-F$	2.4633	0.0682	0.1375
$NORM-\chi^2$	2.8027	1.1777	0.3163
$RESET-F$	1.3280	0.4885	0.1087
$SCHWARZ$	**-3.6359**	**-3.9141**	**-4.8776**
$Omit-F$: $dly * lib93$	-	7.51708*	-
$Omit-F$: $dlpm * lib93$	-	0.8546	-

Notes:

Coefficients' absolute t-ratios are inside parentheses. The diagnostic statistics are described as follows: coefficient of determination (R^2); residual sum of squares (RSS); residual serial correlation ($AR-F$); autoregressive conditional heteroscedasticty ($ARCH-F$); normality ($NORM-\chi^2$); Ramsey's functional form mis-specification test ($RESET-F$); $SCHWARZ$ is a model selection information criterion; and $Omit-F$ is a test of the relevance of variables not included in the corresponding regression equation. The null distribution is given by $\chi^2(\cdot)$ or $F(\cdot,\cdot)$, where the degrees of freedom are inside parentheses. For AR, $ARCH$, and $RESET$ the first degree of freedom indicates the maximum lag length. The values of the tests are displayed. ** and * mean a diagnostic statistic is significant at the 1% and 5% levels, respectively. See Doornik and Hendry (2001) for further details of these tests.

Table 7.12

Short run analysis of the import demand function for the Dominican Republic

Variable	Dependent variable is dlm_t		
	(1)	(2)	(3)
dlm_{t-1}	0.21 (1.28)	-	-
dly	1.86 (2.81)*	1.95 (2.93)**	2.28 (3.77)**
$dlpm$	-0.52 (2.32)*	-0.45 (2.07)*	-0.36 (1.89)*
$ECMm_{t-1}$	-0.62 (2.67)*	-0.40 (2.49)*	-0.36 (2.48)*
$D80$	0.50 (3.33)**	0.54 (3.55)**	0.54 (4.00)**
$lib93$	0.78 (2.20)*	0.85 (2.43)*	0.68 (7.15)**
$dly * lib93$	-	-	0.89 (3.00)**
Diagnostic (test) statistics			
$AR-F$	0.9081	1.4272	0.4734
$ARCH-F$	0.0077	0.0193	0.2733
$NORM-\chi^2$	2.0773	1.9432	1.1388
$RESET-F$	0.0986	1.6732	0.0061
$SCHWARZ$	**-3.3907**	**-3.4347**	**-3.7564**
$Omit-F$: $dly * lib90$	-	7.3562*	-
$Omit-F$: $dlmp * lib90$	-	0.7478	-

Notes:
Coefficients' absolute t-ratios are inside parentheses. The diagnostic statistics are described as follows: coefficient of determination (R^2); residual sum of squares (RSS); residual serial correlation ($AR-F$); autoregressive conditional heteroscedasticty ($ARCH-F$); normality ($NORM-\chi^2$); Ramsey's functional form mis-specification test ($RESET-F$); $SCHWARZ$ is a model selection information criterion; and $Omit-F$ is a test of the relevance of variables not included in the corresponding regression equation. The null distribution is given by $\chi^2(\cdot)$ or $F(\cdot,\cdot)$, where the degrees of freedom are inside parentheses. For AR, $ARCH$, and $RESET$ the first degree of freedom indicates the maximum lag length. The values of the tests are displayed. ** and * mean a diagnostic statistic is significant at the 1% and 5% levels, respectively. See Doornik and Hendry (2001) for further details on these tests.

The variables $lib93$ and $dly * lib93$ refer to the shift dummy.

Furthermore, as in the case of exports, we tested for a shift in import growth influenced by trade liberalisation, through shift dummy for 1993 (see Table 7.12). These results are consistent with those presented in Table 7.11 regarding the income and price elasticities of demand for imports, as well as the positive impact of trade reform on import growth. More specifically, the positive (and statistically significant) shift dummy for trade liberalisation confirms the permanent change prompted by trade liberalisation in 1993. Liberalisation increased import growth by an average of 0.80 percent. Moreover, the interaction dummy confirms the positive impact that trade liberalisation has on income growth, and how this higher income is affecting directly the DR's propensity to import. Regarding the short run disequilibrium of import growth, the *ECM* coefficients illustrate an adjustment of around 50 percent per annum.

One of the most interesting results from the above discussion is that liberalisation affected exports and imports by almost the same magnitude, with the effect on export growth slightly higher. This could explain the positive response of the trade balance to trade liberalisation (see Tables D7.2 and D7.3 in the appendix), which suggests an improvement in the ratio of the trade balance to GDP of one percentage point[20]. An alternative vindication for such a finding is that the US demand for Dominican's exports is contra-cyclical. In other words, when there is a

[20] Further estimations to assess the impact of trade liberalisation on the trade balance of the balance of payments were performed. However, most of the results were not statistically significant (see Tables D7.2 and D7.3). Even though there has been an evident gap between exports and imports, it might be the case that there are other factors explaining the balance of payments performance of the DR, such as interest payment, remittances, and other financial flows.

decline in the rate of growth of the North American economy, the country demand for 'cheaper' or inferior goods increases, thus countries with low skill-technological industries such as the DR face a higher demand for their exports. The opposite occurs when there is a higher GDP growth of the USA or other industrilised economy.

However, This result for the DR contrasts with the aggregate analysis in Chapter 6 which suggests that the trade balance for the sample of 22 countries deteriorated by approximately 2 percentage points of GDP.

7.7 Conclusion

The Dominican Republic has made significant progress towards a more open trade regime, particularly through the elimination of non-tariff barriers and through the simplification of the tariff structure and the reduction in the rates of duties. Furthermore, the relatively protectionist trade regime of the DR has been offset by an extensive network of free-trade zones, which have become the primary source of strong export performance during the last decade (Kaplinsky, 1993). The access of the DR to the WTO has influenced the reforms of trade policy in the last decade. In this sense, the structure of the trade policy required important adjustments, particularly with reference to the instruments that affect the productive sectors and the export strategies of the country.

Nevertheless, the gradual liberalisation of the domestic economy, particularly regarding agriculture, mining and non-traded goods, together with a trade and tax regime that favours the outward-oriented industrial production in the services sectors

(i.e. free trade zones and tourism) has generated a dualist economic structure. In order to address this issue, the DR should continue its tariff and tax reforms, to eliminate remaining distortions and/or incentives to specific industries. Also, the government must complete other reforms, such as the new Monetary and Financial Code, which would help to eliminate foreign exchange distortions such as the surrender requirements and multiple exchange rates, which affect international trade, and to establish an efficient foreign exchange and trade regime.

In addition, the process of liberalisation described has affected export and import growth. Considering exports, the impact of a more liberalised trade regime has raised export growth by over 0.9 percentage points. However, in the first two years following trade policy reform (i.e. between 1990 and 1992) there was not a significant response of export growth to trade liberalisation, which can be explained by the fact that the elimination of export restrictions (including taxes) was not really implemented until the end of 1992. In the case of imports, the lagged response of import growth to trade liberalisation is confirmed by the coefficients of the impulse dummies. Trade liberalisation increased import growth by 0.8 percentage points. It is possible that the 'transitory' protective measures granted by the government to the import-substituting sector during 1990-1993 affected the performance of imports following a more outward oriented trade regime. Additionally, higher income elasticities after trade liberalisation reflect an increase in the sensitivity of imports to income from the increase in the degree of openness of the economy. On the other hand, the price elasticity does not seem to have increased with trade liberalisation.

APPENDIX D

Table D7.1

Non-Tariff Barriers for all products in selected Latin American and Caribbean countries, 1989-98 (in %)

Country	Core NTMs		Non-auto licensing		Prohibition		Quotas		Tariff quotas		Import monitoring		Variable minimum pricing	
	1989-94	1995-98	1989-94	1995-98	1989-94	1995-98	1989-94	1995-98	1989-94	1995-98	1989-94	1995-98	1989-94	1995-98
Argentina	3.1	2.1	3.1	1.0	0.0	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0
Bolivia	0.0	...	0.0	...	0.0	...	0.0	...	0.0	...	0.0	...	0.0	...
Brazil	16.5	21.6	10.0	11.0	7.0	11.0	0.0	1.0	0.0	0.0	100.0	0.0	0.0	1.0
Chile	5.2	5.2	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	4.0
Colombia	55.2	10.3	55.0	6.0	7.0	1.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0
Costa Rica	...	6.2	...	6.0	...	0.0	...	0.0	...	6.0	...	0.0	...	0.0
Dominican Republic	**...**	**6.2**	**...**	**5.0**	**...**	**1.0**	**...**	**0.0**	**...**	**0.0**	**...**	**1.0**	**...**	**0.0**
El Salvador	...	5.2	...	5.0	...	1.0	...	1.0	...	0.0	...	0.0	...	0.0
Mexico	27.8	13.4	28.0	6.0	0.0	1.0	2.0	0.0	0.0	7.0	0.0	0.0	2.0	0.0
Paraguay	...	0.0	...	0.0	...	0.0	...	0.0	...	0.0	...	0.0	...	0.0
Peru	6.3	...	0.0	...	0.0	...	0.0	...	0.0	...	0.0	...	6.0	...
Uruguay	32.3	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	4.0	31.0	0.0
Venezuela	...	17.7	...	2.0	...	3.0	...	0.0	...	0.0	...	0.0	...	0.0

Note: Non-tariff Measures (NTMs) is calculated as frequency ratio in (%) of all Harmonised System (HS) 2-digit product categories. Core NTMs include licensing, prohibitions, quotas and administered pricing.

Source: Michalopoulos (1999).

Table D7.2

Short run analysis of trade balance and trade liberalisation for the Dominican Republic

Variable	Dependent variable is $dltby_t$	
	(1)	**(2)**
$dltby_{t-1}$	0.49 (2.87)*	0.23 (1.17)
dly	-0.23 (0.16)	-0.10 (0.85)
dlyus	0.29 (1.31)	0.23 (1.27)
dlp	-0.02 (0.63)	-0.04 (1.20)
lib91	0.10 (0.58)	-
lib92	0.95 (0.72)	-
lib93	1.49 (0.61)	-
*dly*lib93*	-	0.41 (2.38)*
Diagnostic (test) statistics		
$AR-F$	0.5026	0.1823
$ARCH-F$	0.4207	0.0220
$NORM-\chi^2$	2.2300	1.2966
$RESET-F$	1.4457	0.5834
SCHWARZ	**2.3297**	**2.9461**
$Omit-F$: *dly*lib93*	8.7518*	-

Notes:

Coefficients' absolute t-ratios are inside parentheses. The diagnostic statistics are described as follows: coefficient of determination (R^2); residual sum of squares (RSS); residual serial correlation ($AR-F$); autoregressive conditional heteroscedasticty ($ARCH-F$); normality ($NORM-\chi^2$); Ramsey's functional form mis-specification test ($RESET-F$); $SCHWARZ$ is a model selection information criterion; and $Omit-F$ is a test of the relevance of variables not included in the corresponding regression equation. The null distribution is given by $\chi^2(\cdot)$ or $F(\cdot,\cdot)$, where the degrees of freedom are inside parentheses. For AR, $ARCH$, and $RESET$ the first degree of freedom indicates the maximum lag length. The values of the tests are displayed. ** and * mean a diagnostic statistic is significant at the 1% and 5% levels, respectively. See Doornik and Hendry (2001) for further details on these tests.

Table D7.3

Short run analysis of trade balance and trade liberalisation for the Dominican Republic

Variable	Dependent variable is $dltby_t$	
	(1)	**(2)**
$dtby_{t-1}$	0.25 (1.74)	0.32 (1.70)
dly	-0.13 (1.37)	-0.11 (1.06)
$dlyus$	0.60 (2.23)*	0.22 (1.16)
dlp	0.03 (0.43)	0.04 (1.07)
$lib93$	0.38 (0.22)	1.23 (2.42)*
$dly*lib93$	-	0.90 (2.28)*
Diagnostic (test) statistics		
$AR-F$	1.5180	0.1976
$ARCH-F$	0.8451	0.0012
$NORM-\chi^2$	2.9537*	1.6950
$RESET-F$	0.2236	0.0443
$SCHWARZ$	**3.2502**	**4.7317**
$Omit-F$: $dly*lib93$	-	7.1240*

Notes:

Coefficients' absolute t-ratios are inside parentheses. The diagnostic statistics are described as follows: coefficient of determination (R^2); residuals sum of squares (RSS); residual serial correlation ($AR-F$); autoregressive conditional heteroscedasticty ($ARCH-F$); normality ($NORM-\chi^2$); Ramsey's functional form mis-specification test ($RESET-F$); $SCHWARZ$ is a model selection information criterion; and $Omit-F$ is a test of the relevance of variables not included in the corresponding regression equation. The null distribution is given by $\chi^2(\cdot)$ or $F(\cdot,\cdot)$, where the degrees of freedom are inside parentheses. For AR, $ARCH$, and $RESET$ the first degree of freedom indicates the maximum lag length. The values of the tests are displayed. ** and * mean a diagnostic statistic is significant at the 1% and 5% levels, respectively. See Doornik and Hendry (2001) for further details on these tests.

The variables $lib93$ and $dly*lib93$ refer to the shift dummy.

Chapter 8

CONCLUSION

8.1 Summary of the Results

In this thesis, we have examined the effects of trade policy reforms on exports, imports, the trade balance and the balance of payments using different panel data and time series modelling approaches. To our knowledge, the present study is the first major one of its kind to apply dynamic panel data techniques to the analysis of the impact of trade liberalisation on exports, imports, and the balance of payments performance, in a systematic way. Special attention has been paid to identifying the year(s) when significant liberalisation took place (and then continued), and considerable concern has also been rendered to the construction of time series for the duties applied to exports and imports over the period of analysis, which are also used as measures of liberalisation. The various estimation techniques used have provided results that are strong and robust.

In **Part II** of the thesis, different panel data techniques have been employed to analyse the impact of trade liberalisation on exports, imports and the balance of payments. The investigation focuses on a sample of 22 developing economies that have undergone important reforms of their trade policy regime, either unilaterally or under obligation with the IMF, World Bank, and the WTO.

In Chapter 4, we have investigated the influence of trade liberalisation on export growth, and the main argument for analysing such relationship is that the reduction or elimination of trade policy distortions decreases anti-export bias, and therefore should improve competitiveness and export performance. The chapter also explores the impact of liberalisation on the price and income elasticities of demand for exports, and not simply at the shift in the constant term of the equations. The main empirical findings are: export duty reductions appear to augment export growth, although the magnitude of the effect is small. In addition, trade liberalisation has a strong positive impact on export performance, increasing export growth by approximately two percentage points (or between 25 and 30 per cent). Exports react positively to real exchange rate depreciation, but the size of the elasticity is small and not statistically significant in most tests. Trade liberalisation makes little difference to the sensitivity of exports to real exchange rate changes. Regarding external demand, we found that world income growth has a strong positive effect on export growth; and there is evidence that trade liberalisation increases the sensitivity of exports to income changes. A likely explanation for this finding is that in a more open economy, business is generally more braced to exploit market opportunities outside the country, than in a more 'protective' or inward-looking trade regime.

In Chapter 5, an analogous approach to Chapter 4 is undertaken. This chapter examined import growth functions for the 22 countries in our sample. The estimates of the income and price elasticities of demand for imports fall within the boundaries of previous empirical studies of aggregated import demand functions for developing countries. The findings show that import duty reductions raise import growth, but the

effect varies according to the region and the type of trade policy regime prevailing in the country. Africa seems to have been the most affected by tariff reductions, the effect is also appreciable in the other regions. In terms of the orientation of the trade policy regime of the countries, it is found that import duty reductions have a bigger impact in countries classified as having high and very high levels of protection. This is to be anticipated given the high levels of tariffs and non-tariff barriers prevailing in the countries under that category. Regarding the effect of the trade liberalisation measure (which is expected to capture other elements of the trade policy, such as non-tariff and administrative barriers), our results provide empirical evidence supporting the premise that the elimination of trade policy distortions has a strong, positive impact on import growth. Specifically, trade liberalisation has more than doubled import growth on average across all countries, but, as the regionally disaggregated estimations show, the relative impact of trade liberalisation varies considerably across regions and types of trade policy regimes.

The different exercises undertaken in this chapter also demonstrate that liberalisation has increased the income elasticity of demand for imports, and the hypothesis of an increase in price elasticities as a result of import reform is also confirmed in most cases. The response of import growth to trade liberalisation measures does not come as a surprise, in the light of trade policy practices in developing countries before undertaking the reforms. The policies include the use of development strategies focused on restrictive trade instruments such as import substitution, which concentrate on enhancing the ability to substitute domestic production for imports.

Comparing the results related to the trade reform variables (i.e. duties and liberalisation) in Chapter 4 and Chapter 5, it is evident that reductions in export and import duties have appreciably influenced the growth of exports and imports, but the impact on import growth has been greater. Contrasted to the pre-liberalisation regimes, for a one-percentage point reduction in duties, exports have grown by around 0.2 percent while imports have grown by between 0.2 and 0.4. However, the 'total' effect of trade liberalisation (i.e. the reform of the whole trade policy regime, not just changes in duties) has raised import growth by more than exports. Specifically, the process of trade liberalisation has increased export growth by approximately two percent, whereas import growth has risen by roughly six percent.

The main objective of Chapter 6 was to assess the effect of trade liberalisation on the trade balance and the current account of the balance of payments for the 22 developing countries from Africa, East Asia, South Asia and Latin America comprised in this thesis. Our results shows that the effect of the 'pure' trade liberalisation has been to deteriorate the trade balance by over two percent of GDP on average, but the impact on the current account has been less (increasing the average deficit by roughly 0.8 percent of GDP). The effects of liberalisation on the trade balance and the current account have not been the same across the regions of Africa, Latin America, East Asia, and South Asia, where Africa appears to have been more affected by the process of liberalisation. Additionally, trade liberalisation has been found to work through income growth, that is, faster growth in the liberalised economies is associated with greater trade balance and current account deficits, as shown by the negative and significant interaction dummy, particularly in East Asia.

With respect to the estimations that discriminate between countries according to the degree of protection, the negative effects on the trade balance and balance of payments are larger in the more highly protected countries.

The diverse results regarding the repercussion of trade liberalisation in the countries/regions presented in Chapters 4, 5, and 6 stress the heterogeneous nature of developing countries. The outcomes of the times series/cross section exercises undertaken in these chapters demonstrate how the domestic economic structure affects the influence of trade reforms in these countries. The degree of policy changes in the developing countries in our sample is remarkable; especially in the least developed ones such as those of Africa, and this explains the highly significant coefficients of the liberalisation dummies. On the other hand, when the results are related to the economic growth prospects of the four regions, domestic growth has different impacts during trade liberalisation, particularly on the trade deficits. More advanced economies such as East Asian countries, which exhibit both high elasticities of domestic and foreign incomes, are more likely to have a less harmful impact of trade liberalisation on their trade balance given the strong performance of their exports. Other countries (e.g. in Africa, South Asia and the Caribbean) still face the problem of market access for their exports, which imposes additional strains on their trade performances.

In **Part III**, a case study for the Dominican Republic (DR), one of the countries in our sample, is undertaken. The DR has made significant progress towards a more open trade regime, particularly through the elimination of non-tariff barriers and through the simplification of the tariff structure and the reduction in the rates of

duties. A time series analysis of export and import demand functions was carried out in Chapter 7 to assess the direct effect of trade liberalisation on export and import performance. Taking first the results for the export demand function, trade liberalisation has improved export growth by over 0.9 percentage points. However, in the first two years following trade policy reform (i.e. between 1990 and 1992) there was not a significant response of export growth to trade liberalisation, which is explained by the fact that the elimination of export restrictions (including taxes) was not really implemented until the end of 1992. In the case of imports, trade liberalisation increased import growth by 0.8 percentage points. In addition, the lagged response of import growth to trade liberalisation is confirmed by the coefficients of the impulse dummies. It is possible that the 'transitory' protective measures granted by the government to the import-substituting sector during 1990-1993 affected the performance of imports following a more outward oriented trade regime. Additionally, higher income elasticities after trade liberalisation reflect an increase in the sensitivity of imports to income from the increase in the degree of openness of the economy. On the other hand, the price elasticity does not seem to have increased with trade liberalisation.

One of the most interesting results of Chapter 7 is that liberalisation affected exports and imports by almost the same magnitude, with the effect on export growth slightly higher. This explains the positive response of the trade balance of the balance of payments to trade liberalisation perceived in this particular case. These results also indicate that the DR has not suffered as other countries, on the basis of the analysis

done in previous chapters, where liberalisation affected the trade balance by 2 percent of GDP, on average.

8.2 Policy Implications

Overall, the findings of **Parts II and III** of the thesis have important implications for policy. The excessive import growth in contrast with the more modest export growth following trade liberalisation has fundamental policy implications, especially for the balance of trade and balance of payments. If import growth is faster than export growth in the process of trade liberalisation, it raises the important issue of the sequencing of the liberalisation of exports and imports, which has not been properly considered in the processes of reform. That is, import liberalisation should be appropriately sequenced or combined with effective measures designed to improve competitiveness and to promote exports.

The balance of payments crises suffered by a large number of developing countries have also revealed the extent to which growth rates have been constrained by their balance of payments positions (see Khan and Zahler, 1985). In many cases, trade policy reforms have not been accompanied by an export promotion strategy, which would compensate for the higher imports generated by the relaxation of import barriers. Also, these crises have exposed the extent to which growth rates have come to depend on steadily rising export earnings and capital inflows, and how disruptive an interruption to these sources of foreign exchange can be. Liberalisation needs to

take place in such a way as to maintain a sustainable balance of payments position; if not, the resource gains from liberalisation can easily be offset by real resources losses arising from the need for balance of payments adjustment.

The financing and sustainability of the trade account deficit in the reforming countries will depend not only on the outcome of trade liberalisation, but on other macroeconomic policies (mainly those that influence demand), developments in the real exchange rate and the inflows of foreign capital. Regarding the financing of the trade deficit, financial liberalisation could be a vehicle to ensure such financing, because this would help to attract foreing capital in search of high returns, allowing them to increase their investment (in relation to savings) without running into payments constraints. Also, a higher flow of foreign direct investment would further accelerate growth not only by supplementing domestic resources for capital accumulation, but also through technological transfers and knowledge.

The fact that the current account effects of liberalisation appear to be smaller than the trade balance effects is some indication that the countries under review have had difficulties in financing the foreign exchange consequences of trade policy reform and have had to adjust their economies according to the level of sustainable capital inflows (e.g. remittances, and foreign aid or official development assistance). On the other hand, the liberalisation of the capital account, intended mostly to mobilise private external financing could have also affected the management of foreign exchange, and henceforth the overall payments positions of the countries. Instability in financial flows and the resulting misalignments and fluctuations of

exchange rates worsen payments difficulties by discouraging investment in traded-good industries. Thus, capital flows could widen the resource gap through their adverse effects on exchange rates, imports and exports, rather than being driven by the requirements of the current account.

8.3 The Road Ahead

The research accomplished in this thesis suggests **three lines of future research**.

First, it will be interesting to extend the sample, to cover a larger number of countries that have undergone significant trade policy reforms under programmes such as Structural Adjustment Finance (SAF), Extended Structural Adjustment Finance (ESAF), Stand By Agreements, amongst other IMF and World Bank reform programmes. Also, it will be worth updating the analysis of the outcomes of trade liberalisation, following the completion of pending reforms, under the WTO requirements. This might involve more study cases, to discern the country-specific features of the trade policy reforms, and how they have affected the performance of exports, imports, and the balance of payments.

Second, more work is needed in assessing the impact of trade liberalisation, through the estimation of disaggregated import and export growth functions. This is extremely important to evaluate the impact of trade policy reform on specific sectors/products, where the outcome has practical meaning for policy makers.

Finally, as shown in Chapter 6, trade liberalisation has serious implication for the balance of payments. In this sense, more attention is needed to analyse not only how trade and exchange rate policies affect the balance of payments, but also to assess how other reforms such as financial liberalisation have influenced the overall balance. In the case of the latter, it is interesting to contrast the outcomes of financial reform with that of trade liberalisation, and to evaluate the sequence of both reforms.

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