

**IDS Working Paper 209**

**Trade liberalisation and trade performance in the Dominican Republic**

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## **Summary**

This paper analyses the evolution of trade policy reforms in the Dominican Republic (DR). It also evaluates the impact of trade liberalisation on exports, imports, and the trade account of the balance of payments. The study 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. The trade account shows a positive reaction to trade liberalisation, that is, an improvement in the ratio of the trade balance to GDP of one percentage point. This is an indication of the higher export growth in comparison to import growth following liberalisation.

*Keywords:* trade liberalisation, import growth, export growth, balance of payments, developing countries.

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## Contents

Summary	iii
Acknowledgements	iv
List of figures and tables	v
<b>1 Introduction</b>	<b>1</b>
<b>2 Evolution of trade policy reform</b>	<b>2</b>
2.1 Trade policy before 1990	2
2.2 1990 reform	3
2.3 The 2001 tariff and tax reforms	7
<b>3 The impact of trade liberalisation on exports and imports</b>	<b>11</b>
3.1 Import and export demand models	11
3.2 Estimations and results	12
3.2.1 <i>Cointegration analysis</i>	15
3.2.2 <i>Short run analysis</i>	16
<b>4 Conclusion</b>	<b>23</b>
<b>Appendix</b>	<b>25</b>
<b>References</b>	<b>29</b>

## Figures

Figure 2.1 Domestic and free trade zone exports	3
Figure 2.2 Exports, imports and the trade balance (1970–2000)	9
Figure 3.1 (a) Log of real US income, real exports, and real exchange rate	13
(b) Fitted log of real exports	13
Figure 3.2 (a) Log of real DR income, real imports, and real exchange rate	14
(b) Fitted log of real imports	14

## Tables

Table 2.1 Schedule of contingent tariffs and import quotas for WTO technical rectification products	5
Table 2.2 Tariff equivalent of non-tariff barriers (%)	6
Table 2.3 Tariff schedule before and after 2001 trade reform	8
Table 2.4 Structure of fiscal taxes (selected years), percentage of fiscal revenues	10
Table 2.5 Dominican Republic trade policy reforms (1990–2001)	10
Table 3.1 Augmented Dickey-Fuller unit root tests	12
Table 3.2 Short run analysis of the export demand function for the DR	18
Table 3.3 Short run analysis of the export demand function for the DR	20
Table 3.4 Short run analysis of the import demand function for the DR	21
Table 3.5 Short run analysis of the import demand function for the DR	22

Table A1	Non-tariff barriers for all products in selected Latin American and Caribbean countries, 1989–98 (%)	26
Table A2	Short run analysis of the trade balance and trade liberalisation for the DR	27
Table A3	Short run analysis of the trade balance and trade liberalisation for the DR	28

## 1. Introduction

The Dominican Republic (DR) provides an interesting case study of a developing country that has undergone important reforms of its trade policy regime in the last three decades. These reforms have mainly been part of structural adjustment programmes financed by the International Monetary Fund (IMF) and the World Bank.

During the 1980s, the DR evidenced, as other Latin American countries, marked deterioration in economic conditions prompted by poor management of the economy, and by adverse external shocks such as the 1970s oil crises and by fluctuations in the terms of trade. These events made it necessary to finance macroeconomic adjustment policies and balance of payments crises by structural adjustment loans (SAL) and extended structural adjustment facility (ESAF) programmes with the IMF<sup>1</sup> (see Couatts *et al.* 1986). 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 the effective rate of protection.<sup>2</sup> This attempt was regarded as successful and was followed by the deepening of structural reforms.

In addition to these tariff and tax reforms, the country has also enhanced its trade relations, by signing several bilateral free trade agreements, and by subscribing to 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 objective of this paper is twofold. First, it aims to examine the trade policy reforms undertaken in the DR, and the regime switching process following liberalisation. Second, it provides the first empirical assessment of the impact of trade liberalisation on export and import growth, and the balance of trade in the DR. The rest of the paper is organised as follows. Section 2 analyses the evolution of the trade policy

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<sup>1</sup> 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 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, a 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.

<sup>2</sup> 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 by controlling more closely the levels of international reserves and external debt payments. The first effects were contractionary (investment and public expenditure fell by 20 and 10 per cent, respectively, and GDP per capita decreased by 5.5 and 7.4 per cent, respectively).

reforms in the last 30 years. The empirical analysis is undertaken in Section 3. The conclusions are presented in Section 4.

## **2. Evolution of trade policy reform**

### **2.1 Trade policy before 1990**

In the last 50 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: 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 towards exports.<sup>3</sup> The latter was designed to have its 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

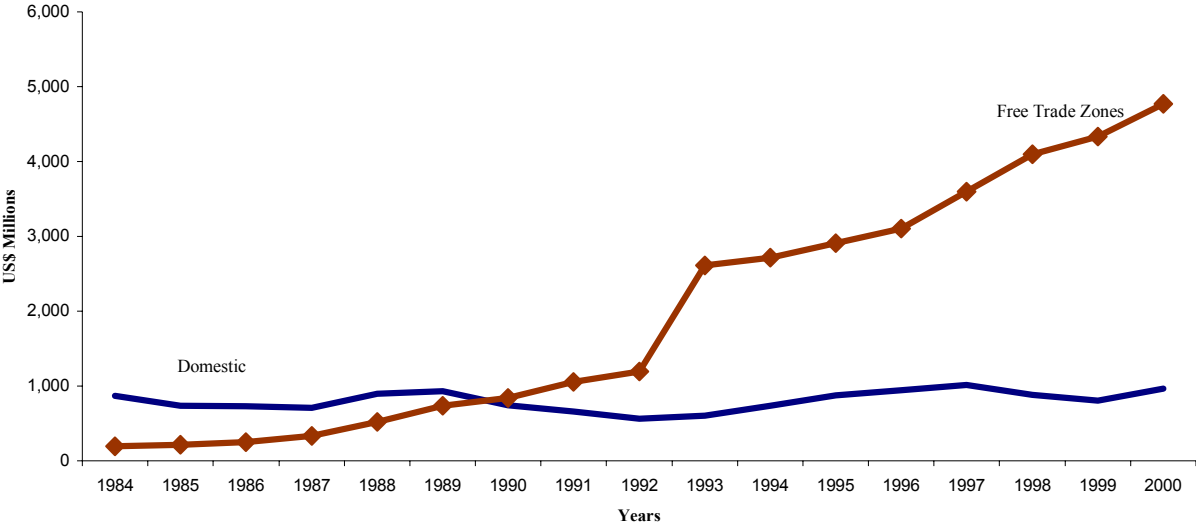
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<sup>3</sup> Other export promotion laws, including those affecting the industrial firms under the free trade zones are: Law 597 of 1977, which granted duty exemption to the import of machinery and other equipment to the enterprises that were exporting 80 per cent of their production; 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).



these activities, creating a dual economy with dynamic and stagnant sectors. Figure 2.1 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 2.1 Domestic and free trade zone exports**



Source: Central Bank of the Dominican Republic, *Boletines Trimestrales*, various issues.

**2.2 The 1990 reform**

In 1990, the DR started a programme 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 need to have 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 per cent to 5-35 per cent, and then to 0-35 per cent. The tariffs applied to imported inputs and intermediate goods were reduced to 5, 10, 15 and 20 per cent; and the tariffs applied to final goods were reduced to 25, 30 and 35 per cent. Also, a new tariff code based on the ‘Harmonised System of Goods Codification’ was introduced, and the tariffs were to be applied on the cost, insurance and freight (CIF) value of the imported merchandise rather than on the free on board (FOB) value. 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.

Although there was a reduction in tariff rates, the government implemented a temporary tariff surcharge set at 30 per cent for 1991, 20 per cent in 1992, and 10 per cent 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 per cent, 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 per cent was implemented, which was eventually reduced to 20 per cent and later to 15 per cent.

Imports were also subject to VAT, with an 8 per cent tax rate, and a selective tax on consumption products (STCP) (with a 5-80 per cent 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 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 per cent was consolidated for agricultural products, and these tariffs and quotas are presented in Table 2.1. 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 per cent and 99 percent by 2005 (see Table 2.1). This agreement raised the effective tariff (i.e. the tariff equivalent of non-tariff barriers) for these products, as can be seen in Table 2.2.

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 per cent 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 per cent, 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 2.1 Schedule of contingent tariffs and import quotas for WTO technical rectification products**

Products	Basic tariff	1999		2000		2001		2002		2003		2004		2005	
		Tariff	Quota	Tariff	Quota	Tariff	Quota	Tariff	Quota	Tariff	Quota	Tariff	Quota	Tariff	Quota
Rice	20	114	15,344	112	15,755	109	16,166	107	16,577	104	16,988	102	17,399	99	17,810
Garlic	25	111	3,600	109	3,750	107	3,900	105	4,050	103	4,200	101	4,350	99	4,500
Sugar	20	94	24,000	93	25,000	91	26,000	90	27,000	88	28,000	87	29,000	85	30,000
Chicken	25	137	8,500	131	9,000	124	9,500	118	10,000	112	10,500	105	11,000	99	11,500
Onions	25	97	3,000	97	3,125	97	3,250	97	3,375	97	3,500	97	3,625	97	3,750
Beans	25	95	14,400	94	15,000	93	15,600	92	16,200	91	16,800	90	17,400	89	18,000
Milk	20	84	32,000	79	32,000	74	32,000	70	32,000	65	32,000	61	32,000	56	32,000
Corn	5	60	858,200	57	897,000	54	935,800	50	974,600	47	1,013,400	43	1,052,200	40	1,091,000

Source: McHugh and Keller (2001).

Notes: Tariffs (%) are applied when imports exceed the pre-established quota. The quota columns (in metric tons) refer to the import quota before contingent tariff applies.

**Table 2.2 Tariff equivalent of non-tariff barriers (%)**

<b>Commodity</b>	<b>Statutory rate</b>	<b>Tariff equivalent</b>
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.<sup>4</sup> However, there still exists a 15 per cent 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.<sup>5</sup> 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, an official institution for the promotion of exports (Centro Dominicano de Promoción de Exportaciones, CEDOPEX) was in charge of export control, contingents, licenses and prohibitions. From 1992 these restrictions were eliminated.

As a result of the programme 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.

<sup>4</sup> Only minor obligations were kept for administrative purposes.

<sup>5</sup> Coffee, sugar, cacao, tobacco, and mineral products other than nickel.

Also, 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. 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 increased the “zero rate” tariff to 3 per cent to cover agricultural inputs that were subject to tariff rates equal to, or greater than 5 per cent. 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 per cent 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.

### **2.3 The 2001 tariff and tax reforms**

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 programme started in January 2001. It should be noted that the new tariff code is consistent with the WTO legislation.

The new programme (Laws No 146-00 and 147-00) affected the tariffs, the value-added tax, and the tax on selective consumption.<sup>6</sup> Specifically, the tariffs on final goods were reduced from 35, 30 and 25 per cent to 20 per cent. The rates applied to intermediate inputs were reduced from 20 and 15 per cent to 14 and 8 per cent, respectively. Besides, new tariff rates of 5, 3 and 0 per cent for raw materials were introduced. There were also further tariff reductions in 2002.

The reform also increased the tax on selective consumption for vehicles and alcoholic beverages, with marginal rates between 10 and 95 per cent. 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 2.3 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 means of protection for some industries/sectors, mainly agricultural products and raw materials that compete with imports. Table 2.4 also shows the reduction of taxes on international trade as a proportion of fiscal revenues, which is an indicator of the more outward orientation of the trade policy regime.

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<sup>6</sup> The imported products that are still exempt from VAT are books, petroleum and oil products, milk, and corn, amongst others.

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 2.2). However, the precise impact of liberalisation on these variables, controlling for other factors, will be estimated later.

**Table 2.3 Tariff schedule before and after 2001 trade reform**

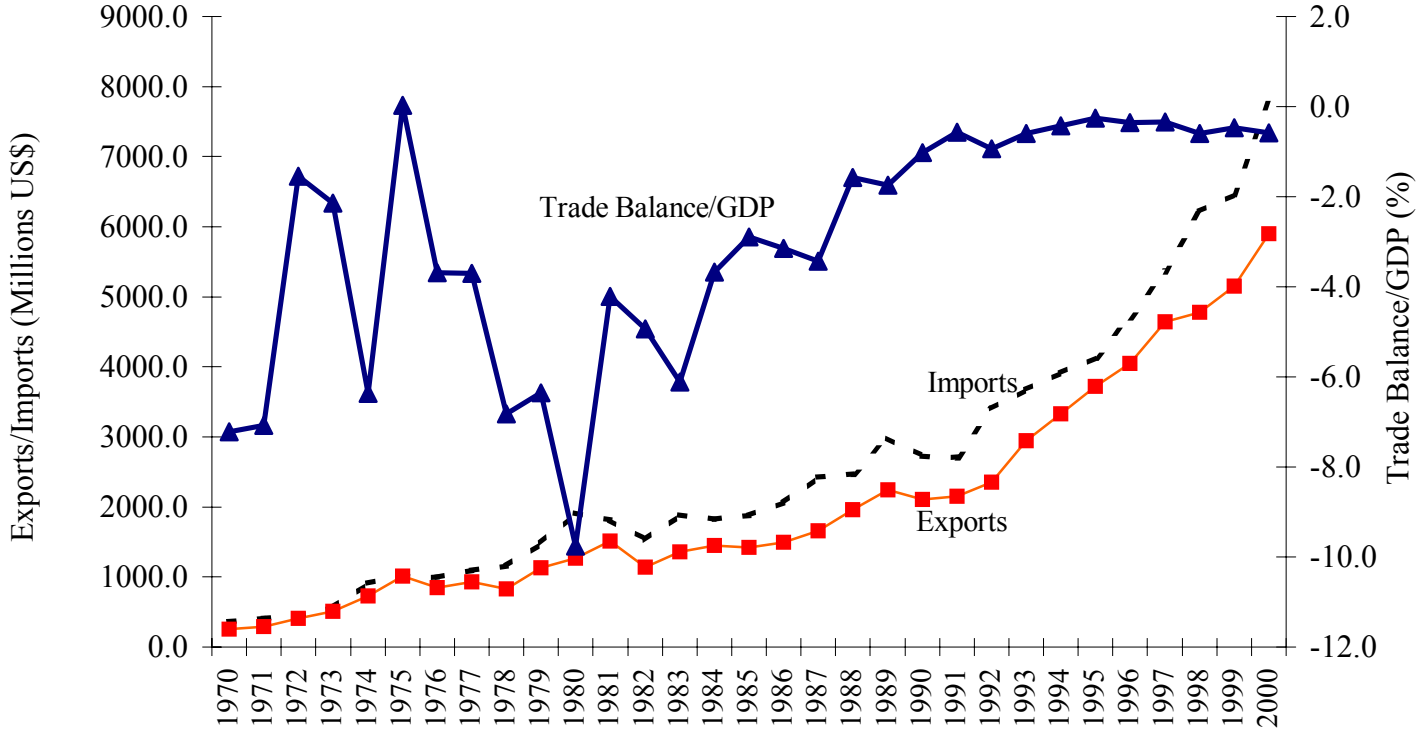
Type of imports	Tariff (%)	
	Before	After
Final consumption	20–35	20
Agricultural goods (final consumption or agro industrial).	30–35	20
Inputs (which are not produced in the country)	5	3
Inputs (which are produced in the country)	10–20	8
Capital goods	10–20	8
Inputs for construction (luxurious)	15–25	20
Inputs for construction (not 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
<i>Memorandum</i>		
Average tariff rate (simple)		17.7
Average tariff rate (simple)**		18.6

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

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

Additionally, despite significant progress made in the 1990s and the reforms of 2001, and the elimination of export duties (see Tables 2.4 and 2.5), the DR still maintains policies that perpetuate anti-export bias. For example, the authorities still 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 (McHugh and Keller 2001).

**Figure 2.2 Exports, imports and the trade balance (1970–2000)**



Source: Banco Central de la República Dominicana, *Boletines Trimestrales*, various issues.

**Table 2.4 Structure of fiscal taxes (selected years), percentage of fiscal revenues**

Tax	1985-89	1990	1992	1995	1996	2000	2001
<i>Income tax</i>	17.4	22.7	16.6	19.4	18.2	21.7	26.1
<i>Property tax</i>	1.7	1.6	0.9	1.1	1.4	1.8	1.4
<i>Taxes on good and services (VAT)</i>	29.6	25.2	32.5	40.1	41.6	34.3	44.0
Internal oil tax differential	5.1	9.5	7.0	8.3	9.0	10.4	14.4
...	...	0.1	10.4	11.8	10.7	5.1	12.8
<i>Taxes on international trade</i>	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
<i>Other taxes</i>	26.4	17.1	14.4	13.4	13.2	15.1	12.9

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

**Table 2.5 Dominican Republic trade policy reforms (1990–2001)**

Year	Reform
1990	(September) Introduction of the trade policy reform, which included: <ul style="list-style-type: none"> <li>▪ Elimination of specific tariff rates and introduction of ad-valorem tariffs.</li> <li>▪ Use of the market exchange rate for international trade transactions.</li> <li>▪ Imposition of duties over the cif value instead of fob.</li> <li>▪ Reduction of tax exemptions.</li> <li>▪ Elimination of quantitative restrictions to imports.</li> <li>▪ 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).</li> <li>▪ Elimination of the main prices controls.</li> </ul>
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 0 per cent 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: <ul style="list-style-type: none"> <li>▪ Tariff rates reductions for final goods to 20 per cent, and to 14 and 8 per cent to inputs and intermediate goods.</li> <li>▪ Introduction of five, three and "zero" tariff rates for raw materials.</li> <li>▪ Increase of the value added tax from 8 to 12 per cent.</li> <li>▪ Increase of the tax for selective consumption rate in the range between 10 and 95 per cent.</li> </ul>
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 (1996); BCRD (2001b); Dirección General de Aduanas (2001).

### 3. 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. To the best of the author's knowledge, 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 (see Santos-Paulino 2002a and b).

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.

#### 3.1 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 Santos-Paulino 2002a and b).<sup>7</sup> Thus, it is assumed that the export demand function for the Dominican Republic can be represented as follows:

$$\text{Log}X_t = a + b\text{Log}PX_t + c\text{Log}Y_t^{US} + \varepsilon_t \quad (1)$$

where  $X$  is the volume of exports;  $PX_t$  is a measure of the real exchange rate (RER);  $Y^{US}$  is United States income;<sup>8</sup> and  $\varepsilon$  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

<sup>7</sup> 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.

<sup>8</sup> United States' income is considered, since on average, more than the 70 per cent of the DR's total exports go to the USA.

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:

$$\text{Log}M_t = a^+ + b^+ \text{Log}PM_t + c^+ \text{Log}Y_t + \varepsilon_t^+ \quad (2)$$

where  $M$  is the volume of imports;  $PM$  is a measure of relative prices;  $Y$  is domestic income, and  $\varepsilon'$  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 price elasticity ( $b^+ < 0$ ). Additionally, it is expected that an increase in domestic income will stimulate imports yielding a positive income elasticity ( $c^+ > 0$ ).

### 3.2 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 3.1.<sup>9</sup> 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 3.1 and 3.2.

**Table 3.1 Augmented Dickey-Fuller unit root tests**

Variables	Level	First difference ( $\Delta$ )
<i>m</i>	-2.198	-4.814**
<i>x</i>	-2.711	-5.097**
<i>p</i>	-2.233	-5.292**
<i>y</i>	-2.145	-3.632**
<i>yusa</i>	-2.406	-4.566**
<b>Ratio</b>		
<i>tb</i>		-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  $\varepsilon_t$  is a random error term, and  $\alpha$  and  $t$  are a constant and time trend, respectively. The ADF test corresponds to the value of the t-ratio of the coefficient  $\phi$ . The null hypothesis of the ADF test is that  $y_t$  is a non-stationary series, which is rejected when  $\phi$  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.

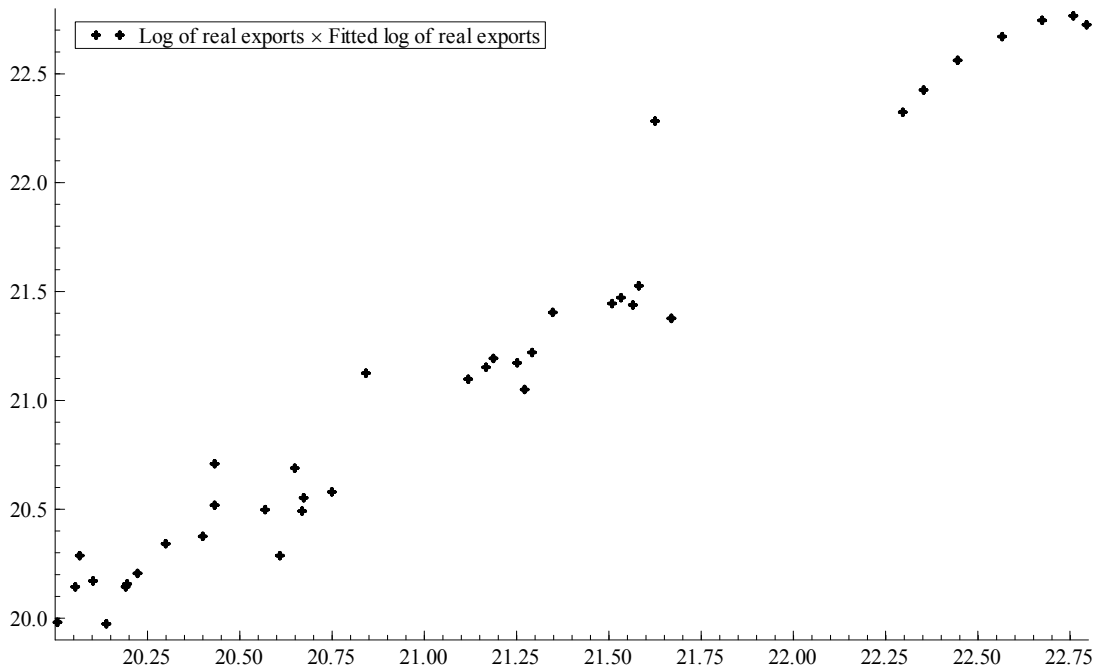
<sup>9</sup> The complete data definitions are presented in the Appendix.

**Figure 3.1**

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



**(b) Fitted log of real exports**

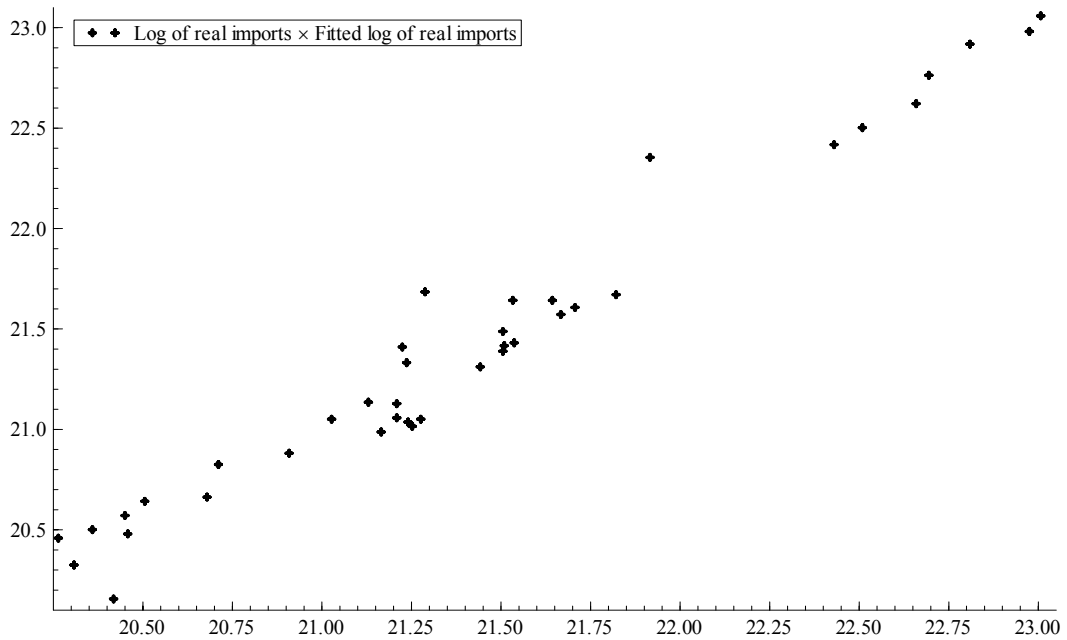


**Figure 3.2**

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



**(b) Fitted log of real imports**



### 3.2.1 Cointegration analysis

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

$$\begin{aligned} lx_t = & 0.68 + 0.65^{**}lx_{t-1} - 0.05lx_{t-2} + 0.33^{**}lyus_t - 0.98lyus_{t-1} + 1.42lyus_{t-2} \\ & - 0.12lpx_t - 0.09lpx_{t-1} - 0.22lpx_{t-2}. \end{aligned} \quad (3)$$

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

$$lx = 2.53^{**}lyus \quad (4)$$

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

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 null hypothesis that all the long run coefficients are zero is rejected at the one per cent level, according to the WALD test. Moreover, the augmented Dickey-Fuller tests applied to the residuals of the equation reveal that these are stationary, according to MacKinnon's (1991) 5 per cent critical values (shown inside parentheses).

For an analogous import demand function the empirical analysis produces

$$\begin{aligned} lm_t = & 8.23^{**} + 0.56^{**}lm_{t-1} - 0.11lm_{t-2} + 2.77^{**}ly_t - 1.71^{**}ly_{t-1} - 0.23ly_{t-2} \\ & - 0.53^{*}lpm_t + 0.22lpm_{t-1} - 0.49lpm_{t-2}. \end{aligned} \quad (5)$$

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:

$$lm = 14.71^{**} + 1.53^{**}ly - 1.39^{*}lpm \quad (6)$$

$$WALD - \chi^2 = 238.82^{**}; ADF = -4.494(-4.38).$$

Equation (6) yields long run coefficients that are economically and statistically significant. 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 per cent 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  $-1$ .

### 3.2.2 Short run analysis

The corresponding short run analyses of the export and import demand functions are estimated in this section, and displayed in Tables 3.2 to 3.5. 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 as explanatory variables in the dynamic behaviour of current variables.

Equations (1) and (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.<sup>10</sup> Furthermore, trade liberalisation is expected to affect the price and 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; Agosin 1991; Clarke and Kirkpatrick 1992; Greenaway and Sapsford 1994; Shafaeddin 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 elasticities, 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 3.2 satisfy the various diagnostic statistics, but a more parsimonious

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<sup>10</sup> Other estimations were done including a measure of duties applied to exports and imports (see data definition appendix). However, the results when including such variables were not sensible and failed to pass the diagnostic tests.

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 interestingly, 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 per cent 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.<sup>11</sup> The other impulse dummies (*lib92*, and *lib93*) pick up the impact of liberalisation in subsequent years.<sup>12</sup> The results are very 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 2.2 and 3.2. This finding is consistent with the evolution of the DR’s trade policy, where most export restrictions survived until 1993. Even though export taxes were eliminated in the 1990 reform, there still existed a 15 per cent 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 3.2, 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 per cent, 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 because the Dominican Republic’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.

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<sup>11</sup> Although the trade liberalisation programme was not approved by the Congress until September 1992, in practice the new trade policy started operating in January 1991.

<sup>12</sup> 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.

**Table 3.2 Short run analysis of the export demand function for the Dominican Republic (1963–2000)**

Variable	Dependent variable is $dx_t$	
	(1)	(2)
$dx_{t-1}$	0.76 (2.12)*	0.68 (2.05)*
$dlyus$	-0.99 (0.88)	-
$dlsx$	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 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
$SCHWARZ$	<b>-3.6819</b>	<b>-3.9598</b>
$Omit - F :$	-	2.1419
$dly * lib93$		
$Omit - F :$	-	3.2086
$dlsx * lib93$		

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 heteroscedasticity ( $ARCH - F$ ); 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 3.3.

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 disequilibrium adjustment is more than 100 per cent 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 3.4. 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.

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. 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.<sup>13</sup>

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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<sup>13</sup> 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 3.3 Short run analysis of the export demand function for the Dominican Republic (1963–2000)**

Variable	Dependent variable is $dx_t$	
	(1)	(2)
$dx_{t-1}$	1.09 (2.75)*	1.09 (2.24)*
$dlyus$	-0.07 (0.05)	-
$dlsx$	0.22 (1.00)	-
$ECMx_{t-1}$	-1.43 (3.19)**	-1.43 (3.52)**
$lib93$	0.93 (2.98)**	0.88 (2.89)*
<b>Diagnostic statistics</b>		
$AR - F$	0.1444	0.2919
$ARCH - F$	0.2388	0.0620
$NORM - \chi^2$	1.2902	2.1413
$RESET - F$	39.649*	3.4300
$SCHWARZ$	<b>-3.1418</b>	<b>-3.5803</b>
$Omit - F :$	-	2.3527
$dly * lib90$		
$Omit - F :$	-	2.2403
$dlsx * lib90$		

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 heteroscedasticity ( $ARCH - F$ ); 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.

**Table 3.4 Short run analysis of the import demand function for the Dominican Republic (1963–2000)**

Variable	Dependent variable is $dln_t$		
	(1)	(2)	(3)
$dln_{t-1}$	0.09 (0.05)	-	-
$dly$	2.35 (4.23)**	2.18 (4.00)**	1.86 (3.19)**
$dipm$	-0.29 (1.42)	-	-
$ECM_{t-1}$	-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)*
Diagnostic 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
$SCHWARZ$	<b>-3.6359</b>	<b>-3.9141</b>	<b>-4.8776</b>
$Omit - F : dly * lib93$	-	7.51708*	-
$Omit - F : dipm * lib93$	-	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 heteroscedasticity ( $ARCH - F$ ); 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 3.5 Short run analysis of the import demand function for the Dominican Republic (1963–2000)**

Variable	Dependent variable is $dln_t$		
	(1)	(2)	(3)
$dln_{t-1}$	0.21 (1.28)	-	-
$dly$	1.86 (2.81)*	1.95 (2.93)**	2.28 (3.77)**
$dlnm$	-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 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
$SCHWARZ$	<b>-3.3907</b>	<b>-3.4347</b>	<b>-3.7564</b>
$Omit - F :$ $dly * lib90$	-	7.3562*	-
$Omit - F :$ $dlnm * lib90$	-	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 heteroscedasticity ( $ARCH - F$ ); 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 a shift dummy for 1993 (see Table 3.5). These results are consistent with those presented in Table 3.4 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 per cent. 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 per cent 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 can explain the positive response of the trade balance to trade liberalisation (see Tables A2 and A3 in the appendix), which suggests an improvement in the ratio of the trade balance to GDP of one percentage point.<sup>14</sup>

#### **4. 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 that of 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.

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<sup>14</sup> 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. 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 (see Tables A2 and A3).

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 risen with trade liberalisation.

The expansion of imports 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 exceeded 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. 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.

## Appendix

### **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), 2001.

Rate of Change of Relative Prices ( $p_x$  and  $p_m$ ) used in the export and import demand functions is

measured by the real exchange rate (RER) defined as  $\left(\frac{EP_d}{P_f}\right)$ , where  $E$  is the nominal exchange rate

measured as the foreign price of domestic currency and  $\left(\frac{P_d}{P_f}\right)$  is the ratio of domestic to foreign

prices. Data for the RER is from the IMF's *International Financial Statistics* (various issues).

Import Growth ( $m$ ): Imports of Goods and Services; annual percentage growth (constant 1995 US\$).

Source: World Bank, *World Development Indicators* (WDI), 2001.

Income Growth ( $y$ ): GDP; annual percentage growth (constant 1995 US\$). Source: World Bank, *World Development Indicators* (WDI), 2001.

USA income growth ( $y_{usa}$ ): 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 ([www.stls.frb.org/fred/data/gdp/gdpc96](http://www.stls.frb.org/fred/data/gdp/gdpc96)).

**Table A1 Non-tariff barriers for all products in selected Latin American and Caribbean countries, 1989–98 (%)**

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
<b>Dominican Republic</b>	...	<b>6.2</b>	...	<b>5.0</b>	...	<b>1.0</b>	...	<b>0.0</b>	...	<b>0.0</b>	...	<b>1.0</b>	...	<b>0.0</b>
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 A2 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
$SCHWARZ$	<b>2.3297</b>	<b>2.9461</b>
$Omit - F :$	8.7518*	-
$dly * lib93$		

*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 heteroscedasticity ( $ARCH - F$ ); 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 A3 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
$SCHWARZ$	<b>3.2502</b>	<b>4.7317</b>
$Omit - F :$ $dly * lib93$	-	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 heteroscedasticity ( $ARCH - F$ ); 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.

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