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TRADE LIBERALIZATION AND THE BALANCE OF PAYMENTS IN SELECTED DEVELOPING COUNTRIES*

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An analysis is made of the impact of the reduction of tariff and non-tariff barriers on the trade balance and the current account of the balance of payments of 22 developing countries from Africa, Latin America, East Asia and South Asia that have undertaken important trade reforms since the mid-1970s. The study applies dynamic panel data and time series/cross-section analysis. The main findings are that liberalization has worsened the balance of trade and the balance of payments, because imports have increased more rapidly than exports. The adverse effect on the trade balance has been nearly 2 per cent of GDP. The impact of liberalization and other variables varies according to the region and type of trade policy regime existing.

1 Introduction

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

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

The aim of this paper is to examine the balance of payments conse-

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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 liberalization 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.

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quences (i.e. trade and current account balances) of trade liberalization in a sample of 22 developing countries for the period 1972–98. The paper will focus on examining what has been the impact of trade liberalization 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 liberalization episodes are measured in two ways. 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 liberalization episode, based on the criteria published by the World Trade Organisation *Trade Policy Reviews*, the World Bank and International Monetary Fund country- and region-specific studies (and other sources). We also look at differences in the performance in Africa, Latin America, East Asia and South Asia, and the countries are 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 generalized methods of moments (GMM), fixed effects, and time series/cross-section (TSCS)). First, we employ 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 GMM estimator controls for endogeneity by using 'internal instruments', i.e. 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 TSCS 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.

The rest of the paper is presented as follows. The framework for the empirical analysis is introduced in Section 2. The results are presented in Section 3. Section 4 provides concluding remarks.

2 Empirical Framework

The effect of trade liberalization on the trade balance and the balance of payments is theoretically ambiguous whatever framework of balance of payments analysis is used. In the partial equilibrium framework of the elasticities approach the effect will depend on the extent to which import and export duties change and the price elasticities of imports and exports. Measuring the balance of payments in foreign currency, export earnings will increase if the price elasticity of demand is greater than unity, and import payments will increase if the price elasticity of demand is greater than zero. The elasticities approach is not suitable for the analysis of trade liberalization that does not involve price changes. In the general equilibrium framework of the absorp-

tion approach to the balance of payments, the effect of liberalization will depend on how real income is affected relative to real absorption. A reduction in export duties will shift expenditure to home produced goods, thereby raising income, but a reduction in import duties does the opposite. Even if real income increases, the balance of payments will not improve if the propensity to absorb is greater than unity. Then, there are the direct effects on absorption to consider. If trade liberalization reduces prices this will increase real absorption through a real balance effect and money illusion, but will decrease absorption if there is a redistribution of income to the traded goods sector where the propensity to save is high. Finally, in the monetary approach to the balance of payments, the outcome of liberalization depends on how the real demand for money changes relative to the real supply.

Given this theoretical ambiguity, the impact of liberalization on the trade balance and the balance of payments becomes an empirical issue. Ostry and Rose (1992) recognized this in their study of tariff changes, and found in their empirical analysis 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 liberalization 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 liberalization worsens the payments position. The effect of trade liberalization 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 liberalization. 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 liberalization on the trade balance (TB) and the current account of the balance of payments (CA), both dependent variables are normalized to take account of differences in the size of countries by 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 is a function of income and relative prices. The basic estimating equations are as follows:

$$\begin{aligned}\text{TB/GDP and CA/GDP} = {} & \beta_1 + \beta_2(\text{TB or BP})_{t-1} + \beta_3 w \\ & + \beta_4 y + \beta_5 p + \beta_6 d_{\text{x}} + \beta_7 d_{\text{m}} \\ & + \beta_8 \text{TOT} + \beta_9 \text{lib} + \beta_{10} y * \text{lib} \qquad (1)\end{aligned}$$

where TB_{t-1} and CA_{t-1} are lagged dependent variables, 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 is the nominal ('pure') terms of trade, measured as the ratio of export to import prices, lib is a liberalization shift dummy and $y *$ lib is an interaction (slope) dummy to take account of the impact that liberalization may have on growth and therefore on the balance of payments. The expected signs of the coefficients are $\beta_2 > 0$, $\beta_3 > 0$, β_4 (<0),[2] β_5 (?), $\beta_6 < 0$, $\beta_7 > 0$ and $\beta_8 > 0$. The signs of the lib (β_9) and $y *$ lib (β_{10}) coefficients are to be determined. The precise data definitions and sources of the variables are presented in the Appendix.

The only previous work in this field is the study by UNCTAD (1999), which presents panel data estimations (fixed and random effects) of the impact of liberalization on trade deficits and growth in a selection of developing and industrialized countries. The study uses the Sachs and Warner (1995) liberalization shift dummy, which is expected to capture the effects of capital account liberalization, as well as the impact of import liberalization.[3] UNCTAD found that a more favourable terms of trade[4] and faster growth in industrial countries improved the trade balance of developing countries, whereas liberalization worsened it considerably. The study also concludes that faster growth in liberalized economies is associated with greater trade deficits than in non-liberalized economies. Also, increases in the purchasing power of exports continue to improve the trade balance in liberalized economies but by less than before liberalization.

3 Estimations and Results

The estimation procedures used in this section are dynamic panel data techniques, based on fixed effects (least squares) and GMM, and TSCS models. The fixed effects estimator includes a dummy variable to allow for country-specific effects that are constant over time. An important issue when estimating least squares 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; Judson and Owen, 1999). This is

[2]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.

[3]The Sachs and Warner indicator is a dichotomous variable (zero–one), which takes the value zero if the economy is closed, i.e. if it satisfies at least one of the following criteria (or 'open' if none of the conditions is satisfied): non-tariff barriers covering 40 per cent or more of trade; average tariff rates of 40 per cent or more; a black-market exchange rate that has depreciated on average by 20 per cent or more relative to the official exchange during the 1970s and 1980s; the country has a socialist economic system; the country has a state monopoly of major exports.

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

particularly so when the time dimension of the panel (T) is small and $N \rightarrow \infty$, and the bias is of order $1/T$.[5] The least squares approach could suffer as well from the inconsistency due to omitted variables bias, and errors of measurement. However, these failures are less evident in the case of the fixed effects approach (in comparison, for example, to the random effects), which controls for country-specific effects, as stressed before.[6]

In this regard, the GMM estimator is considered a superior technique to estimate dynamic panel data. Moreover, it also controls for the endogeneity of the lagged dependent variables, and the potential endogeneity of other explanatory variables, by using 'internal instruments', i.e. instruments that are based on lagged values of the explanatory variables (Arellano, 1993; Arellano and Bond, 1998).[7] 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 dependent variables; and this issue is addressed by the use of the dynamic modelling by GMM.

Also, TSCS models are estimated, which are suitable for panel data characterized by a large number of time series observations and a relatively small number of countries, given the disaggregated analysis also 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.

3.1 Fixed Effects and GMM Estimations

The results of examining the impact of trade liberalization on the trade balance applying fixed effects and GMM models are presented in Tables 1 and 2. Both methods of estimation provide very similar results.

Considering first the trade balance as a proportion of GDP, 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 (although the impact is minimal) and the pure terms of trade effect is positive.

A one percentage point reduction of export duties has significantly improved the trade balance by approximately 0.2 per cent of GDP, whereas a one percentage point reduction of import duties has deteriorated the trade

[5]In this study T is relatively large (over 23 years of analysis in most cases), and thus the 'bias' is insignificant.

[6]The fixed effect estimator instead of random effects (feasible generalized least squares) is applied 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.

[7]The Sargan test of over-identifying restrictions 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. Tables 2 and 4 report the Sargan test and other diagnostic statistics.

TABLE 1
TRADE LIBERALIZATION AND THE TRADE BALANCE: 1972–98

	Least squares (fixed effects)			
Explanatory variables	*(i)*	*(ii)*	*(iii)*	*(iv)*
tb_{-1}	0.68	0.67	0.68	0.67
	(2.41)**	(2.59)**	(2.13)**	(3.55)*
w	0.88	0.74	0.92	0.89
	(2.02)**	(1.95)***	(2.01)**	(1.96)**
y	–0.21	–0.19	–0.22	–0.19
	(4.76)*	(4.35)*	(3.80)*	(3.37)*
p	–0.06	–0.07	–0.07	–0.07
	(3.72)*	(3.63)*	(3.73)*	(3.93)*
d_x	–0.28	–0.26	–0.21	–0.23
	(2.52)**	(2.69)**	(2.50)**	(1.69)***
d_m	0.74	0.83	0.78	0.81
	(3.53)*	(2.76)**	(3.50)*	(2.38)**
lib	–1.35	–1.21	–1.56	–1.28
	(2.77)**	(2.52)**	(2.42)**	(4.48)*
TOT		0.27		0.29
		(1.98)**		(2.57)**
$y * \text{lib}$			–0.26	–0.23
			(3.31)*	(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: Dependent variable, trade balance/GDP (tb).
Figures in parentheses are absolute t ratios.
The 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.
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

balance by nearly 0.8 per cent of GDP. In addition to export and import duty changes, the process of trade liberalization (lib) seems to have worsened the trade balance by at least a further 1 per cent of GDP. This result compares with the average of the trade balance/GDP ratio for the complete sample, which is –2.76 per cent. The negative coefficient on the interaction dummy ($y * \text{lib}$) indicates that liberalization has improved growth performance which has deteriorated the trade balance by a further 0.20–0.40 per cent of GDP.

Turning to the current account of the balance of payments shown in Tables 3 and 4, the results are weaker than for the trade balance, but they indicate that trade liberalization has also worsened the current account for our sample of countries. The weaker results are not unexpected, given that

TABLE 2
TRADE LIBERALIZATION AND THE TRADE BALANCE: 1972–98

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

Notes: Dependent variable, trade balance/GDP (tb).
Figures in parentheses are absolute t ratios; figures in square brackets are p 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 of no serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1998). The p values report the probability of rejecting the null hypothesis of 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.
The GMM estimations were performed using the program DPD98 for Gauss (Arellano and Bond, 1998).
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.

the current account balances comprise 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 liberalization, and have no systematic relation with export and import behaviour. An alternative explanation is that the trade deficits generated by liberalization 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 effects of liberalization would have been more favourable if export and import growth could have been kept in better balance by appropriate sequencing of trade liberalization. It can be

Table 3
Trade Liberalization and the Current Account: 1972–98

	Least squares (fixed effects)			
Explanatory variables	*(i)*	*(ii)*	*(iii)*	*(iv)*
ca_{-1}	0.71	0.71	0.71	0.70
	(6.66)*	(7.33)*	(6.63)*	(7.29)*
w	0.53	0.56	0.53	0.55
	(1.72)***	(1.85)***	(2.70)**	(1.84)***
y	–0.14	–0.20	–0.37	–0.14
	(2.33)**	(1.96)**	(2.34)**	(1.62)***
p	–0.03	0.01	–0.02	0.01
	(0.94)	(0.25)	(0.97)	(0.28)
d_x	–0.16	–0.24	–0.17	–0.23
	(2.46)**	(2.66)**	(1.78)***	(2.65)**
d_m	0.36	0.51	0.39	0.51
	(1.81)***	(3.98)*	(1.68)***	(3.95)*
lib	–0.72	–0.78	–0.73	–0.75
	(2.47)**	(2.35)**	(2.09)**	(2.84)**
y * lib			–0.20	–0.15
			(1.73)***	(2.73)**
TOT		0.24		1.08
		(1.21)		(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: Dependent variable, current account/GDP (ca).
Figures in parentheses are absolute *t* ratios.
The 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.
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

seen from Tables 3 and 4 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; and export duty reductions significantly improve the current account in both the fixed effects and GMM estimates. Regarding the trade policy and liberalization variables, import duty reductions are marginally significant in worsening the balance of payments, and trade liberalization (i.e. the shift dummy) has had a significantly negative effect on the current account of the balance of payments in the range of 0.14–0.80 per cent of GDP. Finally, faster growth in the liberalized economies is associated with greater current account deficits, as shown by the negative and significant coefficient on the interaction dummy.

TABLE 4
TRADE LIBERALIZATION AND THE CURRENT ACCOUNT: 1972–98

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

Notes: Dependent variable, current account/GDP (ca).
Figures in parentheses are absolute *t* ratios; figures in square brackets are *p* 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 of no serial correlation are asymptotically distributed as standard normal variables (see Arellano and Bond, 1998). The *p* values report the probability of rejecting the null hypothesis of 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.
The GMM estimations were performed using the program DPD98 for Gauss (Arellano and Bond, 1998).
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

3.2 TSCS

3.2.1 Disaggregated Analysis by Region. We turn now to examine the impact of trade liberalization 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 liberalization and the trade balance and balance of payments. For this purpose, TSCS modelling is undertaken, which is suitable to analyse data observed for a relatively large number of

years and for a relatively small number of cross-sectional units. The TSCS model allows for the error term of each region/individual to be freely correlated across equations, and the error term need not have the same properties for each unit (thus, it is suitable for analysing region- or group-specific relationships). The results are shown in Tables 5 and 6.

Focusing first on the trade balance (see Table 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 per cent 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 per cent 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 liberalized trade regimes have worsened the trade balance in all the regions, most notably in Africa (as demonstrated by both the shift and the interaction dummies).

Table 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 varies; 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 liberalization in all the regions has been to worsen the current account, but by less than 1 per cent 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.

3.2.2 Disaggregation According to Degree of Protection. Finally, we consider the impact of trade liberalization on the trade balance and the current account according to the degree of restriction and/or freedom of the trade regime of the countries; i.e. whether countries are highly or lowly protected (see Tables A1 and A2 in the Appendix for the definition and classification criteria). The estimation results are provided in Tables 7 and 8. If imports are generally more sensitive to liberalization than exports, it is expected that the direct effect of liberalization on the trade balance and balance of payments will be greater in the more highly protected group of countries than in those

TABLE 5
TWO-STEP GENERALIZED LEAST SQUARES AND MAXIMUM LIKELIHOOD ESTIMATION

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

Notes: Dependent variable, trade balance/GDP.
Figures in parentheses are absolute t ratios.
The likelihood ratio statistic (LRS) is the test for serial correlation; the numbers in square brackets are the critical values. The results provided are based on heteroscedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

TABLE 6
TWO-STEP GENERALIZED LEAST SQUARES AND MAXIMUM LIKELIHOOD ESTIMATION

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

Notes: Dependent variable, current account/GDP.
Figures in parentheses are absolute t ratios.
The likelihood ratio statistic (LRS) is the test for serial correlation; the numbers in square brackets are the critical values. The results provided are based on heteroscedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

Table 7
Two-Step Generalized Least Squares and Maximum Likelihood Estimation

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

Notes: Dependent variable, trade balance/GDP.
Figures in parentheses are absolute *t* ratios.
The likelihood ratio statistic (LRS) is the test for serial correlation. The numbers in square brackets are the critical values. The results provided are based on heteroscedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.
In this set of estimations Indonesia and Zambia are not included because they switched regimes during the period.
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

with more moderate degrees of protection (for equal changes in the degree of protection), and this is generally confirmed by the results.

Table 7 reports the results for the trade balance, and it shows 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 liberalized 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 to moderate levels of protection; moreover, the positive impact on the trade balance of world income growth is smaller in the high to very high category of countries.

TABLE 8
TWO-STEP GENERALIZED LEAST SQUARES AND MAXIMUM LIKELIHOOD ESTIMATION

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

Notes: Dependent variable, current account/GDP.
Figures in parentheses are absolute t ratios.
The likelihood ratio statistic (LRS) is the test for serial correlation. The numbers in square brackets are the critical values. The results provided are based on heteroscedastic and correlated regressions, with group autocorrelation. Such regressions are supported by the LRS.
In this set of estimations Indonesia and Zambia are not included because they switched regimes during the period.
*Significant at the 1 per cent level.
**Significant at the 5 per cent level.
***Significant at the 10 per cent level.

Finally, in the case of the current account (see Table 8), the impact of duty changes on exports and imports differs significantly between the countries with low to moderate and highly protected trade regimes, and the overall effect of the liberalization process continues to be 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.

3.2.3 Testing for Equality of the Coefficients. The likelihood ratio statistics, with a χ^2 distribution, calculated for the different regions and trade policy regime classification are presented in Table 9. The results reject the restrictions that the export and import duties, the shift and the slope liberalization

Table 9
Restriction Test for Equality of Coefficients Across Regions and Trade Policy Regimes

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

Notes: Figures in square brackets are critical values of χ^2. Unless marked, the coefficients are significant at the 5 per cent level.
***Significant at the 10 per cent level.

dummies, and the four trade liberalization indicators together are the same for all four regions, and for the low to moderate and high to very high categories of trade policy distortions. This clearly confirms the previous findings, which show that the impact of trade policy reforms varies considerably across countries. The differences in the effects of the trade liberalization indicators probably reflect institutional differences across countries and the degree of restrictions existing before and after liberalization, as well as the initial disparities in the balance of trade and current account performances.

4 Conclusions

This paper has been concerned with the effect of trade liberalization on the trade balance and the balance of payments, considering 22 developing countries from Africa, East Asia, South Asia and Latin America that have undertaken extensive trade policy reforms over the last three decades. Special attention has been paid to identifying the year(s) when significant liberalization took place (and then continued), and considerable attention has also been paid 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 liberalization. The various estimation techniques used have provided results that are strong and robust to the different specifications estimated. The findings may be summarized as follows.

First, the effect of 'pure' trade liberalization (abstracting from growth effects) has been to worsen the trade balance by 2 per cent 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 per cent of GDP). The effects of liberalization on the trade and the current account balances 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 liberalization. But, the trade balance and the current account balance have worsened, on average, in all the regions analysed. Furthermore, faster growth in the liberalized 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 liberalization differs in relation to whether countries are initially highly protected or already have relatively low levels of protection. The negative effects on the trade and current account balances are larger in the more highly protected countries.

As suggested earlier, the effect of trade liberalization 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 (see Santos-Paulino, 2002a, 2002b). 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.

An important issue is whether or not the deficits can be sustained, and that depends on macroeconomic policies (mainly those that influence aggregate demand), developments in the real exchange rate and the inflows of foreign capital. The importance of the right policy sequence before and during liberalization is a matter of great debate, but there is no doubt that there is a need for implementing the appropriate exchange rate, fiscal and monetary policies during the liberalization process.

Appendix: Data Definitions and Sources

Export duties (d_x): Export duties (per cent of exports); includes all levies collected on goods at the point of export. *Source*: World Bank, *World Development Indicators*, 1999.

Import duties (d_m): Import duties (per cent 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*, 1999.

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 defined as EP_d/P_f, where E is the nominal exchange rate measured as the foreign price of domestic currency and P_d/P_f is the ratio of domestic to foreign prices. Data for the real exchange rate 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 real exchange rates for the remaining countries are constructed from the IMF's *International Financial Statistics* (various issues).

Table A1
Classification of Countries According to the Heritage Foundation Trade Policy Grading Scale: 1995–2000

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

Notes: 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). World Trade Organisation *Trade Policy Reviews* (various issues) were also consulted.
Source: Heritage Foundation Index of Economic Freedom (see Johnson and Sheehy, 1995; Johnson *et al.*, 1998a, 1998b; Johnson and Holmes, 1998; O'Driscoll *et al.*, 1999).

TABLE A2
CLASSIFICATION OF COUNTRIES ACCORDING TO TRADE POLICY REGIME

Classification/countries	
Low to moderate	
Chile	Paraguay
Colombia	Philippines
Costa Rica	Sri Lanka
Ecuador	Thailand
Korea	Uruguay
Malaysia	Venezuela
Mexico	
High to very high	
Cameroon	Morocco
Dominican Republic	Pakistan
India	Tunisia
Malawi	

Notes: The classification presented in this table is based on the Heritage Foundation and IMF (1998) criteria in terms of the tariffs and non-tariff barriers provided in Table A1.

Income growth (y): GDP; annual percentage growth (constant 1995 US$). *Source*: World Bank, *World Development Indicators*, 1999.

World income growth (w): World GDP; annual percentage growth (constant 1995 US$). *Source*: World Bank, *World Development Indicators*, 1999. The activity variable is defined as the difference between world GDP and country GDP, i.e.

$$\mathrm{WY}_i = \mathrm{WorldGDP} - \mathrm{GDP}_i$$

Terms of trade: the so-called 'net barter' terms of trade, is defined as the ratio of the export unit value index to the import unit value index. *Source*: World Bank, *World Development Indicators*, 1999.

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