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The Impact of Trade Liberalization on the Trade Balance in Developing Countries

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Using two recently constructed measures of trade liberalization dates, this article studies the impact of trade liberalization on imports, exports, and overall trade balance for a large sample of developing countries. We find strong and consistent evidence that trade liberalization leads to higher imports and exports. However, in contrast to Santos-Paulino and Thirlwall (2004), who found a robustly negative impact of trade liberalization on the overall trade balance, we find only mixed evidence of such a negative impact. In particular, we find little evidence of a statistically significant negative impact using our first measure of liberalization dates, which extends Li (2004). Using a second measure of liberalization dates compiled by Wacziarg and Welch (2003), we find some evidence that liberalization worsens the trade balance, but the evidence is not robust across different estimation specifications, and the estimated impact is smaller than that reported by Santos-Paulino and Thirlwall (2004).

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Many developing countries have substantially liberalized their trade regime over the past three decades, either unilaterally or as part of

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multilateral initiatives. Nevertheless, trade barriers remain high in many developing countries. One of the concerns that attributes to the reluctance of many of these countries to liberalize their trade regime is the possible worsening of the trade balance.[1] This is the question we want to investigate in this study: did past liberalization episodes in developing countries lead to a deterioration of their trade balance?

On the theoretical ground, Ostry and Rose (1992) offer an extensive survey of the macroeconomic effects of trade tariffs based on different theoretical frameworks, including the income-expenditure approach, the monetary approach, and the intertemporal approach. The authors conclude that there is no clear conclusion about the effect of a tariff change on the trade balance. The effect depends on the behavior of real wages and exchanges rates, on the values of a variety of elasticities, the degree of capital mobility, and whether the tariff shock is perceived as temporary or permanent.

Using a simple two-period intertemporal trade model, we analyze the effect of trade liberalization on the import, the export, and the trade balance in a small country. The effects rely on the interactions among the *real income effect*, the *intratemporal substitution effect* between importing goods and exporting goods, and the *intertemporal substitution effect* across time periods. The *intertemporal substitution effect* is negligible, as the tariff reductions are permanent, and the small country takes the world prices and the interest rate as exogenous. Tariff reductions increase the real income and decrease the price of the import good. Thus, both the *real income effect* and the *intratemporal substitution effect* increase imports. The *intratemporal substitution effect* decreases the domestic consumption of the exportable good, whereas the *real income effect* increases it. Assuming the former effect dominates, trade liberalization will increase exports. As trade liberalization increases both exports and imports, the difference of these two, the trade balance, may increase or decrease due to tariff reductions. The impact of trade liberalization on the trade balance, therefore, needs to be investigated empirically.

One stream of the related empirical literature attempts to find out how trade liberalization affects a country's imports, and generally finds a positive impact (Melo and Vogt, 1984; Bertola and Faini, 1991; and Santos-Paulino, 2002a). There are also empirical researches focusing on the effects of trade liberalization on exports, where the findings are more mixed. Some of them show that countries which embarked on liberalization programs have improved their export performance (Thomas, Nash, and Edwards, 1991; Ahmed, 2000; and Santos-Paulino, 2002b), whereas others have found little evidence of such a relationship (Greenaway and Sapsford, 1994; Jenkins 1996).

[1]Another common concern is the decline in tariff revenue—often a major source of revenue for developing countries. Baunsgaard and Keen (2005) find that low-income countries have mostly not been able to offset reductions in trade tax revenues by increasing their domestic tax revenues.

For policymakers, the impact of trade liberalization on the overall balance would be the more important question. There have been, however, surprisingly few cross-country empirical studies on the subject. Ostry and Rose (1992) studied the impact of tariff changes on the trade balance using five different data sets, mostly data from the Organization for Economic Cooperation and Development countries, and found no statistically significant effect. UNCTAD (1999) studied the effect of trade liberalization on the trade balance for 15 developing countries over the period of 1970–1995, and found a significant negative relationship. In a more recent paper, Santos-Paulino and Thirlwall (2004) studied the effect of trade liberalization on imports, exports, and on the overall trade balance using a sample of 22 developing countries for the period of 1972–97. They found that liberalization stimulated export growth but raised import growth by more, leading to a worsening of the overall trade balance.

One constraint researchers on the subject often face is the lack of systematic data measuring the dates of trade liberalization. Indeed, due to data limitation, most of the empirical studies on the subject are constrained to country case studies. In this article, we use two recently compiled data sets establishing trade liberalization dates that cover a large sample of developing countries for a long period of time. In particular, our two samples cover 39 and 77 developing countries for the period of 1970–2004, and 1970–2001, respectively. Our study focuses on the impact of trade liberalization for developing countries, for which the policy relevance of this question remains especially high. We find strong evidence that trade liberalization leads to faster import and export growth. The evidence on the overall trade balance, however, is mixed. Using our first measure of trade liberalization dates, we find little evidence that trade liberalization worsens the trade balance. There is some evidence that liberalization leads to a deterioration of the trade balance when we use our second measure of liberalization dates, although the finding is not robust to alternative estimation specifications.

I. Theoretical Analysis

This section develops a two-period intertemporal trade model to analyze the effect of trade liberalization on the import, the export, and the trade balance. Since our empirical analysis investigates permanent tariff reductions in developing countries, we study a permanent tariff reduction in a small country in this theoretical analysis. The key insight relies on the interactions among the *real income effect*, the *intratemporal substitution effect* between importing goods and exporting goods, and the *intertemporal substitution effect* across time periods.

The life-time utility function for the representative consumer in the home country is defined as

$$U = u(C_1) + \beta u(C_2),\ 0 < \beta < 1, \tag{1}$$

where C_t is the consumption in period t ($t=1,2$) and β is a time-preference factor. With respect to technology, the home country specializes in producing a single good, labeled as good 1, and the foreign country specializes in producing good 2. Let the output of good 1 in period t be y_{t1}. The linear homogeneous production function for good 1 is $y_{t1}=F(k_t, L)$ where k_t and L are capital and labor used in production, respectively. We assume that labor supply, L, is fixed, and is normalized as 1 from here on. The capital stocks evolve according to

$$k_{t+1}=k_t+I_t, \tag{2}$$

where I_t is the investment in period t and the depreciation rate is assumed to be zero.

Consumption and investment are composite of foreign and domestic goods:

$$C_t+I_t=G(x_{t1},x_{t2}),$$

where $G(x_{t1},\ x_{t2})=(x_{t1}^{\rho}+x_{t2}^{\rho})^{1/\rho}$ is an Armington aggregator and $0<\rho\leq 1$. The elasticity of intratemporal substitution between foreign and domestic goods is $\sigma=1/(1-\rho)$ and $1<\sigma<\infty$. This setup is standard in the literature of international real business cycle (IRBC) (see Backus, Kehoe, and Kydland, 1992 and 1994 for more discussions). While the IRBC literature uses an infinite horizon model for calibrations, we use a two-period model to get closed form solutions, in order to provide some intuition for our empirical investigations.

Similar to the argument in Ostry (1988), the consumer may be viewed as solving a two-stage optimization problem. In the first stage, the consumer chooses x_{t1} and x_{t2} to minimize her expenditure for a given level of consumption and investment, C_t+I_t. That is, she solves

$$\begin{aligned}&\min_{x_{t1},x_{t2}}\ E=p_{t1}x_{t1}+p_{t2}x_{t2}\\&\text{subject to } G(x_{t1},x_{t2})\geq C_t+I_t,\end{aligned}$$

where p_{ti} is the domestic price of good i. Letting τ be an ad valorem tariff rate on imports, we have $p_{t1}=p_{t1}^{*}$ and $p_{t2}=(1+\tau)p_{t2}^{*}$ where p_{ti}^{*} is the world price. The solution to this problem yields the expenditure function

$$E(p_{t1},\ p_{t2},\ C_t+I_t)=q_t(C_t+I_t)$$

where $q_t=(p_{t1}^{1-\sigma}+p_{t2}^{1-\sigma})^{1/1-\sigma}$. To simplify the analysis, we assume that the world prices do not change. That is, $p_{1\mathrm{j}}^{*}=p_{2\mathrm{j}}^{*}$ for $j=1,2$, and therefore, we have $q_1=q_2=q$. Using the envelope theorem, we have

$$x_{ti}=\frac{\partial E(\cdot)}{\partial p_{ti}}=q_t^{\sigma}p_{ti}^{-\sigma}(C_t+I_t).$$

The intertemporal budget constraint for the consumer can be written as

$$q_1(C_1 + I_1) + \frac{q_2(C_2 + I_2)}{1 + r} = p_{11}F(k_1) + \tau p^*_{12}x_{12} + \frac{p_{21}F(k_2) + \tau p^*_{22}x_{22}}{1 + r}, \tag{3}$$

where r is the world interest rate that the small country takes as exogenous. The government redistributes the tariff revenue, $\tau p^*_{t2}x_{t2}$, back to the consumer in every period. Note that capital, k_2, accumulated in period 1 will be consumed at the end of period 2 and k_3 will be zero, implying that $I_2 = k_3 - k_2 = -k_2$. In the second stage, the consumer chooses C_1, I_1, and C_2 to maximize lifetime utility (1) subject to the intertemporal budget constraint (3) (k_1 is given by history and is not subject to choice on date 1).

Using Equation (3) to substitute C_2 in (1), the two first order conditions for C_1 and I_1 are

$$\frac{\partial u(C_1)}{\partial C_1} = \beta(1 + r)\frac{\partial u(C_2)}{\partial C_2}, \tag{4}$$

and

$$\frac{p_{21}}{Q}\frac{\partial F(k_2)}{\partial k_2} = r, \tag{5}$$

where $Q = q_2 - \tau p^*_{22}q_2^{\sigma}p_{22}^{-\sigma}$ is the aggregate price index, excluding the tariff revenue effect. Equation (4) is the standard Euler equation, and equation (5) states that the marginal value product of capital equals the interest rate. C_1, I_1, and C_2 are solved by equations (3), (4), and (5). The import value M_t, the export value X_t, and the trade balance TB_t are correspondingly written as

$$M_t = p^*_{t2}x_{t2} = p^*_{t2}q_t^{\sigma}p_{t2}^{-\sigma}(C_t + I_t)$$

$$X_t = p^*_{t1}(y_t - x_{t1}) = p^*_{t1}[y_t - q_t^{\sigma}p_{t1}^{-\sigma}(C_t + I_t)].$$

$$TB_t = X_t - M_t$$

Note that the intertemporal budget constraint (3) implies that $TB_1 + TB_2/(1 + r) = 0$.

We are now ready to discuss the effect of trade liberalization. With some computations, we can show that $\partial Q/\partial\tau > 0$. Hence, the aggregate price index declines as tariff rate τ decreases. Equation (5) then indicates that k_2, and therefore I_1 must increase, since now the real price of the domestic product, p_{21}/Q, becomes higher. Rewriting the intertemporal budget constraint (3), we have

$$Q(C_1 + I_1) + \frac{Q(C_2 - k_2)}{1 + r} = p_{11}F(k_1) + \frac{p_{21}F(k_2)}{1 + r}. \tag{6}$$

The value of the right-hand side of equation (6) increases as k_2 increases. Therefore, $C_1 + I_1$ must increase. The proof is straightforward: if $C_1 + I_1$ were smaller, then C_1 would be smaller since I_1 is larger, then C_2 would be smaller using equation (4), so that the value of the left-hand side of equation (6) would decline, and that would be a contradiction.

When tariff rate τ is reduced, the real price of the domestic good and therefore the real income increases. This is labeled as the *real income effect,* which increases both consumption demand and investment demand. The *intertemporal substitution effect* across time periods is negligible. Even if C_1 declines, $C_1 + I_1$ must be higher after tariff reductions.

The effect of trade liberalization on the import value in current period is

$$\frac{\partial M_1}{\partial \tau} = p_{12}^*(C_1 + I_1)\frac{\partial\left(q_1^\sigma p_{12}^{-\sigma}\right)}{\partial \tau} + p_{12}^* q_1^\sigma p_{12}^{-\sigma}\frac{\partial(C_1 + I_1)}{\partial \tau}. \tag{7}$$

It is easy to show that the first derivative in the right-hand side of equation (7) is $\partial(q_1^\sigma p_{12}^{-\sigma})/\partial\tau < 0$. This is called the *intratemporal substitution effect;* the tariff reduction reduces the price of the import good and therefore increases the import demand. As we have argued above, the *real income effect* implies that $\partial(C_1 + I_1)/\partial\tau < 0$. Thus, both the *intratemporal substitution effect* and the *real income effect* increase the value of imports.

Noting that $y_1 = F(k_1)$ does not change, the effect of trade liberalization on the value of exports in current period is

$$\frac{\partial X_1}{\partial \tau} = -\left[p_{11}^*(C_1 + I_1)\frac{\partial\left(q_1^\sigma p_{11}^{-\sigma}\right)}{\partial \tau} + p_{11}^* q_1^\sigma p_{11}^{-\sigma}\frac{\partial(C_1 + I_1)}{\partial \tau}\right]. \tag{8}$$

Now, the first derivative in the right-hand side of equation (8) is $\partial(q_1^\sigma p_{12}^{-\sigma})/\partial\tau > 0$. That is, the *intratemporal substitution effect* decreases the domestic consumption of the exportable good and therefore increases the export value, whereas the *real income effect* does the opposite. Assuming the former effect dominates, we have $\partial X_1/\partial\tau < 0$. Hence, trade liberalization increases the export value.

As both X_1 and M_1 increase, the difference of these two, the trade balance, may increase or decrease due to tariff reductions. More precisely, with some computations, we have

$$\frac{\partial TB_1}{\partial \tau} = \sigma q_1^{2\sigma-1} p_{11}^{-\sigma} p_{12}^{-\sigma}\left(-1 + \frac{p_{12}^*}{p_{11}^*(1+\tau)}\right),$$

and its sign may be positive or negative. Summarizing we have:

Proposition 1

Tariff reductions increase the value of imports in the current period. If the intratemporal substitution effect dominates the real income effect, tariff

reductions increase the value of exports in the current period. The effect of tariff reductions on the trade balance is ambiguous.

Since $y_1 = F(k_1)$ does not change, our results also hold for the ratio of the import value, the export value, and the trade balance to GDP, which we will use as the dependent variables in our empirical study. As we will show next, the theoretical results we derived above are consistent with our empirical investigations.

II. Two Measures of Trade Liberalization Dates

Our first measure of trade liberalization dates is based on Li (2004), who has individually documented trade liberalization episodes in 45 countries between 1970 and 1995. We extended the liberalization measure for the 39 developing countries[2] in her data set to 2004 using the tariff data from the United Nations Conference on Trade and Development's Trade Analysis and Information System (TRAINS) database (supplemented by data from the IMF's Trade Policy Information Database—TPID). In doing so, a trade liberalization episode is identified if there is a continuous and accumulated tariff reduction by at least 35 percent (for example, a tariff reduction from 15 to 9.75 percent).[3] However, once a country's overall tariff level reaches 10 percent or lower, we regard it as open and a further tariff cut, even by more than 35 percent, will no longer be considered as a liberalization episode.[4] The IMF's TPID database also rates a country's nontariff barrier level into three categories (open, moderate, and restrictive). In addition to looking at tariff reductions, we also take the reductions in nontariff barriers into consideration when defining a liberalization episode. However, it turns out that reductions in nontariff barriers are usually accompanied by large tariff cuts.

Table 1 reports our first measure of liberalization dates covering the period between 1970 and 2004, with the years of liberalization episodes highlighted (tariff reductions typically spread over several years). Two observations are worth mentioning. First, the period of 1985–95 seems to be the "opening-up decade" for developing countries. Almost all the countries in our sample experienced one or more episodes of liberalization during this period. Secondly, many countries experienced multiple episodes of liberalization (this is the case for 20 of the 39 countries in the sample). Indeed, trade liberalization is still an ongoing process for many developing countries.

[2]According to the World Bank's classification (http://go.worldbank.org/K2CKM78CC0).

[3]Ideally, we would like to use the weighted average tariff, but often only the simple average tariff data are available.

[4]One example where this 10 percent threshold is applied is Chile. Over the period from 1999–2004, Chile's simple average tariff rate was reduced from 10 to 5 percent, which was a cut of 50 percent. However, since the 10 percent threshold was already met at the initial tariff level, this period is not treated as a liberalization episode.

Table 1. Trade Liberalization Episodes (Measure of Liberalization Dates Based on Li, 2004)

Country	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	W-W open year
Argentina	0	0	0	0	0	0	x	x	x	x	0	0	0	0	0	0	0	0	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	1991
Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	0	0	0	0	0	0	0	0	0	0	0	1990
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	1991
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	1993
Chile	0	0	0	0	x	x	x	x	x	x	0	0	0	0	0	x	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	1976
China	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	0	0	0	0	0	x	0	n.a.
Colombia	0	0	0	x	x	x	x	x	x	x	0	0	0	0	0	x	x	x	x	x	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0	1986
Costa Rica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1986
Ecuador	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	1991
The Gambia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1985
Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	1985
Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1988
Guinea-Bissau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	1987
Guyana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	0	0	0	0	0	0	0	x	x	x	0	0	0	1988
Honduras	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	1991
India	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	0	0	x	x	x	x	x	x	x	0	0	0	0	0	0	0	n.a.
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	1970
Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	0	0	0	0	0	x	x	0	0	0	0	1989
Kenya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	0	0	0	0	0	0	0	x	x	x	x	x	1993
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	0	0	0	0	0	0	0	0	0	1963

Mali	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	1988
Mauritania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	1995
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1986
Morocco	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	0	0	0	0	0	0	0	x	0	0	0	0	0	0	1984
Nepal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	0	0	0	0	0	0	0	0	0	0	1991
Nicaragua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	0	0	0	x	x	0	0	0	0	0	0	0	0	0	0	0	1991
Nigeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	n.a.
Pakistan	0	0	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	0	0	x	x	x	x	x	0	0	2001
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1989
Peru	0	0	0	0	0	0	0	0	0	x	x	x	0	0	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0	0	1991
Philippines	0	0	0	0	0	0	0	0	0	0	0	x	x	x	0	0	x	0	0	0	0	x	x	x	x	x	x	x	x	x	0	0	0	0	0	1988
Sri Lanka	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	0	0	0	0	x	0	0	0	0	0	1991
Thailand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	x	x	x	0	0	x	x	x	x	x	x	Always
Tunisia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	1989
Turkey	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1989
Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	0	0	0	0	0	0	1988
Uruguay	0	0	0	0	x	x	x	x	x	x	x	x	0	0	0	0	0	0	0	0	0	0	x	x	x	x	0	0	0	0	0	0	0	0	0	1990
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	0	0	0	0	0	0	0	0	0	0	0	1996
Zambia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	0	0	0	0	0	0	0	0	1993

Sources: Li (2004); United Nations Conference on Trade and Development, Trade Analysis and Information System database; IMF, Trade Policy Information Database; Wacziarg and Welch (2003).

Note: x represents a year of trade liberalization, 0 represents no trade liberalization.

For countries that experienced multiple liberalization episodes, a subsequent liberalization is often implemented either because the earlier one was limited in scope or was later reversed (at least partially). We, therefore, define a trade liberalization dummy, which takes the value of one after the end of the last recorded liberalization episode for a country and zero beforehand.[5]

Our second measure of trade liberalization dates is from Wacziarg and Welch (2003). Wacziarg and Welch define the liberalization date as the date after which all of the Sachs and Warner (1995) openness criteria are continuously met. In particular, Wacziarg and Welch classify a country as closed if it displays at least one of the following characteristics: (1) average tariff rates of 40 percent of more; (2) nontariff barriers covering 40 percent or more of trade; (3) a black market exchange rate that is depreciated by 20 percent or more relative to the official exchange rate, on average; (4) a state monopoly on major export; and (5) a socialist economic system. However, data limitations often forced them to rely on country case studies of trade policy. One advantage of the Wacziarg-Welch data set is that it covers a substantially larger sample of developing countries. The Wacziarg-Welch liberalization dates are also reported in the last column of Table 1 (only for the overlapping countries).

We note in many cases the identified dates are very close across the two measures. For example, our first measure would identify 1992 as the year that Argentina liberalized its trade regime, compared with 1991 in Wacziarg and Welch (2003). For multiple liberalization episodes identified by our first measure, in several cases the Wacziarg-Welch date is closer to the first episode. For example, our first measure suggests that Chile had two episodes of liberalization, during 1974–79 and 1985–92, respectively. Thus, our first liberalization dummy will be one starting from 1993. The Wacziarg-Welch liberalization measure, instead, identifies 1976 as the year after which the economy has been open. This misses the reversal afterwards and the second liberalization during 1985–92.[6] Finally, in a few cases, the identified liberalization dates are quite different across the two measures. For example, Li (2004) identifies a liberalization era lasting from 1985 to 96 for Indonesia (average nominal tariff more than halved), whereas Wacziarg and Welch classify Indonesia as open from 1970. Nevertheless, the two measures are

[5]We made one exception for China. China's (simple average) tariff was reduced from 39.7 percent in 1992 to 16.7 percent in 1997, and then from 15.4 percent in 2001 to 10.7 percent in 2003, and further to 9.8 percent in 2004. This is a 36 percent tariff reduction from 2001 to 2004. The classification will make the liberalization dummy zero for China for our sample period, and the analysis would miss the dramatic opening up and trade promotion that had happened during the 1990s. We, therefore, assign the liberalization dummy as one for China after 1998. Nevertheless, the regression results would be broadly similar even if we did not make such an exception.

[6]Chile's uniform tariff was raised to 20 percent in 1983, then to 35 percent in 1984. During 1985–92, the uniform tariff rate was reduced to 15 percent, while the average tariff dropped from 36 to 12 percent. Nontariff barriers were also lowered (Li, 2004).

significantly and positively correlated, with a correlation coefficient of 0.57 (for countries in which they overlap).

Table 2 tabulates the average import-, export-, and trade-balance-to-GDP ratios using our first measure of trade liberalization for the periods before and after liberalization. Reported at the bottom of the table are cross-country averages. In general, countries not only import but also export more after they liberalized their trade regimes. The cross-country average import-to-GDP ratio increased from 23.8 to 30.6 percent, with 33 countries seeing their import-to-GDP ratio increased vs. four countries experiencing a decline. The average export-to-GDP ratio increased from 19.5 to 24.1 percent, with the ratio increased in 28 countries and reduced in nine countries. The average increase in exports, however, is smaller than that of imports, as the average trade deficit slightly increased from 4.3 to 6.5 percent. However, the picture is not uniform across countries—22 countries experienced a deterioration of the trade balance after liberalization and 15 countries actually had an improved trade balance.

Table 3 reports the summary statistics using the Wacziarg-Welch measure of trade liberalization dates.[7] The average import-to-GDP ratio increased from 25.1 percent before liberalization to 29.9 percent afterwards. In all, 47 of the 62 developing countries that experienced trade liberalization during the period had higher import-to-GDP ratios. The average export-to-GDP ratio increased from 18.5 to 20.4 percent, with 40 countries experiencing an increase in the average ratio and 22 countries a decrease. Finally, the average trade deficit increased from 6.5 to 9.5 percent, with 41 out of 62 countries experienced a worsening of their trade balance.

Tables 2 and 3 are nevertheless only simple summary statistics. To pin down the partial impact of trade liberalization on the trade balance, one needs regression analysis to control for other factors that also affect the trade balance, which we do in the next section.

III. Regression Analysis

Specification and Data

We follow Santos-Paulino and Thirlwall (2004) to use trade balance over GDP as the dependent variable and estimate the following dynamic panel equation:

$$\frac{TB}{GDP_{it}} = \alpha + \beta_1 \frac{TB}{GDP_{it-1}} + \beta_2 lib_{it} + \beta_3 \hat{y}_{it} + \beta_4 \hat{y}^*_{it} + \beta_5 \hat{reer}_{it} + \beta_6 \hat{TOT} + \beta_7 fisr + u_i + v_{it},$$

[7]We excluded former Soviet Union and former Yugoslavia countries due to substantially shorter time series.

Table 2. Import, Export, and Trade Balance-to GDP-Ratios Before and After Trade Liberalization
(Extended Li Trade Liberalization Measure, 1970–2004)

	Imports/GDP (%)		Exports/GDP (%)		Trade Balance/GDP (%)	
Country	Before liberalization	After liberalization	Before liberalization	After liberalization	Before liberalization	After liberalization
Argentina	6.2	9.1	8.1	11.5	2.0	2.4
Benin	27.6	28.8	10.3	18.6	−17.4	−10.2
Brazil	7.5	9.1	8.1	9.7	0.6	0.6
Cameroon	16.8	15.6	15.5	18.1	−1.3	2.5
Chile	18.6	24.4	18.8	24.4	0.3	0.0
China	11.5	20.1	11.4	22.4	−0.1	2.3
Colombia	12.2	15.2	11.7	13.2	−0.4	−2.0
Costa Rica	31.3	35.7	24.3	29.5	−7.0	−6.2
Ecuador	17.9	21.9	21.2	22.6	3.3	0.7
The Gambia	52.1	54.5	26.8	8.4	−25.4	−46.2
Ghana	22.7	42.2	22.0	26.5	−0.7	−15.7
Guatemala	17.3	24.6	15.4	14.0	−2.0	−10.6
Guinea-Bissau	37.9	29.7	9.5	28.6	−28.4	−1.1
Guyana	69.9	81.0	62.9	71.2	−7.0	−9.9
Honduras	29.7	44.7	25.8	24.8	−3.9	−19.8
India	6.9	11.4	5.4	9.2	−1.5	−2.2
Indonesia	15.6	24.0	22.0	34.3	6.4	10.3
Jamaica	40.5	42.2	24.1	14.5	−16.4	−27.7
Kenya	26.3	—	17.0	—	−9.3	—
Malaysia	47.0	83.0	52.4	97.7	5.4	14.7
Mali	22.2	29.6	10.4	20.5	−11.8	−9.0
Mauritania	31.6	32.6	36.3	26.7	4.7	−6.0
Mexico	8.9	24.1	9.0	22.0	0.0	−2.1
Morocco	24.8	32.2	15.3	20.8	−9.4	−11.3
Nepal	15.4	28.8	5.9	10.6	−9.5	−18.3
Nicaragua	34.8	41.6	21.2	14.9	−13.5	−26.7
Nigeria	23.4	23.8	29.4	40.3	5.9	16.6
Pakistan	17.5	17.3	11.6	14.2	−5.9	−3.1
Paraguay	13.3	31.1	9.3	15.1	−4.0	−15.9
Peru	11.7	13.6	13.8	12.1	2.1	−1.5
Philippines	27.0	49.0	19.8	46.0	−7.3	−2.9
Sri Lanka	31.1	38.9	22.4	29.7	−8.8	−9.1
Thailand	32.5	—	28.2	—	−4.3	—
Tunisia	35.2	43.3	22.0	30.7	−13.2	−12.6
Turkey	10.5	21.0	5.6	13.6	−4.9	−7.5
Uganda	13.4	22.5	12.7	8.5	−0.7	−14.0
Uruguay	14.4	17.5	13.8	13.8	−0.6	−3.6
Venezuela	17.8	15.6	24.8	27.3	7.0	11.7
Zambia	27.7	31.9	35.6	26.5	8.0	−5.4
Average	23.5	30.6	19.3	24.1	−4.2	−6.5
Before < After	33		28		15	
Before > After	4		9		22	

Source: Authors' calculations based on data from IMF, International Financial Statistics database.

Table 3. Import, Export, and Trade Balance-to GDP Ratios Before and After Trade Liberalization

(Wacziarg-Welch Trade Liberalization Measure, 1970–2001)

	Imports/GDP (%)		Exports/GDP (%)		Trade balance/GDP (%)	
Country	Before liberalization	After liberalization	Before liberalization	After liberalization	Before liberalization	After liberalization
Average	25.1	29.9	18.5	20.4	−6.5	−9.5
Before < After	47		40		21	
Before > After	15		22		41	

Source: Authors' calculations based on data from IMF, International Financial Statistics database.

where TB denotes the trade balance (the lagged dependent variable is included in the equation to control for adjustment dynamics); *lib* is the trade liberalization dummy; $\hat{y}_{it}$ and $\hat{y}^{*}_{it}$ are domestic and foreign real GDP growth respectively; $r\hat{e}er_{it}$ and $\hat{TOT}$ denote the change in (log) real exchange rate and terms of trade respectively. We also include fiscal-balance-to-GDP ratio (*fisr*) to control for the impact of government fiscal policy on the trade balance. Finally, u_i represents time in varying country-specific effects, and v_{it} is a well-behaved disturbance term.

Trade, GDP, and fiscal balance data are from the IMF's International Financial Statistics (IFS) database. Terms of trade data are from the IMF's World Economic Outlook database. Foreign (real) GDP growth is the weighted growth rates of a country's export market countries, where the weight is the market country's 1990 share of the home country's total exports. Bilateral trade data used to calculate the weights are from the IMF's Direction of Trade Statistics database. Finally, the real exchange rate is calculated as a geometric weighted average of bilateral real exchange rates between home country and its trading partners:

$$reer_i = \prod_j \left(\frac{E_{i,us} CPI_i}{E_{j,us} CPI_j} \right)^{W_{ij}},$$

where i indicates home country and j indicates trading partner countries. $E_{i,us}$ is the nominal exchange rate of country i in U.S. dollar per local currency unit, and W_{ij} is the share of country j in country i's total trade with its major trading partners. Countries whose trade share in home country is larger than 10 percent are included as major trading partners in calculating *reer* except China, because of incomplete consumer price index (CPI) data (both CPI and bilateral exchange rate data are from the IFS). An increase in *reer* indicates a real appreciation.

Before studying the impact of trade liberalization on the overall trade balance, we first analyze its impact on imports and exports separately. The standard trade equation would use the log of import and export volume as

the dependent variable to derive income and price elasticities. This, however, will dramatically reduce our sample size due to missing import/export price data for many countries. Because income and price elasticities are not our primary interests, we use the import- and-export-to-GDP ratio (in log)[8] as the dependent variable in the import and export analyses to maintain our sample size and for consistency between import-export regressions and the trade balance regressions (where trade balance over GDP is the dependent variable).

Impact of Trade Liberalization on Imports

The regression results using our first measure of liberalization dates are reported in Table 4. The sample covers 39 countries with 1,202 observations. Column (1) reports the fixed effects panel regression as a benchmark. The trade liberalization dummy is positive and significant at the 1 percent level, indicating that liberalization leads to higher import growth. In addition, higher domestic growth also leads to a higher import-to-GDP ratio, suggesting an income elasticity larger than 1. Both real exchange rate appreciation and improved terms of trade (through lower import prices) lead to lower imports (in value), suggesting a price elasticity lower than 1.[9] Finally, the positive sign on the fiscal balance is a bit puzzling, as we would expect that an improvement in the fiscal balance lowers the import demand.

However, under the dynamic panel setting fixed effects estimates, even if the country fixed effects assumption is correct, will be consistent only if the time series dimension of the panel goes to infinity. We, therefore, use the system-generalized method of moments (GMM) developed by Blundell and Bond (1998) to get consistent estimates.[10] As a robustness check, we report both one-step and two-step estimates. The two-step procedure involves the additional computation of an optimal weight matrix, but is theoretically more efficient. We first follow the standard procedure to use all available lags of the dependent variable and the exogenous regressors in levels dated $t-2$ to all earlier years as instruments in the estimation.[11] However, too many instruments can "overfit" endogenous variables and bias coefficient estimates, as well as weaken Hansen test of instrument validity (Ziliak, 1997; Bowsher, 2002), and it has been suggested that shorter lags of instruments be used (Arellano, 2003; Roodman, 2007). We, therefore, also report GMM estimates only using lags dated $t-2$ and $t-3$ as instruments (labeled as GMM (2, 3) in the tables). The GMM estimates are reported in columns (2)–(5) of Table 4.

[8]Using the ratios in level yields broadly similar results.

[9]Developing countries' imports could be more inelastic if the share of imports of intermediate inputs is high.

[10]The Stata program is from Roodman (2006).

[11]This is for the transformed (first difference) equation. The contemporaneous first difference is used as the instrument in the levels equation.

Table 4. Trade Liberalization and Imports
(Extended Li Trade Liberalization Measure, 1970–2004)

Dependent variable: Imports/ GDP (in log)	(1) Fixed effects	(2) GMM (one-step)	(3) GMM (2, 3) (one-step)	(4) GMM (two-step)	(5) GMM (2, 3) (two-step)
Lagged dependent variable	0.778***	0.897***	0.854***	0.883***	0.859***
	(0.018)	(0.023)	(0.037)	(0.072)	(0.046)
Trade liberalization	0.082***	0.037***	0.047***	0.041*	0.043**
	(0.013)	(0.010)	(0.011)	(0.024)	(0.017)
Domestic GDP growth	0.005***	0.005**	0.004	0.005*	0.004
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
Change in real effective exchange rate	−0.115***	−0.141***	−0.127***	−0.135**	−0.124**
	(0.026)	(0.050)	(0.049)	(0.054)	(0.054)
Changes in terms of trade	−0.001***	−0.001***	−0.002**	−0.002**	−0.002**
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Fiscal balance/GDP	0.003*	0.001	0.002	0.001	0.003
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Number of countries	39	39	39	39	39
Number of observations	1,202	1,202	1,202	1,202	1,202
Arellano-Bond test for AR(2) in first differences (*p*-value)		0.36	0.37	0.36	0.37
Hansen test of joint validity of instruments (*p*-value)		1.00	1.00	1.00	1.00

Note: *, **, and ***represent significant at 10, 5, and 1 percent levels, respectively. Robust standard errors are in parenthesis, with robust standard errors for the two-step estimates calculated using the Windmeijer (2005) correction.

The results are broadly similar to the fixed effects regression[12] except that the fiscal balance now becomes insignificant and domestic GDP growth becomes insignificant when shorter lags are used as instruments. In all specifications, trade liberalization is shown to lead to higher imports. The Arellano-Bond test confirms the absence of second order correlation of the disturbance term required for consistency, and the Hansen test also does not reject the null hypothesis of joint validity of instruments.[13]

[12]We note that the fixed effects estimate of the lagged dependent variable is smaller than the GMM estimates as one would expect (Bond, 2002).

[13]A very high *p*-value for the Hansen test, however, is often a sign of instrument proliferation weakening its ability to detect the problem.

Table 5 reports the import regressions using the Wacziarg-Welch measure of trade liberalization dates that covers a larger sample of 77 developing countries (62 of which ''opened up'' during the sample period) with 2,039 observations. The results are broadly similar to those reported in Table 4 except that the fiscal balance now becomes negative as expected, although insignificant. The trade liberalization dummy is positive and significant at the 1 percent level in all specifications. The estimated coefficients are larger than those reported in Table 4. For example, for one-step GMM (2, 3), the coefficient on the trade liberalization dummy is 0.074 vs. 0.047 in Table 4.

Impact of Trade Liberalization on Exports

The regression results for exports are reported in Tables 6, and 7, for the two measures of trade liberalization dates, respectively. The pattern of coefficients is broadly as expected and consistent across the two measures: higher foreign growth and terms of trade improvement lead to higher exports; and real exchange rate appreciation lowers exports.

The trade liberalization dummy is positive and significant either at the 5 or 10 percent level in all regressions except in the fixed effects regression when the Wacziarg-Welch trade liberalization dates are used. This suggests that developing countries not only import more after liberalizing their trade regime, but also export more. We observe, however, that the coefficients on the trade liberalization dummy from the export regressions tend to be smaller than those from the import regressions. For example, for one-step GMM (2, 3), the coefficients from the export regressions are 0.030 and 0.036 for the two measures of liberalization dates, respectively, whereas the corresponding coefficients from the import regressions are 0.047 and 0.074, respectively. This indicates that liberalization may lead to higher import growth than export growth, possibly leading to a deterioration in the overall trade balance.[14]

Impact of Trade Liberalization on the Trade Balance

In this section, we study the impact of trade liberalization on the overall trade balance. The regression results using the Li measure of liberalization dates are presented in Table 8. Among the control variables, domestic GDP growth is negative and significant. Foreign GDP growth is positive although only significant in the fixed effects and one-step GMM regressions. The change in real effective exchange rate is negative although insignificant. This is not too surprising given that it is negative in both the import and export regressions. The change in terms of trade is consistently positive and significant. Finally, the fiscal balance is positive as expected, although only significant in the one-step GMM regressions.

[14]Krueger (1978) suggests that there is evidence that import flows respond more rapidly than exports to trade liberalization, causing temporary trade imbalances.

Table 5. Trade Liberalization and Imports
(Wacziarg-Welch Trade Liberalization Measure, 1970–2001)

Dependent variable: Imports/ GDP (in log)	(1) Fixed effects	(2) GMM (one-step)	(3) GMM (2, 3) (one-step)	(4) GMM (two-step)	(5) GMM (2, 3) (two-step)
Lagged dependent variable	0.767***	0.811***	0.793***	0.812***	0.787***
	(0.014)	(0.029)	(0.037)	(0.038)	(0.039)
Trade liberalization	0.061***	0.069***	0.074***	0.070***	0.077***
	(0.012)	(0.016)	(0.019)	(0.021)	(0.020)
Domestic GDP growth	0.003***	0.003*	0.002	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Change in real effective exchange rate	−0.124***	−0.127**	−0.120**	−0.126**	−0.118**
	(0.022)	(0.050)	(0.049)	(0.052)	(0.051)
Changes in terms of trade	−0.001***	−0.001**	−0.001**	−0.001**	−0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fiscal balance/GDP	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Number of countries	77	77	77	77	77
Number of observations	2,039	2,039	2,039	2,039	2,039
Arellano-Bond test for AR(2) in first differences (*p*-value)		0.43	0.44	0.43	0.46
Hansen test of joint validity of instruments (*p*-value)		1.00	0.93	1.00	0.93

Note: *, **, and ***represent significant at 10, 5, and 1 percent levels, respectively. Robust standard errors are in parenthesis, with robust standard errors for the two-step estimates calculated using the Windmeijer (2005) correction.

The liberalization dummy is negative and significant in the fixed effects regression. However, it becomes insignificant in all the GMM regressions, although it remains negative. Since GMM yields consistent estimates, the evidence here gives little support to the claim that trade liberalization has a negative and significant impact on the overall trade balance.

Table 9 reports the results using the Wacziarg-Welch measure of trade liberalization dates. The results for the control variables are again broadly as expected. Higher domestic GDP growth leads to a deterioration of the trade balance, whereas higher foreign GDP growth improves a country's trade balance. Real exchange rate appreciation also tends to lead to a deterioration in the trade balance, although for the GMM regressions the coefficient is only significant when the shorter list of instruments are used.

Table 6. Trade Liberalization and Exports
(Extended Li Trade Liberalization Measure, 1970–2004)

Dependent variable: Exports/GDP (in log)	(1) Fixed effects	(2) GMM (one-step)	(3) GMM (2, 3) (one-step)	(4) GMM (two-step)	(5) GMM (2, 3) (two-step)
Lagged dependent variable	0.855***	0.924***	0.874***	0.919***	0.882***
	(0.015)	(0.021)	(0.043)	(0.025)	(0.050)
Trade liberalization	0.040***	0.025**	0.030**	0.026**	0.033*
	(0.013)	(0.012)	(0.015)	(0.013)	(0.018)
Foreign GDP growth	0.007*	0.011***	0.010***	0.013***	0.011***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Change in real effective exchange rate	−0.225***	−0.217***	−0.199**	−0.207**	−0.219**
	(0.028)	(0.085)	(0.095)	(0.086)	(0.093)
Changes in terms of trade	0.003***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Number of countries	39	39	39	39	39
Number of observations	1,203	1,203	1,203	1,203	1,203
Arellano-Bond test for AR(2) in first differences (*p*-value)		0.84	0.87	0.87	0.88
Hansen test of joint validity of instruments (*p*-value)		1.00	1.00	1.00	1.00

Note: *, **, and ***represent significant at 10, 5, and 1 percent levels, respectively. Robust standard errors are in parenthesis, with robust standard errors for the two-step estimates calculated using the Windmeijer (2005) correction.

There is a strong evidence across different specifications that positive terms of trade shocks improve the trade balance. For the fiscal balance, although the coefficient is always positive as expected, it is only significant in the fixed effects regression.

In contrast to the results in Table 8, the trade liberalization dummy is negative and significant in all specifications except in the standard two-step GMM estimation. For example, the one-step GMM (2, 3) estimate of the trade liberalization dummy is −1.30, suggesting an immediate worsening of the trade balance-to-GDP ratio of 1.3 percent after liberalization, which we note is substantially smaller than the estimates (−2.52 and −3.57) reported in Santos-Paulino and Thirlwall (2004).

Finally, we rerun the trade balance regressions using the Wacziarg-Welch liberalization dates, but limit the sample to the 39 countries in the Li data set. The results (not reported) are broadly similar to those reported in Table 9. In particular, the trade liberalization dummy is negative and significant in

Table 7. Trade Liberalization and Exports
(Wacziarg-Welch Trade Liberalization Measure, 1970–2001)

Dependent variable: Exports/GDP (in log)	(1) Fixed effects	(2) GMM (one-step)	(3) GMM (2, 3) (one-step)	(4) GMM (two-step)	(5) GMM (2, 3) (two-step)
Lagged dependent variable	0.821***	0.895***	0.860***	0.897***	0.856***
	(0.013)	(0.016)	(0.032)	(0.027)	(0.038)
Trade liberalization	0.019	0.028**	0.036**	0.031**	0.042**
	(0.012)	(0.013)	(0.016)	(0.014)	(0.018)
Foreign GDP growth	0.005	0.008***	0.007**	0.008***	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Change in real effective exchange rate	−0.226***	−0.224***	−0.214***	−0.226***	−0.214***
	(0.023)	(0.070)	(0.072)	(0.073)	(0.074)
Changes in terms of trade	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Number of countries	77	77	77	77	77
Number of observations	2,055	2,055	2,055	2,055	2,055
Arellano-Bond test for AR(2) in first differences (*p*-value)		0.82	0.84	0.83	0.86
Hansen test of joint validity of instruments (*p*-value)		1.00	0.91	1.00	0.91

Note: *, **, and ***represent significant at 10, 5, and 1 percent levels, respectively. Robust standard errors are in parenthesis, with robust standard errors for the two-step estimates calculated using the Windmeijer (2005) correction.

all specifications except in the standard two-step GMM. This suggests that the difference between Tables 8 and 9 is more likely from the difference in the measure of liberalization dates than from the difference in country coverage.

In summary, unlike in the import and export analyses, where we get consistent results across the two measures of liberalization dates, in the analysis of liberalization's impact on the overall trade balance, we get different results depending on the measure used. There is little evidence that liberalization worsens the overall trade balance using the Li measure, but some evidence of a negative impact when the Wacziarg-Welch measure is used.

IV. Concluding Remarks

It is a common concern among developing countries that trade liberalization could lead to a deterioration of their trade balance. Despite the importance of

Table 8. Trade Liberalization and the Trade Balance
(Extended Li Trade Liberalization Measure, 1970–2004)

Dependent variable: Trade balance/GDP	(1) Fixed effects	(2) GMM (one-step)	(3) GMM (2, 3) (one-step)	(4) GMM (two-step)	(5) GMM (2, 3) (two-step)
Lagged dependent variable	0.694***	0.883***	0.787***	0.919***	0.742***
	(0.020)	(0.035)	(0.053)	(0.099)	(0.071)
Trade liberalization	−0.951***	−0.395	−0.588	−4.591	−0.259
	(0.307)	(0.292)	(0.375)	(4.403)	(1.530)
Domestic GDP growth	−0.185***	−0.162**	−0.143*	−0.177***	−0.188**
	(0.032)	(0.071)	(0.085)	(0.066)	(0.083)
Foreign GDP growth	0.156*	0.187***	0.167**	0.048	0.118
	(0.090)	(0.065)	(0.079)	(0.218)	(0.139)
Change in real effective exchange rate	−0.810	−0.957	−0.839	−0.356	−1.106
	(0.682)	(1.643)	(1.594)	(1.673)	(1.325)
Changes in terms of trade	0.086***	0.089***	0.083***	0.080***	0.079***
	(0.009)	(0.026)	(0.026)	(0.023)	(0.024)
Fiscal balance/GDP	0.036	0.090*	0.116*	0.10	0.143*
	(0.039)	(0.053)	(0.071)	(0.069)	(0.082)
Number of countries	39	39	39	39	39
Number of observations	1,202	1,202	1,202	1,202	1,202
Arellano-Bond test for AR(2) in first differences (*p*-value)		0.90	0.88	0.81	0.88
Hansen test of joint validity of instruments (*p*-value)		1.00	1.00	1.00	1.00

Note: *, **, and ***represent significant at 10, 5, and 1 percent levels, respectively. Robust standard errors are in parenthesis, with robust standard errors for the two-step estimates calculated using the Windmeijer (2005) correction.

the question, cross-country empirical studies on the subject have been scarce. In a recent paper, Santos-Paulino and Thirlwall (2004), using a data set of 22 developing countries for the period of 1976–98, find strong evidence of such a negative impact. This paper studied the impact of trade liberalization on imports, exports, and the trade balance for developing countries using two recently compiled measures of trade liberalization dates that cover a much larger sample of developing countries and for longer time periods.

In a simple theoretical model, we show that trade liberalization increases both exports and imports, although it has ambiguous effects on the trade balance. Consistent with the theoretical results, we find robust and consistent

Table 9. Trade Liberalization and the Trade Balance
(Wacziarg-Welch Trade Liberalization Measure, 1970–2001)

Dependent variable: Trade balance/GDP	(1) Fixed effects	(2) GMM (one-step)	(3) GMM (2, 3) (one-step)	(4) GMM (two-step)	(5) GMM (2, 3) (two-step)
Lagged dependent variable	0.637***	0.842***	0.752***	0.839***	0.754***
	(0.017)	(0.029)	(0.042)	(0.035)	(0.042)
Trade liberalization	−1.260***	−0.844**	−1.300***	−0.843	−1.249***
	(0.294)	(0.334)	(0.484)	(1.059)	(0.466)
Domestic GDP growth	−0.106***	−0.079**	−0.077*	−0.083**	−0.085**
	(0.022)	(0.037)	(0.040)	(0.038)	(0.037)
Foreign GDP growth	0.217***	0.214***	0.237***	0.211***	0.227***
	(0.070)	(0.070)	(0.073)	(0.081)	(0.076)
Change in real effective exchange rate	−1.887***	−1.910	−2.033*	−1.953	−2.235**
	(0.553)	(1.188)	(1.175)	(1.324)	(1.136)
Changes in terms of trade	0.076***	0.082***	0.079***	0.082***	0.078***
	(0.007)	(0.016)	(0.015)	(0.017)	(0.015)
Fiscal balance/GDP	0.071***	0.04	0.05	0.04	0.05
	(0.022)	(0.040)	(0.049)	(0.041)	(0.048)
Number of countries	77	77	77	77	77
Number of observations	2,039	2,039	2,039	2,039	2,039
Arellano-Bond test for AR(2) in first differences (*p*-value)		0.75	0.76	0.75	0.78
Hansen test of joint validity of instruments (*p*-value)		1.00	0.98	1.00	0.98

Note: *, **, and ***represent significant at 10, 5, and 1 percent levels, respectively. Robust standard errors are in parenthesis, with robust standard errors for the two-step estimates calculated using the Windmeijer (2005) correction.

evidence using both measures that trade liberalization in developing countries promotes both imports and exports. The results, however, are mixed for the impact on the overall balance depending on the liberalization measure used. Using an extended Li (2004) measure of liberalization dates, we find little evidence of a statistically significant negative impact of liberalization on the overall trade balance. There is, however, some evidence that liberalization worsens the trade balance when the Wacziarg-Welch liberalization dates are used, although the evidence is not robust across different estimation specifications. And even in this case, the estimated impact is smaller than that reported by Santos-Paulino and Thirlwall (2004).

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