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# A History of Empirical Literature on the Relationship Between Trade and Growth

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Because international trade theory has not provided an unambiguous prediction on the impact of trade on growth, a vast literature tried to identify the relationship empirically. After summarizing the influential large country case studies of the 1970s and early 1980s - which showed the folly of the import substitution strategy and emphasized outward-oriented policies as a key component of viable long-term growth strategies - this paper focuses on the recent literature. Early cross-country regressions largely concluded that export growth had a positive impact on economic performance. However, these regressions faced some econometric problems and lacked robustness, and the paper goes on to describe how the literature evolved to overcome these shortcomings. Generally, the positive link between openness and growth was confirmed but recent regressions remain subject to methodological problems. The paper then reviews studies that have tried to address the relationship between trade and growth by analyzing the impact of openness on productivity. These studies conclude that trade openness have a positive impact on growth. Finally, the paper reviews the literature on the link between trade liberalization and other reforms, concluding that supportive macroeconomic and structural policies enhance the benefits of trade liberalization.<sup>2</sup>

## 1. IMPORT-SUBSTITUTION VS. OUTWARD ORIENTATION STRATEGY

Modern literature on the relationship between trade and growth is indebted to a few large, in-depth, multi-country case studies dating back from the 1970s and 1980s undertaken by the OECD (Little and others 1970); the NBER (Krueger,

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<sup>2</sup> In focusing on the relationship between trade and growth, this paper does not survey the many interesting extensions of this literature, such as the impact of regional trade agreements on growth, the links between trade, growth, and poverty, or the relationship between change in trade specialization and growth. It also does not cover the rich literature on simulation studies, such as computable general equilibrium models.

1978; Bhagwati, 1978); Balassa (1982); and the World Bank (Michaely and others, 1991). These surveys showed that outward-oriented development strategies were, in the long run, conducive to significantly higher growth than import-substitution.<sup>3</sup>

Case studies provide detailed information on trade policies and the channels through which they affect economic performance. However, because of the heterogeneity across countries and country specific factors, as well as the many channels through which trade affects growth, conclusions from country experience cannot easily be generalized or compared and even large projects can only cover a handful of countries.

Cross-country regressions have subsequently been used to extend the country coverage and reach more general conclusions. Nearly all cross-country regressions (Table 1) found a strong positive relationship between growth and some measure of openness, supporting the findings of case studies on export-orientation (Edwards, 1993; Baldwin, 2003). However, early cross-country regressions suffered from econometric shortcomings. Their specifications were not based on theoretical models and they largely ignored the possible impact of other factors on growth.

Driven by the focus on the analysis of outward-orientation strategies, export growth was the key explanatory variable in many early cross-country regressions on growth. The idea was that exports generated positive externalities on the rest of the economy and thus affected growth. However, studies such as Levine and Renelt (1992) found that imports and total trade could equally well explain growth, suggesting that total trade rather than just exports are the appropriate explanatory variable. Moreover, export growth is an imperfect proxy for trade policy and is largely endogenous. This led to difficulties to identify causation: cross-country studies try to measure the impact of trade on growth but potentially overestimate it because they capture both the impact of trade on growth and the impact of growth on trade. Studies that tried to isolate the direction of causation found a less significant impact (Table 2<sup>4</sup>).<sup>5</sup>

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<sup>3</sup> For a description of these projects and their influence, see Baldwin (2003), Edwards (1993), Krueger (1997), and Srinivasan and Bhagwati (1999).

<sup>4</sup> Table 2 shows that the direction of causation has generally been initially tested using the Granger test. However, econometric research has shown that this test focuses on time precedence rather than causality. More recent works use other and more sophisticated methods. See Kónya (2004 a,b).

<sup>5</sup> For a review, see Harrison (1996) and Edwards (1993).

Table 1. Summary of Results of Pre-1995 Cross-Country Regressions

Measures of trade openness / Method	Countries	Period	Impact on growth	Source
Deviation from predicted trade	43	1973-78	Openness has a significant and positive impact	Balassa (1985)
Deviation from predicted trade		1982	Openness has a significant and positive impact	Edwards (1992)
Changes in trade shares	19	1960-85	Openness has a significant and positive impact	Helliwell and Chung (1991)
Trade shares	81 LDCs	1960-85	Openness has a weakly significant impact	Quah and Rauch (1990)
Deviation from predicted export share	108	1960-82	Positive	Syrquin and Chenery (1989)
Growth of export share to GDP	41	1950-73	Positive	Michaely (1977)
Export growth	11	1960-73	Positive	Balassa (1978)
Export growth	11	1960-73	Positive	Balassa (1982)
Export growth	4	1955-78	Positive	Nishimizu and Robinson (1984)
Export growth	41	1960-70	Ambiguous: positive for 1960-70; Positive but often insignificant for the more recent period.	Kohli and Singh (1989)
Export growth	17	1950-80	Positive	Nishimizu and Page (1990)
Export growth	4	1976-88	Positive	Tybout (1992)
Import penetration	17	1950-73 1973-85	Ambiguous Negative	Nishimizu and Page (1990)
6 measures of openness	41 to 100	1960-89	Positive but none is robust	Levine and Renelt (1992)
Relative price of tradables to international prices	60	1960-87	Raises GDP Growth	Bhalla and Lau (1992)
Relative domestic price of investment goods to international prices	98	1960-65	Raises GDP growth per capita	Barro (1991)
Relative price of traded goods	95	1960-85	Raises GDP growth per capita	Dollar (1991)
Effective rate of protection in manufacturing	47	1950-80	Lower protection raises GDP growth	Heitger (1986)
Effective rate of protection	47	1960-70	Trade distortions negatively affects growth	Heitger (1987)
Trade Liberalization index from Thomas et al. (1991)	35	1975-85	Export incentives positively affect GDP per capita growth, insignificant impact of import restrictiveness	Lopez (1990)
Trade Liberalization index from Thomas et al. (1991)		1978-88	Trade Reform positively affects GDP growth	Thomas and Nash (1992)

Source: Edwards (1993), Harrison (1996).

Table 2. Results of Some Studies Trying to Isolate the Direction of Causation

Method	Countries	Period	Impact	Source
Granger Test	37	1950-81	Exports cause growth for only 4 countries	Jung and Marshall (1985)
Granger Test	34		Trade to growth causality for only 16 countries	Hutchinson and Singh (1987)
Granger Test	Austria	1965	Exports do not cause growth Productivity causes exports	Kunst and Marin (1989)
Granger Test	17 to 51	1960-87	Two way causality for all measures of openness	Harrison (1996)
Granger, Sims tests	4 (Asian NICs)		Exports sometimes cause growth	Hsiao (1987)
Identification through Heteroskedasticity	About 100	1961-2000	Openness has a small positive effect on growth OLS overstates the effect of openness	Lee, Ricci, Rigobon (2004)
Instrumental variables	150	1985	Trade causes growth; OLS does not overstate the impact	Frankel and Romer (1999)
Instrumental variables	23 to 62	1913-90	Trade causes growth; OLS does not overstate the impact	Irwin and Tiers (2002)
Instrumental variables	About 100	1980s-90s	Trade causes growth; Estimates larger than with OLS	Dollar and Kraay (2004)
White Specification test	73	1960-77	Exports cause growth	Ram (1985)
Within country regression	About 100	1980s & 1990s	Trade causes growth	Dollar and Kraay (2001)

## 2. RECENT STUDIES OF THE RELATIONSHIP BETWEEN TRADE AND GROWTH

Together with new growth theory developments, these problems led in the mid-1990s to changes in the way cross-country regressions were designed :

- 1) the focus shifted away from export growth toward more sophisticated measures of openness, including policy variables;
- 2) regressions included variables such as technological change or human capital that were identified by the new growth theory as important growth determinants;
- 3) following Edwards (1993), testing the robustness of regressions to changes in the measure of trade openness and trade policy became standard practice.

These studies continued to find a strong positive link between trade and growth (Table 3).<sup>6</sup> Still, despite many improvements, the remaining causation and measurement problems have prompted some authors, most notably Rodriguez and Rodrik (1999), to question the reality of the link between trade policy and growth.

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<sup>6</sup> For detailed reviews, see Baldwin (2003) and Winters (2004).

Table 3. Summary of Results of Post-1995 Cross-Country Regressions

Measures of trade openness	Countries	Period	Impact on growth	Source
<i>I. Trade shares</i>				
Export share	>100	1970-97	Positive	Yanikkaya (2003)
Export penetration	>100	1970-97	Positive	Yanikkaya (2003)
Trade share in GDP	51	1960-87	Positive; not robust in all specifications	Harrison (1996)
Trade share in GDP	150	1985	Positive	Frankel and Romer (1999)
Trade share in GDP	23 to 62	1913-90	Positive	Irwin and Tervis (2002)
Trade share (within country regression)	About 100	1980s-90s	Positive	Dollar and Kraay (2001)
Changes in trade share in GDP	About 100	1980s-90s	Positive	Dollar and Kraay (2004)
Trade shares in GDP	>100	1970-97	Positive	Yanikkaya (2003)
Trade shares in GDP	about 100	1961-2000	Positive	Lee, Ricci, Rigobon (2004)
Trade share in GDP	China	1978-98	Ambiguous: positive for coastal provinces but negative for inland provinces.	Jin (2004)
Trade share in GDP	>100	2000	Negative for heavily regulated economies Positive once controlled for the effect of domestic regulation	Bolaky and Freund (2004)
Trade share in GDP	82	1960-200	Positive if certain complementary reforms are undertaken	Chang et al. (2005)
<i>II. Trade barriers and measures of price distortion</i>				
Black market premium	51		Negative	Harrison (1996)
Black market premium	about 100	1961-2000	Negative	Lee, Ricci, Rigobon (2004)
Export taxes as a percentage of exports	>100	1970-97	Ambiguous	Yanikkaya (2003)
Import duties as a percentage of imports	>100	1970-97	Positive correlation between tariff and growth	Yanikkaya (2003)
Import tariff	10	1875-1914	Positive correlation between tariff and growth	O'Rourke (2000)
Import tariff	35	1865-1990	Negative correlation between tariff and growth after WWII but positive before	Clemens and Williamson (2001)
Taxes on international trade	>100	1970-97	Ambiguous	Yanikkaya (2003)
Taxes on international trade	about 100	1961-2000	Negative	Lee, Ricci, Rigobon (2004)
Current account restrictions	>100	1970-97	Negative but not significant	Yanikkaya (2003)
Measures of price distortion	28		Ambiguous	Harrison (1996)
Price and exchange rate volatility	95	1976-85	Negative impact of trade distortions and ER volatility	Dollar (1992)
<i>III. Indexes aggregating several measures of openness</i>				
Sachs and Warner Index	111	1970-89	Positive (raises growth of GDP per capita)	Sachs and Warner (1995)
Sachs and Warner Index	111	1970-89	Positive	Wacziarg and Welch (2003)
Sachs and Warner Index	141	1990-98	Not significant	Wacziarg and Welch (2003)
Sachs and Warner Index	73	1975-93	Positive	Greenaway et al. (1998)
Measures of openness (openness and trade barriers)	17 to 51	1960-87	Half measures robust; Positive for robust measures	Harrison (1996)
<i>IV. Trade liberalization</i>				
Trade liberalization (from Michaely et al., 1991)	17	1960-84	Positive but not robust in all specifications	Harrison (1996)
Trade Liberalization (from Thomas et al., 1991)	28	1978-88	Ambiguous	Harrison (1996)
Trade liberalization (Panel; within country regression)	108 to 133	1950-98	Positive (Liberalization raises GDP growth and investment share).	Wacziarg and Welch (2003)
Trade Liberalization	22	Since mid-70s	Positive on export growth	Santos-Paulino & Thirlwal (2004)
Trade Liberalization (Dean et al. index and structural adjustment program)	73	1975-93	Positive	Greenaway et al. (1998)

No single reliable indicator of openness being available, Sachs and Warner (1995) combined multiple policy criteria (tariff and non-tariff measures, black market exchange rate premium, state export monopolies, and the monopolization of exports) into a single dummy variable, classifying countries either as open or closed. They found that the index was strongly and positively related to the growth rate of GDP per capita: variations in the openness index accounted for up to 2 percentage points of annual growth over 1970-89. The Sachs and Warner index has been widely applied in recent cross-country work, but Rodriguez and Rodrik (1999), among others, found that most of the index's explanatory power came from its measures of state export monopolies and the

black market foreign exchange premium.<sup>7</sup> Wacziarg and Welch (2003) supported this conclusion. They replicated Sachs and Warner's work with an updated database and found a similar impact, but also found that the positive relationship seemed to break down in the 1990s, perhaps because the nature of protection had changed: the importance of export monopolies and black market premium decreased while other protectionist measures not factored in by the index have become more common. Wacziarg and Welch also analyzed the within-country liberalization dynamics and, in contrast to cross-section results, found that sustained liberalization had a strong and robust impact on growth.

Recent studies also tried to integrate the explanatory variables highlighted by the new growth theory. For example, Greenaway and others (1998) included proxies of human capital. They used the Sachs and Warner openness index as an indicator of openness and two other "on-off" dummies aggregating various measures of trade protection in order to identify when a liberalization occurred. They found that, in the long run, liberalization increases per capita GDP by 2 percent and that open economies eventually are about 50 percent richer in terms of GDP per capita than closed economies. In the short run, the results suggest that liberalization negatively affects growth in the first year and then has a positive impact.

Recent studies also used sophisticated techniques to address various econometric problems, such as the causation issue. For example, Frankel and Romer (1999) tried to isolate the impact of trade on income by estimating the impact of the component of openness that is independent of income. Specifically, they constructed instrumental variables based on geographic attributes that are not influenced by incomes or factors affecting income such as government policies. The instrumental variables explain a significant proportion of the differences in income levels in 1985 as well as the growth performance across countries: a 1 percentage point increase in the ratio of trade to GDP raised per capita income by 1.5 to 2 percentage points. This suggests that trade has driven growth up. Irwin and Terviö (2002) found that Frankel and Romer's results hold for the 20th century as a whole.

Yet, Rodriguez and Rodrik (1999) argued that the instrumental variables constructed by Frankel and Romer may not be appropriate because geography could affect income through channels other than trade. For example, geography may influence health or institutions, which also affect growth. Rodriguez and Rodrik then argued that the relationship was not robust to the inclusion of these other geographical variables. Irwin and Terviö (2002) also found that the inclusion of the variable "distance to the equator" reduces the estimated impact of trade on growth. However, Frankel and Rose (2002) showed that Frankel

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<sup>7</sup> For a discussion on the merits and limitations of the Sachs and Warner index, see, among others, Berg and Krueger (2003); Greenaway and others (1998); Rodriguez and Rodrik (1999).

and Romer's conclusion was robust to the inclusion of geographical and institutional variables.

Against this background, Lee and others (2004) suggested more sophisticated econometric methods to better isolate causation and found a positive, albeit smaller than in many other studies, impact of openness on growth.

Empirical literature has also recently tried to solve another limitation of the growth regressions, namely their inability to predict turning points in economic performance (Pritchett, 2006). In a sample of 110 countries, Hausmann and others (2004) identified 83 episodes of growth accelerations over 1957-1992. They found that growth accelerations are correlated with increased investment and trade and with real exchange rate depreciation. However, this does not imply causation since most growth accelerations appear unrelated to political changes and economic reforms (measured by the Sachs and Warner index<sup>8</sup>). Nonetheless, although economic reforms do not appear to produce accelerations, they make it more likely that growth accelerations are sustained. Despite the use of new econometric techniques and of more sophisticated and comprehensive data, the literature on cross-country regressions still faces methodological problems and suffers from a lack of robustness.<sup>9</sup> Rodriguez and Rodrik's criticisms (1999) had a particular impact because they showed, using the actual data of influential studies, that the results were not robust with regard for different measures of policy stance. They concluded that there is "little evidence that open trade policies (in the sense of lower tariff and nontariff barriers to trade) are significantly associated with growth." They were skeptical of "a strong negative relationship in the data between trade barriers and economic growth, at least for levels of trade restrictions observed in practice." Still, Rodriguez and Rodrik made it clear that they doubt "trade protection is good for economic growth" and that there is "no credible evidence - at least for the post-1945 period - that suggests that trade restrictions are systematically associated with higher growth rates." This is particularly relevant and was stressed by Berg and Krueger (2003) and Bhagwati and Srinivasan (2002), but there is a debate as to whether it applied also prior to 1945. Clemens and Williamson (2001) and O'Rourke (2000) found a positive correlation between protection and growth in the recent past, but also a negative correlation prior to World War II. Irwin (2002) argued that these results must be carefully interpreted, as the pre-1945 results reflected several key "new world" outliers that grew for specific reasons that did not apply to the "old world." Moreover, Irwin argued that outliers grew not because of protectionist measures (high tariffs were imposed for fiscal reasons and had a different structure than protective tariffs) but because capital imports helped stimulate export-led growth in agricultural products.

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<sup>8</sup> This is consistent with the Rodriguez and Rodrik (1999) reading of the index as an indicator of changes in economic policies rather than an indicator of change in trade openness.

<sup>9</sup> Hallak and Levinsohn (2004) survey the voluminous literature on methodological problems.



Bhagwati and Srinivasan (1999) argue that cross-country regressions of growth on openness faced largely unsurmountable methodological problems, weak theoretical foundations, poor data quality, and inappropriate econometric techniques. Responding to Rodriguez and Rodrik,<sup>10</sup> they also argued that “there are enough de facto degrees of freedom at an analyst’s command to reverse the ‘findings’ that another analyst using similar regression methods has arrived at.” Instead, because they have a better grounding in both theory and empirics, Srinivasan and Bhagwati viewed in-depth studies of country experiences as the best approach for understanding the link between trade and growth. Nevertheless, and quite ironically given their influence in the 1970s and 1980s, there is a dearth of recent systematic country case studies.

Berg and Krueger (2003) pointed out that regression analysis can capture only a small piece of the picture. They argued, however, that forces that shape the relationship between openness and growth are so strong that they emerge fairly clearly. Growth is such a complex phenomenon that the relationship between trade and growth is unlikely to be captured by simple linear regressions relying on inevitably imperfect proxies of trade policy.

### 3. THE IMPACT OF TRADE OPENNESS ON PRODUCTIVITY

Theory has highlighted the fact that trade can affect growth through its positive impact on productivity. Early empirical research was based on the notion that there is a productivity differential in favor of the export sector and that the export sector generates positive externalities on the rest of the economy (Edwards, 1993). Feder (1983), using a framework based on a neoclassical production function, found strong support for the hypothesis of higher productivity in the export sector in semi-industrialized countries and that export externalities were relatively more important than productivity differentials in explaining the impact on growth. Harrison (1996) pointed out that early micro studies had generally shown a positive association between increased exports and productivity growth, but also an often negative relationship between imports and productivity. She argued that the asymmetry likely reflected factors related to estimation problems arising from simultaneity bias.

Many sectoral studies for individual countries highlight the impact of import competition on productivity growth. Others have highlighted the impact of reduced import barriers on inputs. Coe and others (1997) showed that openness to imports of capital goods (supposed to incorporate trading partners’ stock of knowledge) enhances total factor productivity growth. Yanikkaya

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<sup>10</sup> See also Bhagwati and Srinivasan (2002). Panagariya (2004) provided another reply to Rodriguez and Rodrik arguing that the evidence from cross-country regressions is not as weak as they claimed and that even if it were the case it would be hardly sufficient to reject the case for outward-oriented policies.

(2003) found support for the hypothesis - stemming from the new growth theory - that trade promotes growth through technology transfers: the more a country (especially for developing countries) trades with the United States (one of the most highly innovative countries), the more likely it is to grow faster. Finally Tybout and Westbrook (1995) in the case of Mexico, Aw and others (2000) in the case of Taiwan, and Pavcnik (2002) in the case of Chile provide suggestive evidence linking trade liberalization and productivity growth driven by reallocations. This brings support to the recent trade theory incorporating firm-level heterogeneity developed initially by Melitz (2003)

**Table 4. Summary of Results on the Relationship between Openness and Productivity**

Measures of openness / Method	Countries	Period	Impact on productivity	Source
Production function	31	1964-73	Marginal factor productivities in the export sector are higher than in the non-export sector	Feder (1983)
Import Substitution	4	1955-78	Import substitution negatively affects TFP	Nishimizu and Robinson (1984)
Import Substitution	4	1976-88	Import substitution positively affects TFP	Tybout (1992)
7 measures of openness	variable	1960-88	Often significant link between 7 openness measures and productivity growth	Harrison (1996)
9 measures of openness	93	1960-90	More open countries experienced faster TFP growth 6 of the 9 measures are statistically significant.	Edwards (1998)
R&D in capital goods imports	71		Positive impact on TFP growth	Coe, Helpman and Hoffmaister (1997)
Cross-sectoral study	Korea		Positive impact of trade liberalization on productivity	Lee (1996)
Cross-sectoral study	South Africa		Positive impact of trade liberalization on productivity	Jonsson and Subramanian (1999)
Cross-sectoral study	Brazil		Positive impact of trade liberalization on productivity	Ferreira and Rossi (2001)
Enterprise level data	Latin America		Little evidence	Tybout and Westbrook (1995)
Enterprise level data	P.R. of China		Ambiguous	Kraay (1997)
Enterprise level data	Africa		Positive impact from exports on productivity	Bigsten (1998)
Enterprise level data	Asia		Little evidence	Aw, Chung, and Roberts (1999)
Entry Rate		1980s	Entry rate into liberalizing sectors is 20 percent higher	Wacziarg (1997)
Trade with the US in total trade	>100	1970-97	Positive impact on growth	Yanikkaya (2003)

Sources: Berg and Krueger (2003); Edwards (1998); Harrison (1996); Winters (2004).

In sum, although research using firm-level data produced mixed results, cross-country regressions generally found a positive impact of liberalization and openness on productivity (Table 4). These regressions share the methodological problems described in the previous section. For example, Rodriguez and Rodrik (1999) criticized the measures of openness and questioned the robustness of the results of Edwards (1998). Moreover, the direction of causality is difficult to establish.<sup>11</sup>

<sup>11</sup> For a review of the literature on this issue, see Berg and Krueger (2003) and Winters (2004).

#### 4. THE ROLE OF COMPLEMENTARY POLICIES

Empirical evidence shows that there is a sizable heterogeneity in the extent to which growth responds to trade liberalization (Wacziarg and Welch, 2003; Chang Kaltani, and Loayza, 2005). This suggests that the impact of trade on growth needs to be assessed in relation to other reforms, policies, and institutions for at least three main reasons. First, most trade reforms have been undertaken as part of broader reforms and over several years, making it difficult to sort out the impact of trade liberalization from that of other reforms. Second, openness to trade appears to improve other policies that also influence growth. Finally, trade reforms appear to have a long-lasting impact on growth only if they are sustained and accompanied by other reforms.<sup>12</sup>

Experience shows that trade liberalization cannot be sustained in a context of macroeconomic instability. Michaely and others (1991) and Panagariya (2004) provided case studies indicating that in an unstable macroeconomic environment and with an overvalued exchange rate, trade liberalization is likely to be reversed. Similarly, Ebrill and others (1999) documented that trade liberalization has been in some cases reversed because of a lack of accompanying fiscal revenue reform. Wacziarg and Welch (2003) also reported that restrictive macroeconomic policies explain why some countries did not experience higher growth following trade liberalization. In particular, they stressed that currency overvaluation can undo trade liberalization.

The role of an appropriate exchange rate policy in successful trade liberalization has been highlighted in most studies on trade liberalization and growth. Early country case studies such as Bhagwati (1978) and Krueger (1978), as well as those by Michaely and others (1991), emphasized the importance of accompanying trade reform with devaluation. Krueger (1998) stressed that experience showed that excess demand for foreign exchange would re-emerge unless trade liberalization was accompanied by a meaningful change in the nominal exchange rate. Governments then had to either adjust the exchange rate or reverse the trade liberalization. In the meantime, domestic activity usually declined. Other studies stressed the need to avoid an overvalued exchange rate as an essential condition for maintaining openness (Panagariya, 2004). Edwards (1993) argued that the reversals of three episodes of trade liberalization in Chile between 1950 and 1970 were partly due to a highly overvalued real exchange rate. The successful trade liberalization of the 1970s–1980s, in contrast, was accompanied by a strongly depreciated real exchange rate.

In cross-country regressions, the role of macroeconomic problems and an appropriate exchange rate has mostly focused on the use of a black market premium as an explanatory variable. The black market premium has been widely used as an indicator of trade openness and has been found generally to

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<sup>12</sup> See Baldwin, 2003, Berg and Krueger, 2003, Bolaky and Freund, 2004, Chang, Kaltani, Loyaza, 2005, Panagariya, 2004 and Winters, 2004.

negatively affect growth. Rodriguez and Rodrik (1999) questioned the use of the black market premium as an indicator of trade orientation, suggesting that it instead reflects a chaotic macroeconomic environment and policy failures. Whether the black market premium is a good indicator of openness or an indicator of macroeconomic policy failure is of little relevance if the issue is considered in the context of the complementarities of trade liberalization and exchange rate policies.

Investment policies can be particularly important in strengthening the link between openness and growth, as this link may mainly occur through investment. Levine and Renelt (1992) reviewed the variables used to model growth and found only two robust relationships :

- a positive correlation between the ratio of international trade to GDP and the investment share,
- a positive correlation between the investment share and growth.

This suggests that the relationship between trade and growth may be primarily due to enhanced resource accumulation rather than to improved resource allocation. More recently, Wacziarg and Welch (2003) found that, over 1950–1998, investment rates increased by 1.5-2 percentage points after liberalization and that one fifth of the effect of trade liberalization on growth occurred through investment.

Investment policies may thus undermine or enhance the growth benefits of trade liberalization. However, the relation between foreign investment and domestic investment can be complex. Jin (2004) found that domestic investment in most Chinese provinces fell following trade liberalization due to international competition, although foreign investment did increase.

Openness also affects policies and institutions. Berg and Krueger (2003) argued that trade may expose weaknesses in some other areas or enhance the benefits of other reforms, which in turn lead to better export performance and increased productivity. They also stressed that trade liberalization may alter the political reform dynamic by influencing institutions and creating constituencies for further reforms. While Rodrik and others (2002) argued that institutions explain more real income per capita than openness, they also found that openness partly explains the quality of institutions and so has a positive indirect effect on incomes. Moreover, cross-country regressions showed that property rights play an important role in explaining cross-country differences in productivity growth (Edwards, 1998).

By providing incentives to fight corruption, trade liberalization may also affect growth. Ades and Di Tella (1999) showed a relationship between rents (due to active industrial policy or lack of foreign competition) and corruption, which in turn reduces investment and medium-term growth. Wei (2000) found support for the hypothesis that open countries have incentives to develop better institutions and fight corruption because the latter particularly affects international transactions and thus is more costly in open than in closed economies.

Capturing the role of all these complementary policies has been challenging for cross-country regressions. Development in econometrical techniques have only recently allowed to do so. Chang, Kaltani, and Loayza (2005) found that the positive impact of trade on growth is larger if it is accompanied by increased education, infrastructure, deeper financial, but also institutional and regulatory reforms. Bolaky and Freund (2004) found that the impact of trade liberalization is increased if it is accompanied by a regulatory reform. They showed that the increase in trade does not affect positively growth in heavily-regulated economies but once the effect of domestic regulation is controlled, the impact of trade on growth is stronger than has been found in other studies. This clearly suggests that regulatory reform increases the impact of trade on growth.

## CONCLUSION

Because international trade theory has not provided an unambiguous prediction on the impact of trade on growth, much of the focus has been on empirical analysis, the weight of which suggests that trade positively affects growth. Case studies point to a positive impact, but are difficult to generalize. More recent empirical studies have focused on cross-country and panel regressions and, although their methods can be criticized, they usually suggest that trade openness strongly enhances economic performance. In addition, industry and firm-level research also show that openness contributes to growth through a positive impact on exports and productivity.

The impact of trade openness is difficult to assess because trade affects growth through many channels and because trade reforms are normally undertaken together with other policies. The benefits of trade reform partly depend on complementary policies, which in turn respond positively to trade liberalization and themselves affect growth. Trade liberalization should be undertaken as part of a broader package that ensures macroeconomic stability and includes structural reforms (such as reducing impediments to business), as this will strengthen and make the benefits from trade liberalization more durable.

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