Board of Governors of the Federal Reserve System

International Finance Discussion Papers

Number 822

November 2004

Growth-Led Exports: Is Variety the Spice of Trade?

by

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Abstract

Fast-growing countries tend to experience rapid export growth with little secular change in their terms of trade. This contradicts the standard Armington trade model, which predicts that fast-growing countries can experience rapid export growth only to the extent that they accept declining terms of trade. This paper generalizes the monopolistic competition trade model of Helpman and Krugman (1985), providing a basis for growth-led exports without declining terms of trade. The key mechanism behind this result is that fast-growing countries are able to develop new varieties of products that can be exported without pushing down the prices of existing products. There is strong support for the new model in long-run export growth of many countries in the post-war era.

Keywords: export demand, international trade, product differentiation

JEL Classification: F1, F4

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Introduction

Few people would be surprised to learn that there is a strong positive correlation between the growth rate of a country's exports and the growth rate of its economy. Indeed, there is an extensive body of theoretical and empirical research on the phenomenon of "export-led growth," which focuses on the benefits for long-run economic growth of encouraging exports and openness to trade.[2] Curiously, however, the standard empirical model of trade flows implies that fast-growing countries with fast-growing exports should be experiencing secular declines in their terms of trade. But there is little evidence for such behavior in the terms of trade.

Figure 1 shows the positive correlation between long-run export growth and long-run economic growth in a sample of 53 countries over the period 1960-2000.[3] Figure 2 shows essentially no correlation between export growth and changes in the terms of trade for these countries.[4]

This paper develops a new empirical model of export demand based on the theoretical work of Helpman and Krugman (1985). The new model significantly and robustly outperforms the standard model. Unlike the standard assumption of one good per country, the alternative model allows for multiple varieties of goods to be produced in each country. In this model, economic growth allows a country to produce more varieties, and demand for a country's exports

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[2]This research dates back at least to McKinnon (1964). For subsequent work, see Pereira and Xu (2000) and the references cited therein.

[3]Country coverage is documented in Table 1. All data are from *World Development Indicators 2004.*

[4]An alternative model consistent with the lack of long-run correlation between export growth and the terms of trade is that of a small open economy whose exports are perfectly substitutable for foreign products. However, an extensive literature shows that for most countries, exports are far from perfect substitutes with foreign products. See, for example, Goldstein and Khan (1985) and Marquez (2002).

is directly tied to the number of varieties it produces. Thus, fast-growing countries can have fast-growing exports without a decline in the terms of trade.

This finding carries important implications for empirical international macroeconomics. In most models of international macroeconomic linkages, permanently higher output tends to lower a country's trade balance through higher imports that are not matched by higher exports, at least not without a permanent decline in the terms of trade. For example, in the Fall 2004 Per Jacobsson Lecture, former Treasury Secretary Lawrence Summers claimed that the increase in U.S. trend growth since the mid-1990s was at least partly responsible for the widening of the U.S. trade deficit.[5] This research questions that conclusion.

The "growth-led exports" view of this paper is complementary to the traditional view of export-led growth. Deregulating, opening up the economy, and otherwise encouraging exports may indeed spur growth through technological transfer and more competitive producers. The model developed here helps to explain why such growth is all the more beneficial for a country's welfare because it is not offset by declining terms of trade. The evidence presented in this paper provides some support for a connection between changes in openness to foreign trade and economic growth. But even for countries with a relatively stable share of exports in GDP, faster economic growth tends to be associated with faster export growth.

Theoretical Model

This section derives a two-country model of export demand and supply based on tastes,

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[5]http://www.perjacobsson.org/lectures.htm.

technology, and labor in a setting with endogenous varieties of goods.[6] Under plausible assumptions, the number of varieties grows in proportion to a country's total output.[7] A key contribution of this paper is to show that allowing for endogenous varieties leads to an export demand equation that can be approximated by augmenting the standard Armington demand equation with a term for the relative size of the exporting country in the world economy.[8] In this model, long-run growth in output shifts both the export supply and export demand curves out simultaneously, thereby minimizing any effect on the terms of trade.

Demand

The demand side of the model is taken from Helpman and Krugman (1985) who, in turn, based their work on the "love of variety" utility function proposed by Dixit and Stiglitz (1977).[9] The utility of the representative household is displayed in equation (1). The budget constraint is equation (2). Here D represents domestic consumption of domestically produced goods and X* represents imports (exports from the rest of the world). Asterisks denote foreign variables. The subscripts denote individual varieties. There are N domestic varieties and N* varieties of

[6]For simplicity there is no capital stock. But labor can be interpreted as representing all factors of production.

[7]Varieties refers both to different types of goods--such as televisions, cars, and toothpaste–and to different brands and models of the same type of goods.

[8]For a review of the theoretical and empirical literature on the Armington export demand equation, see Gagnon (2003). The well-known gravity model of trade is a reduced form based on an Armington demand equation applied to bilateral trade. See, for example, Anderson and van Wincoop (2003). Time-series implementations of the gravity model share the property of the Armington equation that increases in export supply drive down the terms of trade.

[9]Grossman and Helpman (1991) employ a similar demand system with a richer supply side.

imports. Prices of domestic goods are denoted by P^D. Import prices (in foreign currency) are denoted by P^{X*} and the exchange rate is R. Total expenditure is E. "A" is an exogenous variable that reflects taste for imports. Consumers are biased towards domestic goods if A is less than unity. The elasticity of substitution, σ, is assumed to be equal across all goods in order to obtain a closed-form solution for demand.

$$(1)\ U = \left[\sum_{i=1}^{N} D_i^{\frac{\sigma-1}{\sigma}} + \sum_{i=1}^{N*} A\, X*_i^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

$$(2)\ E = \sum_{i=1}^{N} P_i^D D_i + \sum_{i=1}^{N*} R\, P_i^{X*}\, X*_i$$

The representative household chooses consumption of each variety to maximize (1) subject to (2) and taking prices, available varieties, and total expenditure as given.[10] All domestic firms face the same production technology, which leads to equal prices of all domestic varieties, P^D, and thus equal quantities sold, D. Similarly, all foreign varieties sell at the common price P^{X*} with equal quantities X*. Aggregate demand for each type of good equals the number of varieties times the quantity demanded of each variety. The resulting aggregate demand system is given by equations (3)-(4). As discussed in Anderson and van Wincoop (2003), the share of spending on domestic goods equals 1/(1+A) and the share spent on foreign goods is A/(1+A).

[10]A well-known property of the Dixit-Stiglitz utility function is that the household purchases a positive amount of every variety available. Thus, it is best considered a representative household rather than an individual household.

$$(3)\ N\,D = \frac{N\left(P^{D}\right)^{-\sigma} E}{N\left(P^{D}\right)^{1-\sigma} + N*\left(\frac{R\,P^{X*}}{A}\right)^{1-\sigma}}$$

$$(4)\ N*X* = \frac{N*\left(\frac{R\,P^{X*}}{A}\right)^{-\sigma} \frac{E}{A}}{N\left(P^{D}\right)^{1-\sigma} + N*\left(\frac{R\,P^{X*}}{A}\right)^{1-\sigma}}$$

Solving the analogous system for the rest of the world, yields equations (5)-(6).[11]

$$(5)\ N*D* = \frac{N*\left(P^{D*}\right)^{-\sigma} E*}{N*\left(P^{D*}\right)^{1-\sigma} + N\left(\frac{P^{X}}{R\,A*}\right)^{1-\sigma}}$$

$$(6)\ N\,X = \frac{N\left(\frac{P^{X}}{R\,A*}\right)^{-\sigma} \frac{E*}{A*}}{N*\left(P^{D*}\right)^{1-\sigma} + N\left(\frac{P^{X}}{R\,A*}\right)^{1-\sigma}}$$

Expenditure equals revenue from domestic production plus an exogenous transfer, T, from the rest of the world: equation (7). Foreign expenditure equals foreign production minus the transfer converted into foreign currency: equation (8). The transfer allows for unbalanced

[11]Note that the elasticity of substitution is assumed equal across countries. This assumption aids in the derivation of a linear demand equation for estimation and it is also implicit in the cross-country empirical work of the next section.

trade. T is assumed to be driven by macroeconomic factors such as fiscal and monetary policy that affect national saving and investment.

(7) $E = N\left(P^D D + P^X X\right) + T$

(8) $E^* = N^*\left(P^{D*} D^* + P^{X*} X^*\right) - T/R$

Supply

Now turn to the firms' decisions and aggregate supply. There are a potentially unlimited number of varieties within each class of good, but a firm must pay a fixed cost for each new variety as well as a marginal cost for each unit of output. All costs and prices are expressed in terms of units of labor. Equations (9) and (10) are the total cost functions for each variety of domestic and foreign good, respectively.[12] Note that each variety is both consumed at home (D) and exported (X). F is the fixed cost and G is the marginal cost. Technological progress tends to lower costs, and can thus be modeled as an exogenous decline in F and G.

(9) $C = F + G(D + X)$

(10) $C^* = F^* + G^*(D^* + X^*)$

The profit-maximizing prices depend on the elasticity of substitution and the marginal cost, as shown in equations (11)-(14).[13] These are standard markup equations.

(11) $P^D = \left(\frac{\sigma}{\sigma - 1}\right) G$

(12) $P^X = P^D$

(13) $P^{D*} = \left(\frac{\sigma}{\sigma - 1}\right) G^*$

(14) $P^{X*} = P^{D*}$

[12]Krugman (1989) employs a similar cost function and obtains the same pricing equation.

[13]These equations imply that export prices equal domestic prices. Dropping the assumption of equal elasticity of substitution across countries would allow for differences between export and domestic prices.

Total production in each country exhausts the available pool of labor, shown in equations (15)-(16), thereby determining the number of varieties of goods produced. Aggregate labor supply, L, is exogenous in each region. Free entry ensures that firm profits are zero, driving revenue equal to cost for each variety: equations (17)-(18). By Walras' Law, one of the last two equations or one of the two expenditure equations can be dropped.

(15) $L = N[F + G(D + X)]$

(16) $L^* = N^*[F^* + G^*(D^* + X^*)]$

(17) $P^D D + P^X X = F + G(D + X)$

(18) $P^{D*} D^* + P^{X*} X^* = F^* + G^*(D^* + X^*)$

<u>Implications for Empirical Export Demand</u>

This sub-section derives an estimable version of equation (6) for aggregate exports. The first step is to substitute the (unobserved) number of varieties produced by a country with the country's (observed) total output. Total output is defined as the number of varieties produced times the quantity of each variety, shown in equation (19). Inserting equations (11) and (12) into (17) yields equation (20) for domestic output of each variety. Substituting (20) into (19) and rearranging terms shows that the number of varieties is a function of total output and the ratio of marginal to fixed cost, equation (21).

(19) $Y = N(D + X)$

(20) $D + X = \dfrac{(\sigma - 1)F}{G}$

(21) $N = \dfrac{YG}{(\sigma - 1)F}$

The second step is to define the foreign expenditure price as the weighted average of foreign and domestic prices, shown in equation (22). Inserting (21) into (6), dividing the numerator and denominator by P^{E*}, and making use of (22) yields equation (23), where Z=G/[(σ-1)F] for notational simplicity.

$$(22)\ P^{E*} = \left(\frac{P^{D*}\,D*}{E*}\right) P^{D*} + \left(\frac{P^X\,X}{R\,E*}\right)\frac{P^X}{R}$$

$$(23)\ N\,X = \left(\frac{P^X}{R\,P^{E*}}\right)^{-\sigma}\left(\frac{E*}{P^{E*}}\right)\left(\frac{Y}{Y+Y*}\right)\left(\frac{1}{A*}\right)^{1-\sigma}$$
$$\left(\frac{Y+Y*}{Y*}\right)\left(\frac{Z}{Z*}\right)\left(\frac{P^{E*}}{P^{D*}}\right)^{1-\sigma}\left(1+\frac{Z\,Y}{Z*Y*}\left[\frac{P^X}{R\,P^{D*}\;A*}\right]^{1-\sigma}\right)^{-1}$$

To obtain a linear equation in growth rates, take the logarithm of equation (23) and totally differentiate. An appendix (available upon request) shows that the change in log exports can be expressed in terms of the log changes in other variables as shown in equation (24). The simple form of equation (24) derives from the assumed initial conditions that technology is the same across the two countries (F=F* and G=G*) and there is no home bias (A*=1). Equation (24) can be viewed as a linear approximation to the demand function in a neighborhood around these initial conditions.

$$(24)\ \Delta\log(N\,X) = -\sigma\Delta\log\left(\frac{P^X}{R\,P^{E*}}\right) + \Delta\log\left(\frac{E*}{P^{E*}}\right) + \Delta\log\left(\frac{Y}{Y+Y*}\right)$$
$$+(\sigma-1)\left(\frac{Y*}{Y+Y*}\right)\Delta\log A* + \left(\frac{Y*}{Y+Y*}\right)(\Delta\log Z - \Delta\log Z*)$$

The first term on the right hand side of equation (24) is the change in the price of exports relative to the price of total foreign expenditures converted into domestic currency; the coefficient on this term is the negative of the elasticity of substitution. The second term is the change in real expenditure in the rest of the world, with a coefficient of unity. The first two terms together comprise the standard Armington demand equation. The third term is the change in the ratio of domestic output to world output, also with a coefficient of unity. This term represents the main contribution of this paper, and its coefficient is the parameter of interest. The fourth and fifth terms are functions of changes in unobservable tastes (A^*) and technology (Z, Z^*).

For identification, it is necessary that the unobservable disturbances (the last two terms) are not correlated with the regressors (the first three terms). Within the system developed here, taste shocks ($\Delta\log A^*$) are not correlated with prices, output, or expenditures.[14] The underlying technology variables (F, G, F^*, G^*) are correlated with prices, output, and expenditure. However, they enter the demand equation directly only through a function of their ratio ($Z=G/[(\sigma-1)F]$). Thus, identification requires only the plausible assumption that technological progress lowers both fixed and marginal costs proportionally. Under this assumption, $\Delta\log Z=\Delta\log Z^*=0$, and the fifth term of equation (24) drops out.

Empirical Results

This section presents estimates of the coefficients of equation (24) using data on long-run growth rates of exports. A critical test of the growth-led exports model is that the coefficient on the change in the ratio of exporter GDP to world GDP should be significantly greater than zero and not significantly different from unity.

The equation is estimated across countries using one long-run growth rate for each

[14]The empirical section below checks for robustness to the possibility that taste shocks may affect relative export prices.

country. Using long-run growth rates eliminates the need to model short-run adjustment dynamics. In addition, the relationship between output and the number of varieties is likely to be strongest over long time-horizons, as the number of varieties may not move in proportion with output over the business cycle.

Gagnon (2003) estimates a related equation using bilateral U.S. imports of manufactures. Gagnon (2003) also reviews other empirical tests of the effect of product varieties on trade, most of which focus on direct measures of product variety.

Data

The data are obtained from the World Bank's *World Development Indicators 2004* database. The data are expressed as average annual growth rates (log changes) over the full sample of 1960-2000, as well as over two sub-samples: 1960-80, and 1980-2000. The data are available in nominal and real dollars, so exchange rate conversion is not necessary. Foreign data for each exporter are calculated as world minus exporter data. Data definitions are as follows:[15]

NX: Real exports of goods and services	P^X: Export deflator
E: Nominal gross national expenditures	P^E: Expenditures deflator
Y: Real gross output (GDP)	P^Y: GDP deflator

[15]All countries with available data were used in the regressions except for Bulgaria, which had strongly negative export growth in the second sub-sample that is related to its transition from a socialist to a market economy. No transition economy has data over the 40-year sample. Bulgaria, China, and Hungary have data over the 1980-2000 sub-sample period. Table 1 contains a complete listing of countries in the various samples.

Results

Table 2 presents estimates of equation (24) with heteroskedasticity-robust standard errors (Huber/White).[16] The first three columns of Table 2 display ordinary least squares (OLS) regressions. Column (1) is based on growth rates over the period from 1960 through 2000. Columns (2) and (3) are based on growth rates over the first half and second half, respectively, of these 40 years. In all three samples, the ratio of exporter GDP to world GDP is highly significant in explaining export growth, lending support to the importance of product varieties and growth-led exports. Column (4) shows that these results are not sensitive to outliers in the data, as estimates from minimum absolute deviation regressions are very close to the OLS results. Similar results (not shown) obtain for the sub-sample periods.

The coefficient on the relative export price is the negative of the substitution elasticity (σ). This coefficient has the correct sign but is rather close to zero in these regressions, suggesting the possibility of simultaneity bias. Columns (5) and (6) explore the sensitivity of the parameter of interest to the coefficient on relative prices. Column (5) presents results of an instrumental-variables regression in which the ratio of the domestic to the foreign GDP deflator is used as an instrument for the relative export price. This instrument does not have the desired effect of increasing the estimated elasticity of substitution. In fact, the estimated substitution

[16]Note that there is no intercept term in the regressions, consistent with the specification of equation (24) in growth rates. Moreover, the data do not permit the addition of an intercept term, as growth of foreign expenditure is nearly identical for all exporters, creating severe collinearity between this term and an intercept. Dropping the intercept introduces a bias in the coefficient on foreign expenditures coming from taste shocks that are common to all exporters. From the point of view of an exporting country, foreign taste shocks include changes in trade barriers and transportation costs. To the extent that trade barriers and transportation costs have fallen for all exporters, the coefficient on foreign expenditure is biased upward. The remaining coefficients are not affected by this bias.

elasticity has the wrong sign.[17] Column (6) presents OLS results under the restriction that the coefficient on relative export prices is -2, representing a much larger substitution elasticity than is typically found in aggregate-level implementations of the Armington model.[18] Together, the results in columns (5) and (6) show that the coefficient on the ratio of exporter GDP--the parameter of interest--is not sensitive to estimated values of the substitution elasticity.

Column (7) displays estimates over a sub-sample of countries for which manufactured goods and services comprised more than 50 percent of exports in 2000.[19] This sample selection was made because the Helpman-Krugman model was designed for differentiated manufactures and services, and thus it may not be appropriate for trade in undifferentiated primary commodities. Small countries that specialize in the export of a particular primary commodity may experience growth in both GDP and exports with little change in relative prices if their production of the commodity is small relative to world consumption. This phenomenon would lead to a positive coefficient on the exporter GDP ratio for reasons other than those embodied in the Helpman-Krugman model. The final column of Table 1 displays the countries that do not specialize in primary commodity exports. For the most part, these are the traditional industrialized countries, especially when one excludes countries for which data are not available in 1960. Thus, another benefit of this reduced sample is to focus on countries with relatively high-quality data that account for most of world trade in manufactures and services. As seen in

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[17]An alternative instrument, the trade balance, was associated with extremely poor first-stage fit and yielded similar results for the coefficient on the ratio of exporter GDP.

[18]Senhadji and Montenegro (1999) report a median price elasticity of export demand of -0.78 across 53 countries. See, also, Marquez (2002).

[19]The manufactures and services data are available in *World Development Indicators 2004*. Similar results were obtained using a criterion of 75 percent of exports, as this higher cutoff reduced the sample by only 4 more countries.

column (7) of Table 2, the coefficient on the ratio of exporter to world GDP remains highly significant in this smaller sample.[20]

Columns (8) and (9) explore the interaction between export-led growth and growth-led exports. The sample of column (1) is split into two equal-sized groups: those for which the share of exports in GDP moved closely in line with the sample median between 1960 and 2000--column (8)--and those for which the share of exports in GDP rose either more or less quickly than the median--column (9).[21] If export-led growth were entirely responsible for the results of this paper, one would expect that the coefficient on the ratio of exporter GDP to world GDP would be strongly affected by this sample split, as nearly all the identifying information would be in the sample of column (9)--these are the countries for which exports grew especially strongly or weakly. Indeed, the coefficient on the ratio of exporter GDP is larger in column (9) than in column (8), but the difference is not significant and the coefficient in column (8) remains highly statistically significant.[22] Thus, it appears that economic growth spurs exports even in countries that are not aggressively pursuing a strategy of export-led growth.[23]

In all columns of Table 2, the estimated effect of growth in the ratio of exporter to world output is highly statistically significant and generally not significantly different from its

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[20]Similar results obtain over the two subsamples.

[21]As described in Table 2, the cutoff points for this sample split are the 25th and 75th percentiles of growth in export shares.

[22]This result also casts doubt on the hypothesis that shocks to foreign tastes for exports (A*) are driving long-run output growth rates, which also could give rise to a positive coefficient.

[23]An alternative sample split based on countries with export shares growing either faster or slower than the median yielded a higher coefficient on the sub-sample with fast-growing exports, but the coefficient on the slow-export-growth sub-sample remained positive and highly significant.

predicted value of unity. These results provide strong support for the role of product varieties in trade and for growth-led exports.

Conclusion

This paper shows how the Helpman-Krugman (1985) trade model can be implemented empirically by augmenting the standard Armington export demand equation with a term for the ratio of the exporting country's output relative to world output. The augmented equation is estimated using cross-country data on average export growth rates between 1960 and 2000 for up to 89 countries. The effect of the exporter output ratio is highly significant and robust to alternative samples and specifications.

These results imply that fast-growing countries need not experience growing trade deficits or secular declines in their terms of trade, as is implied by the Armington model. This finding has important implications for international macroeconomic analysis, including analysis of the effects of productivity shocks, as most empirical macroeconomic models utilize Armington trade equations.

Table 1. Data Coverage by Exporting Country

Country	Symbol	1960	1980	2000	Manuf. Exports[1]
Algeria	DZA	x	x	x	
Antigua and Barbuda	ATG		x	x	
Argentina	ARG		x	x	
Australia	AUS		x	x	
Austria	AUT	x	x	x	x
Belgium	BEL	x	x	x	x
Belize	BLZ		x	x	
Benin	BEN	x	x	x	
Bolivia	BOL		x	x	
Botswana	BWA		x	x	x
Burkina Faso	BFA		x	x	
Burundi	BDI		x	x	
Cameroon	CMR		x	x	
Canada	CAN		x	x	x
Chad	TCD		x	x	
Chile	CHL	x	x	x	
China	CHN		x	x	x
Colombia	COL	x	x	x	
Comoros	COM		x	x	
Congo (Brazzaville)	COG		x	x	
Congo (Zaire)	ZAR	x	x	x	
Cote d'Ivoire	CIV	x	x	x	
Denmark	DNK	x	x	x	x
Dominica	DMA		x	x	x
Dominican Republic	DOM	x	x	x	x
Egypt	EGY	x	x	x	x
El Salvador	SLV	x	x	x	x
Finland	FIN	x	x	x	x
France	FRA	x	x	x	x
Gabon	GAB		x	x	
Gambia	GMB		x	x	
Germany	DEU		x	x	x
Ghana	GHA	x	x	x	
Greece	GRC	x	x	x	
Guinea-Bissau	GNB		x	x	
Guyana	GUY	x	x	x	
Haiti	HTI	x	x	x	
Honduras	HND		x	x	
Hong Kong	HKG		x	x	x
Hungary	HUN		x	x	x
Iceland	ISL	x	x	x	
Indonesia	IDN		x	x	x
Ireland	IRL	x	x	x	x
Iran	IRN		x	x	
Italy	ITA	x	x	x	x
Japan	JPN	x	x	x	x
Jordan	JOR		x	x	x
Kenya	KEN	x	x	x	
Korea	KOR	x	x	x	x
Lesotho	LSO		x	x	
Luxembourg	LUX	x	x	x	x

Table 1. (cont'd.) Data Coverage by Exporting Country

Country	Symbol	1960	1980	2000	Manuf. Exports[1]
Madagascar	MDG	x	x	x	
Malawi	MWI	x	x	x	
Malaysia	MYS	x	x	x	x
Mali	MLI		x	x	
Mauritania	MRT	x	x	x	
Mauritius	MUS		x	x	x
Mexico	MEX	x	x	x	x
Morocco	MAR		x	x	x
Mozambique	MOZ		x	x	
Namibia	NAM		x	x	x
Netherlands	NLD	x	x	x	x
New Zealand	NZL		x	x	
Nicaragua	NIC	x	x	x	
Niger	NER	x	x		
Nigeria	NGA	x	x		
Norway	NOR	x	x	x	
Paraguay	PRY	x	x	x	x
Philippines	PHL	x	x	x	x
Portugal	PRT	x	x	x	x
Rwanda	RWA	x	x	x	
St. Kitts and Nevis	KNA		x	x	x
St. Lucia	LCA		x	x	x
St. Vincent & Grenadines	VCT		x	x	x
Senegal	SEN	x	x	x	
Sierra Leone	SLE		x	x	
South Africa	ZAF	x	x	x	x
Spain	ESP	x	x	x	x
Swaziland	SWZ		x	x	x
Sweden	SWE	x	x	x	x
Switzerland	CHE	x	x	x	x
Syria	SYR		x	x	
Togo	TGO	x	x	x	
Trinidad and Tobago	TTO	x	x	x	
Tunisia	TUN		x	x	x
United Kingdom	GBR	x	x	x	x
United States	USA	x	x	x	x
Uruguay	URY	x	x	x	x
Venezuela	VEN		x	x	
Zambia	ZMB	x	x	x	
Zimbabwe	ZWE		x	x	

Source: *World Development Indicators 2004*.
[1]Countries for which manufactured goods and services comprised more than 50 percent of exports in 2000.

Table 2. Growth of Real Exports of Goods and Services, Equation (24), 1960-2000
(robust standard errors)

		1960-1980	1980-2000	MAD [1]	IV PY/RPY[2]	$\sigma = 2$[3]	Manuf. & Services[4]	(X/Y) Stable[5]	(X/Y) Changing[6]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rel. Price Exports	-0.34 (.21)	-0.55* (.29)	-0.56*** (.19)	-0.16 (.34)	1.27* (.64)	-2.00 (N.A.)	-1.27** (.61)	-0.60 (.39)	-0.35 (.24)
Foreign Expenditure	1.43*** (.08)	1.45*** (.11)	1.17*** (.20)	1.47*** (.18)	1.87*** (.18)	0.98*** (.11)	1.51*** (.13)	1.42*** (.13)	1.36*** (.11)
Ratio of Exporter GDP	1.50*** (.26)	1.22*** (.28)	1.31*** (.21)	1.34*** (.36)	1.34*** (.43)	1.68*** (.32)	1.10*** (.25)	1.25*** (.38)	1.60*** (.33)
R^2	.58	.42	.53	.57	.64	.41	.61	.37	.67
No. Obs.	53	55	89	53	53	53	28	27	26

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.
[1]Minimum absolute deviation regression. Foreign expenditure term replaced by a constant equal to average growth of foreign expenditure over the sample.
[2]Instrumental variables regression. Instrument is ratio of exporter to foreign GDP deflator. First-stage $R^2 = .25$.
[3]Coefficient on relative prices constrained to equal -2.
[4]Sample includes countries for which manufactured goods and services comprised more than 50 percent of exports in 2000.
[5]Sample includes countries for which the change in the share of exports in GDP lies between the 25th and 75th percentile of all available countries.
[6]Sample includes countries for which the change in the share of exports in GDP is either less than the 25th percentile or greater than the 75th percentile.

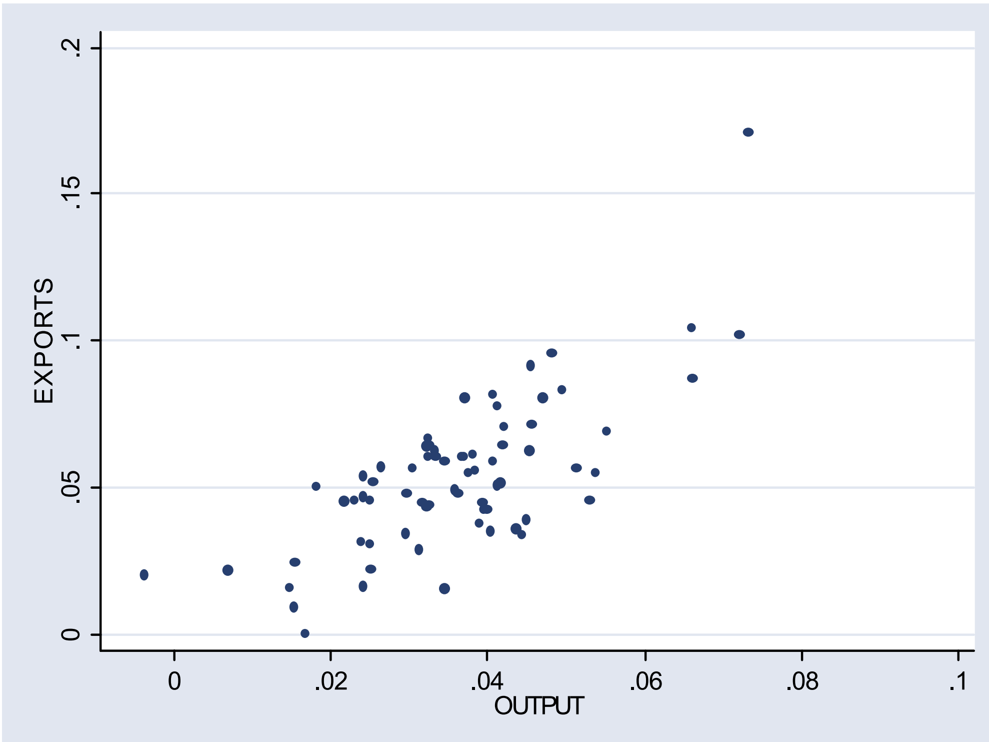

Figure 1. Export Growth and Output Growth, 1960-2000

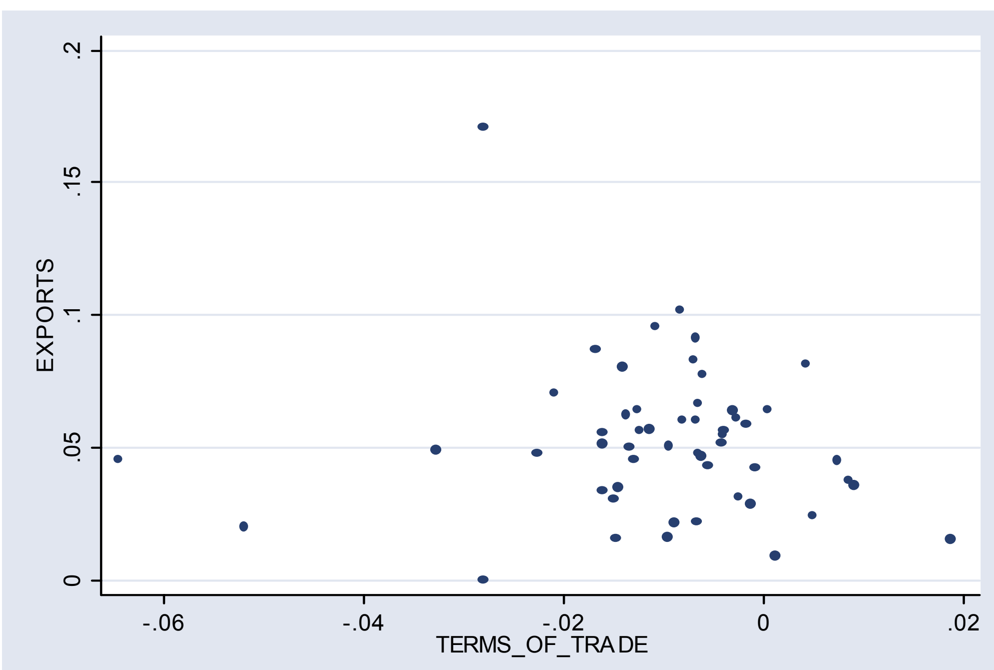

Figure 2. Export Growth and Change in Terms of Trade, 1960-2000

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