

Trade openness and economic growth: a cross-country empirical investigation

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Abstract

- This paper demonstrates that **trade liberalization does not have a simple and straightforward relationship with growth** using a large number of openness measures for a cross section of countries over the last three decades.
- We use **two groups of trade openness measures**. The regression results for numerous **trade intensity ratios** are mostly **consistent with the existing literature**.
- However, contrary to the conventional view on the growth effects of trade barriers, our estimation results show that **trade barriers are positively** and, in most specifications, **significantly associated with growth**, especially for developing countries and they are consistent with the findings of theoretical growth and development literature.

Literature Review – Openness Indicators

- (1) the most basic measure of openness is the **simple trade shares**, which is **exports plus imports divided by GDP**.
- (2) measures of **trade barriers** that include average **tariff rates, export taxes, total taxes** on international trade, and **indices of non-tariff barriers (NTBs)**.
- (3) **bilateral payments arrangements (BPAs)** as a measure of the trade orientation of countries. A BPA is an agreement that describes the general **method of settlement of trade balances** between two countries.

Literature Review – Openness Indicators

- (4) measures of **the exchange rate**. The most commonly used measure in this category is **the black market premium** that shows the success of the rationing function of prices in the foreign exchange market.
- (5) the indices of **trade orientation** that are constructed by some authors to test the effects of trade openness on growth. The basic claim of these studies is that **outward-oriented economies** have consistently **outperformed inward-oriented economies**.

3. Model and data

We use the following empirical framework to investigate long-run growth. In general form, this model can be characterized as

$$\gamma_{yt} = F(y_t, k_t, h_t; Z_{(t)}), \quad (1)$$

where γ_{yt} is a country's per capita growth rate in period t , y_t is initial GDP per capita, k_t is the physical capital stock per person, h_t is initial human capital per person. We use telephone mainlines per worker and life expectancy rates as rough proxies for the stock of physical and human capital, respectively. Although the initial GDP per capita level is employed to assess the issue of conditional convergence, it is possible to interpret it as a proxy for the stock of capital for a country. The variable Z represents a vector of control

Appendix B. Growth regressions: six 5-year periods

Eq.	Variable	OLS	SUR	3SLS
1.1	OPEN	0.015 (6.29)	0.017 (5.16)	0.022 (4.57)
1.2	OPEN*	0.012 (4.81)	0.010 (3.06)	0.015 (3.05)
1.3	MGDP	0.027 (6.14)	0.030 (5.09)	0.038 (4.51)
1.4	XGDP	0.029 (5.77)	0.031 (4.84)	0.043 (4.22)
1.5	TOECD	0.0074 (2.03)	0.010 (2.27)	0.026 (3.60)
1.6	TNOECD	0.10 (1.86)	0.010 (1.74)	0.023 (2.24)
1.7	USBEXP	0.0025 (2.59)	0.0015 (1.76)	0.037 (5.79)
1.8	USBIMP	0.0003 (0.92)	0.0003 (0.98)	0.60 (5.67)
1.9	USBTRD	0.0004 (1.40)	0.0003 (1.19)	0.027 (6.28)
1.10	USBTRD*	0.015 (6.43)	0.014 (5.04)	0.018 (3.91)
1.11	DENSITY	0.0009 (4.71)	0.0008 (3.29)	0.003 (4.96)
2.1	TARIFF	0.058 (3.29)	0.036 (1.86)	0.042 (1.81)
2.2	TARIFF ^d	0.058 (2.79)	0.038 (1.69)	0.059 (2.51)
2.3	TARIFF*	0.030 (1.73)	0.027 (1.44)	0.036 (1.68)
2.4	XTAX	0.023 (0.81)	0.029 (0.96)	− 0.02 (0.52)
2.5	XTAX*	0.037 (1.61)	0.045 (1.87)	0.015 (0.42)
2.6	XTAX ^{d,*}	0.050 (1.90)	0.054 (2.00)	0.024 (0.61)
2.7	TAXTRD	0.032 (3.32)	0.034 (2.98)	0.039 (2.93)
2.8	TAXTRD*	0.022 (2.48)	0.026 (2.60)	0.029 (2.55)
2.9	BPA	0.76 (2.45)	0.83 (2.29)	0.77 (1.92)
2.10	BPA*	0.61 (2.09)	0.62 (1.81)	0.48 (1.32)
2.11	CURRENT	− 0.18 (0.59)	− 0.24 (0.67)	− 0.21 (0.57)
2.12	CURRENT ^d	− 0.71 (1.97)	− 0.69 (1.66)	− 0.70 (1.54)
2.13	CURRENT ^{d,*}	0.03 (0.09)	0.30 (0.75)	0.22 (0.51)

The system has six equations, where the dependent variables are the per capita growth rate over 5-year periods from 1970 through 1997. See also notes in [Tables 2 and 4](#).

- We use **two types of trade openness measures** in the regressions to explore the relationship between trade liberalization and growth. Unless indicated otherwise, annual data on all openness measures are taken from the WDI (1999).
- **The first group** is calculated using trade volumes. **The most basic measure of trade intensity is the so-called “trade openness” (OPEN) that is the ratio of exports plus imports to GDP.** This paper also employs **import penetration ratios (MGDP)** and **exports shares in GDP (XGDP)** to measure openness of a country.
- Next, to assess whether the growth effects of trade with developed and with developing countries are different from one another, two more measures of trade intensity ratios—**trade with OECD countries (TOECD)** and **trade with non-OECD countries (TNOECD)**—are also used in the empirical estimates.
- The last two measures are taken from Easterly and Yu. Further, we make use of the so-called **“U.S. trade openness” (USBTRD)**, which is defined as the ratio of each country’s total bilateral trade with the US to its GDP. **U.S. bilateral exports (USBEXP) and imports (USBIMP)** (computed as USBTRD) are also used. Note that bilateral trade numbers are weighted by the capital to capital distance to control for the impact of geographical proximity on bilateral trade. Data on U.S. bilateral trade are compiled by the Direction of Trade Statistics and are available beginning in 1972.
- Finally, **population densities (DENSITY)**, constructed as the ratio of total population to total area, enter the growth regressions as measures of trade openness

- The **second group** of trade openness measures is based on **trade restrictions**.
- First, we use **total import duties (TARIFF)** to measure the severity of trade restrictions. Import duties as a percentage of the value of imports are the sum of all levies collected on goods at the point of entry into the country and are used as a measure of the average import tariff rate.
- Second, we use **total export duties (XTAX)** and **taxes on international trade (TAXTRD)** as measures of trade policies. Export duties as a percentage of the value of exports are comprised of all levies collected on goods at the point of export. Similarly, taxes on trade as a percentage of current revenues include import duties, export duties, profits of export or import monopolies, exchange profits, and exchange taxes.
- Third, **bilateral payments arrangements (BPAs)** are used to measure the trade restrictiveness of countries, as discussed above. We use two measures of BPAs: **BPAs among IMF members (BPAIMF)** and **arrangements of IMF members with non-IMF members (BPA)**. Finally, we also use a **measure of trade barriers (CURRENT)**, which are defined as restrictions that **exist on payments with respect to current transactions** in the form of quantitative limits or undue delay on other than restrictions imposed for security reasons and official action directly affecting the availability or cost of exchange. Tabular data on BPA, BPAIMF, and CURRENT are taken from the IMF's Annual Reports on Exchange Restrictions (ARER) and are available starting in 1967. As discussed above, there is ambiguity about the sign of the coefficient of the trade restriction variables.

- The cross-country regressions apply to a panel of over 100 developed and developing countries observed from 1970 to 1997. Socialist (or formerly socialist) and the oil exporting countries are excluded from the sample due to data considerations or the bulk of GDP of oil producers represents the extraction of natural resources (see Mankiw et al., 1992; Barro, 1997).
- Moreover, the number of countries is limited by the availability of data. The system is a three-equation system. The dependent variables are the average growth rates of real per capita GDP over three periods: 1970–1979, 1980–1989, and 1990–1997.

Table 1

Pearson correlation coefficients for various openness indicators^a

Variable	OPEN	USBTRD	DENSITY	TARIFF	XTAX	TAXTRD	BPA	CURRENT
OPEN (+) ^b	1.0	0.71	0.63	-0.17	-0.21	0.046	-0.21	-0.25
	0.0	0.0001	0.0001	0.0044	0.0005	0.4269	0.0001	0.0001
USBTRD (+)		1.0	0.67	-0.12	-0.062	0.038	-0.15	-0.19
		0.0	0.0001	0.0604	0.3176	0.5315	0.0084	0.0012
DENSITY (+)			1.0	-0.16	-0.066	-0.11	-0.060	-0.14
			0.0	0.0066	0.2719	0.500	0.2803	0.0109
TARIFF (-)				1.0	0.25	0.64	0.13	0.41
				0.0	0.0001	0.0001	0.0253	0.0001
XTAX (-)					1.0	0.51	0.15	0.29
					0.0	0.0001	0.0143	0.0001
TAXTRD (-)						1.0	0.03	0.25
						0.0	0.6222	0.0001
BPA (-)							1.0	0.32
							0.0	0.0001
CURRENT (-)								1.0
								0.0

^a The top figures show simple correlation coefficients for decade averages; the bottom figures indicate the *P*-level of the test.

^b Indicates how an increase in a variable affects openness.

Table 2

Trade flows and per capita GDP growth: panel of three decades (1970–1997)

Variable	1	2	3	4	5	6	7	8	9	10	11
Log	−4.38	−4.56	−4.03	−5.13	−4.70	−4.38	4.43	4.42	−4.81	−4.96	−3.73
(GDPSH)	(6.50)	(5.95)	(5.54)	(6.57)	(5.92)	(5.74)	(5.68)	(5.47)	(6.54)	(6.65)	(5.56)
Log	16.48	18.30	16.78	17.77	18.95	17.98	19.83	20.36	17.41	21.55	15.77
(LIFE)	(5.68)	(5.53)	(5.24)	(5.41)	(5.73)	(5.56)	(5.62)	(5.55)	(5.23)	(6.49)	(5.30)
TELPW	0.011	0.012	0.011	0.012	0.014	0.014	0.012	0.011	0.010	0.010	0.010
	(3.31)	(3.44)	(2.98)	(3.43)	(3.68)	(3.80)	(3.08)	(2.97)	(2.91)	(2.95)	(2.87)
TROPIC	−1.97	−1.85	−1.88	−2.34	−1.71	−1.67	−1.83	−1.61	−2.65	−1.96	−1.70
	(4.80)	(4.02)	(4.42)	(5.29)	(3.69)	(3.76)	(3.94)	(3.34)	(5.82)	(4.39)	(4.10)
WATER	−0.76	−0.88	−0.89	−0.97	−1.36	−1.48	−0.50	−0.60	−0.35	−0.30	−0.48
	(1.94)	(1.93)	(2.15)	(2.27)	(2.78)	(3.16)	(1.13)	(1.28)	(0.83)	(0.71)	(1.19)
WAR	−0.0005	−0.0009	−0.0008	−0.0009	−0.0008	−0.0009	−0.0009	−0.0009	−0.0009	−0.0001	−0.0005
	(2.61)	(3.99)	(3.31)	(3.53)	(3.35)	(3.49)	(2.11)	(2.10)	(2.21)	(0.19)	(2.73)
REGIME	−0.73	−0.52	−0.60	−0.41	−0.36	−0.44	0.79	−0.76	−0.74	−0.95	−0.89
	(2.18)	(1.50)	(1.67)	(1.15)	(0.98)	(1.20)	(2.05)	(1.95)	(2.06)	(2.41)	(2.63)
OPEN	0.018	0.014*									
	(5.45)	(3.84)									
MGDP			0.029								
			(4.90)								
XGDP				0.039							
				(5.84)							
TOECD					0.016						
					(3.19)						
TNOECD						0.023					
						(3.36)					
USBEXP							0.0074				
							(3.25)				
USBIMP								0.0034			
								(1.41)			
USBTRD									0.020	0.015*	
									(6.86)	(4.95)	
DENSITY											0.0009
											(3.86)
R ² for each	0.36,	0.30,	0.31,	0.33,	0.26,	0.24,	0.30,	0.28,	0.34,	0.21,	0.31,
	0.39	0.39	0.40	0.42	0.42	0.45	0.43	0.37	0.51	0.47	0.38
Eq. (# of obs.)	0.25	0.33	0.35	0.38	0.33	0.36	0.17	0.17	0.28	0.37	0.22
	(114)	(97)	(101)	(97)	(95)	(95)	(98)	(98)	(98)	(92)	(114)

Table 3
Trade restrictions and per capita GDP growth: panel of three decades (1970–1997)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Log (GDPSH)	−2.55 (3.27)	−0.73 (0.73)	−3.72 (4.65)	−3.98 (5.05)	−3.87 (4.77)	−2.59 (2.43)	−3.15 (4.05)	−3.04 (3.91)	−3.14 (4.58)	−4.37 (5.63)	−3.76 (4.91)	−2.97 (3.30)	−3.23 (3.32)
Log (LIFE)	14.66 (3.78)	14.42 (3.22)	17.13 (3.05)	17.25 (4.39)	17.35 (4.57)	15.72 (3.64)	15.53 (4.07)	13.35 (3.68)	13.93 (4.57)	17.76 (5.08)	15.04 (4.71)	13.29 (3.86)	10.70 (3.00)
TELPW	0.011 (2.98)	0.008 (0.92)	0.013 (3.05)	0.011 (3.12)	0.010 (2.80)	0.015 (1.89)	0.011 (3.03)	0.012 (3.06)	0.008 (2.18)	0.012 (3.09)	0.008 (1.99)	0.010 (1.38)	0.018 (2.25)
TROPIC	−1.19 (2.53)	−0.90 (1.70)	−1.52 (3.38)	−0.96 (2.02)	−1.67 (3.60)	−1.43 (2.75)	−1.44 (2.97)	−1.70 (3.69)	−1.63 (3.82)	−1.91 (4.12)	−1.84 (4.29)	−1.90 (3.94)	−1.84 (3.47)
WATER	−0.25 (0.50)	0.17 (0.27)	0.26 (0.53)	−0.028 (0.06)	0.10 (0.21)	0.64 (1.08)	−0.40 (0.82)	−0.059 (0.12)	−0.37 (0.84)	−0.46 (0.99)	−0.51 (1.10)	−0.43 (0.86)	−1.11 (2.25)
WAR	−0.010 (1.57)	−0.0014 (1.41)	−0.0014 (2.71)	−0.0010 (1.26)	−0.002 (3.14)	−0.0024 (3.52)	−0.0006 (0.98)	−0.0010 (2.13)	−0.0009 (3.79)	−0.0009 (3.77)	−0.0009 (3.75)	−0.0009 (3.32)	−0.0009 (3.42)
REGIME	−0.92 (2.07)	−0.70 (1.33)	−0.91 (2.17)	−0.84 (1.70)	−0.87 (2.07)	−0.70 (1.44)	−0.88 (2.06)	−0.95 (2.33)	−0.86 (2.55)	−0.74 (2.18)	−0.81 (2.39)	−0.77 (2.02)	−0.51 (1.41)
DENSITY	0.0014 (3.82)	0.0026 (1.96)	0.014 (3.98)	0.013 (3.64)	0.014 (3.84)	0.0017 (1.51)	0.0014 (3.61)	0.014 (3.77)	0.0010 (3.89)	0.0010 (4.03)	0.0009 (3.71)	0.002 (1.89)	0.006 (2.47)
TARIFF	0.053 (2.08)	0.066 ^d (2.15)	0.042* (1.88)										
XTAX				−0.044 (0.97)	0.051* (2.03)	0.074 ^{d,*} (2.42)							
TAXTRD							0.026 (1.90)	0.023* (1.87)					
BPA									0.71 (1.76)	0.31* (0.91)			
CURRENT											−0.47 (1.19)	−0.96 ^d (1.99)	−0.22 ^{d,*} (0.48)
R ² for each	0.24, 0.36	0.28, 0.21	0.33, 0.27	0.31, 0.25	0.34, 0.23	0.37, 0.11	0.30, 0.29	0.27, 0.33	0.28, 0.41	0.29, 0.48	0.29, 0.40	0.31, 0.24	0.17, 0.37
Eq. (# of obs.)	0.21 (80)	0.29 (52)	0.24 (83)	0.25 (76)	0.24 (83)	0.27 (56)	0.17 (83)	0.17 (88)	0.25 (107)	0.29 (95)	0.24 (106)	0.26 (79)	0.32 (65)

Source: Authors.

Conclusion

- The regression results for trade volumes provide substantial support for the hypothesis that trade promotes growth through a number of channels such as technology transfers, scale economies, and comparative advantage and are consistent with earlier empirical studies of the issue.
- The growth effects of trade with developed countries are not considerably different from trade with developing countries. Further, population densities also positively affect growth through increasing trade volumes.

Conclusion

- Surprisingly, unlike the literature on the growth effects of trade intensity ratios, findings of empirical studies of trade restrictions are considerably different from predictions of theoretical studies.
- Even though the theoretical growth studies provided no conclusive evidence about the direction of growth effects of trade barriers, especially for developing countries, a great majority of the empirical studies concluded that there exists a significant and negative relationship between trade restrictions and growth
- We believe that our results cast substantial doubts on the conventional view that suggests a robust and negative relationship between trade barriers and growth.
- Our main goal is to show that there is no such relationship between trade restrictions and growth. On the contrary, this relationship mostly depends on certain characteristics of countries.