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Impact of trade openness on poverty: a panel data analysis of a set of developing countries

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Abstract

The impact of trade openness on poverty has been in the limelight for a few decades now, since most developing countries relaxed their trade regimes. Poverty has always been a central issue for developing countries mainly because of their large vulnerable populations. In this paper, a panel of 25 developing countries is analyzed for three years to determine the effects of trade openness on poverty. We find that poverty has a negative and significant relationship with total trade, imports, exports and merchandise trade. The human capital (education) has negative impact on poverty. We also find that infrastructure and health have a positive impact on per capita GDP. This paper supports the view that an inward-oriented trade policy is neither good for growth nor for poverty.

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1. INTRODUCTION

Foreign trade has been a widely debated issue across the developing world. In the last 30 years, a number of developing countries increased their openness to foreign trade. World trade as a percentage of world output has increased 1.47 times between 1980 and 2012. These years witnessed an integration of individual economies into a globalized economy, which has been often beneficial for the participating countries in many ways. This integration includes the flow of capital across countries in addition to the traditional trade in goods and services. In this piece, we focus on trade in goods and services between nations. While the many advantages of trade liberalization have been widely discussed, its impact on poverty remains a highly sensitive issue, especially in developing countries, since they have larger vulnerable populations than developed ones. Poverty often sparks rows beyond the scope of economics and governance. It is often perceived as a moral issue. Hence, it becomes important to find out the effects of trade liberalization on poverty.

Trade liberalization means reducing trade barriers and promoting trade. It opens new markets for domestic products and introduces new products in the domestic market. This is beneficial to both consumers and producers and in turn leads to an increase in national income. However, there are gains as well as losses. As developing countries have sizable populations that live in poverty and access to basic necessities is not a given, the impact of foreign trade on poverty becomes an important issue. Even if the national income increases, the impact on poverty cannot be overlooked. Theoretical as well as empirical evidence says that trade liberalization is poverty alleviating although it is not the strongest tool for poverty reduction, though it is the cheapest and most accessible (Winters et al 2004).

Winters et al (2004) decompose the link between poverty and trade liberalization. They say that liberalization has distributional effects for which four routes have been outlined: macroeconomic aspects, households and markets, wages and employment, and government revenue and spending. But the ambiguity remains because poverty is heterogeneous. A lot of differences are noted among individual households. They arrive at no straightforward conclusion. The theory states that poverty will reduce in the long run due to trade liberalization. They find that the empirical evidence broadly supports this. At the same time they stress that the outcome depends on many factors and policies that accompany trade liberalization like local institutions etc. They say that the impact of trade liberalization should not be viewed in isolation. But trade liberalization, without complementary policies, may work in some countries. They conclude that trade liberalization is the most accessible tool of poverty reduction even though it may not be the most powerful one.

Dollar and Kraay (2001) worked with a set of developing countries that globalized post 1980. Most of these economies experienced phenomenal growth following this move. It was found that increases in trade volumes and decreases in tariffs, when accounting for other factors have a positive effect on growth in developing countries. A similar pattern of growth cannot be seen in those developing countries that were not globalizing. The absolute poverty was found to be reduced. It was observed that the growth in rich countries had decelerated where the trend has been just reverse in developing countries that were globalizing. They also observed that during the 1980s and 1990s, the post-1980 globalizers are catching up to the rich countries while the rest of the developing world was falling farther behind.

Hoekman et al (2001) examine how to implement trade liberalization as part of a strategy for alleviating poverty in developing countries. They examine models of trade policy that have reduced poverty and deduce that liberal trade policy is necessary but not sufficient for growth, poverty reduction and growth of trade. They find that there are no examples of economies that have significantly reduced poverty without significantly increasing exports.

Harrison (2006) explores the links between globalization and poverty. Poor in export sectors have been found to benefit from reforms in the trade and FDI norms. Chang et al (2005) also talk about the importance of labor market flexibility in increasing per capita income originating from globalization. Balat et al (2007) conclude that the availability of markets for agricultural export crops helps realize the gains from trade. Anderson (2004) examines the effects of agricultural trade reforms on poverty alleviation in developing countries. This paper stresses that if the developing countries wish to take complete advantage of the Doha Round then they require freeing up their own product and factor markets so that their farmers are able to take complete advantage of the new opportunities.

India is one of the last developing countries to relax its trade policy. Up until early 1980s, India had a very strict trade policy and it was relaxed drastically in 1991. The sharp trade liberalization was actually brought about by pressure form external events. India also inhabits the largest number of poor people in the world. Therefore, India becomes a good model to test the effects of trade liberalization on poverty and growth. Topalova (2005) uses the trade liberalization implemented in 1991to measure its impact on poverty and inequality in Indian districts. It was found that poverty incidence decreased with more openness in trade in rural areas. It was found that inequality remains unaffected in all rural and urban states.

However, trade liberalization is not without its critique. First, that neither the theory nor empirical evidence on globalization and poverty is unarguably positive. Second, and more importantly, that people's interpretation of the available evidence is strongly influenced by their values and beliefs about the process of globalization. Globalization is often perceived as a process that gives more power to the rich as compared to the poor. Trans-national corporations are often accused of using their powers to benefit themselves and harm the poor. Third, there are some unresolved methodological issues in the area. There has been no consensus on the measures of the shape of income distribution (see Aisbett, 2005).

In this paper, we analyze a panel of 25 developing countries in the years 2000, 2005 and 2010. We look at the changes in poverty levels due to foreign trade controlling for other factors. The rest of the paper is divided into the following sections: section 2 deals with the methodology, which is further divided into data and model framework, section 3 discusses the results and section 4 is the conclusion.

2. METHODOLOGY

2.1. DATA

In this study, panel data for 25 developing countries is used for the years 2000, 2005 and 2010. These countries are listed separately in appendix 'A'. The World Bank list of developing countries was referred to but data for these three particular years was available for 25 out of 145 countries. All the variables that were used in our model were sourced from the World Bank's World Development Indicators 2013. The description of variables is given in appendix 'B'. The descriptive statistics of the variables are presented in appendices 'C' and 'D'.

2.2. FRAMEWORK

We estimate two models in this paper viz. a single equation random effect panel regression model and a two equation instrumental variable panel regression model, both for the years 2000, 2005 and 2010.

First, we estimate the single equation model. The aim of this model is to find out the effect of trade openness directly on poverty in developing countries. The following equation is estimated:

$$povt = a + b_1(tra) + b_2(instr) + b_3(edu) + b_4(health) + b_5(gdpcap) + e.....(1)$$

where, 'povt' is poverty headcount ratio at $1.25 a day (PPP). The 'tra' is the trade openness measured as total trade as percentage of GDP. 'instr' is the infrastructure variable which is represented by telephone lines and mobile cellular connections per 100 people. 'edu' is the levels of education which is represented by primary completion rate. This indicator is also known as "gross intake rate to the last grade of primary". The ratio can exceed 100% due to over-aged and under-aged children who enter primary school late/early and/or repeat grades. 'health' measures the health conditions in the economy represented by life expectancy at birth measured in years. 'gdpcap' is gross domestic product divided by midyear population. Data are in current U.S. dollars. 'e' is the error term.

The trade openness is the main variable in this model. Theoretically, it should be negatively related to poverty levels but the empirical evidence is mixed on the issue. Telephone connections are used as a measure of infrastructure. Better infrastructure often results in the effects of trade openness to be more pronounced. The secondary enrollment ratio measures the levels of literacy in the economy and we check whether education affects the relationship between trade openness and poverty. LEB is a measure of health conditions and is included to gauge how better health can influence poverty in the presence of trade.

We further disaggregated trade into imports and exports and estimated their effect on poverty using the following equations:

$$povt = a + b_1(imp) + b_2(instr) + b_3(edu) + b_4(health) + b_5(gdpcap) + e.....(2)$$
$$povt = a + b_1(ex) + b_2(instr) + b_3(edu) + b_4(health) + b_5(gdpcap) + e.....(3)$$

where, 'imp' is total imports as percentage of GDP and 'ex' is total exports as percentage of GDP.

We also estimate the significance of merchandise trade and its relationship with poverty using the following equation:

$$povt = a + b_1(mtr) + b_2(instr) + b_3(edu) + b_4(health) + b_5(gdpcap) + e.....(4)$$

where, 'mtr' is merchandise trade as percentage of GDP.

The Hausman test was performed to determine whether to use a random or a fixed effects model. The variance inflation factor was calculated to check for multi-collinearity. Correlation between the variables was also checked and not found to be high.

Poverty has a direct relationship with GDP per capita. GDP in turn is influenced by the status of infrastructure, health et cetera. Good infrastructure and widespread healthcare are essential for growth and development. Since these have an indirect effect on poverty through GDP, we suspect GDP per capita to be endogenous and therefore, we also perform 2sls regressions. In this model, we instrumented GDP per capita and the instruments are infrastructure and health. The model run was as follows:

$$povt = a + b_1(tra) + b_2(gdpcap) + b_3(edu) + e.....(5a)$$
$$gdpcap = c + d_1(instr) + d_2(health) + z.....(5b)$$

The first equation is the final regression and the second regression is the first stage regression. The proxies used for infrastructure, health and education are the same as those used for the earlier regression. The variance inflation factor was calculated to check for multi-collinearity and it was found that the problem did not exist in the dataset.

Again, we further disaggregated trade into imports and exports to estimate their effects on poverty separately. The following regressions are carried out for imports:

$$povt = a + b_1(imp) + b_2(gdpcap) + b_3(edu) + e.....(6a)$$
$$gdpcap = c + d_1(instr) + d_2(health) + z.....(6b)$$

and for exports:

$$povt = a + b_1(ex) + b_2(gdpcap) + b_3(edu) + e.....(7a)$$
$$gdpcap = c + d_1(instr) + d_2(health) + z.....(7b)$$

Again, we also perform the instrumental variable regression for merchandise trade with the following equations:

$$povt = a + b_1(mtr) + b_2(gdpcap) + b_3(edu) + e.....(8a)$$
$$gdpcap = c + d_1(instr) + d_2(health) + z.....(8b)$$

3. RESULTS

The results of our analysis are presented in the following tables. Table 1 shows the results of the random effects regression. Tables 2 and 3 show the results of the instrumental variable regression. In table 1, first, we present the estimates of the effects of trade (panel 1) and other factors viz. infrastructure, education, health and GDP per capita on poverty and then the effects of imports (panel 2) and exports (panel 3) separately followed by merchandise trade (panel 4).

TABLE 1: Random Effects Results

Dependent Variable: Poverty				
Independent Variables	model 1	model 2	model 3	model 4
tra	-0.138**	-	-	-
	(-2.47)			
imp	-	-0.271***	-	-
		(-2.69)		
ex	-	-	-0.215*	-
			(-1.93)	
mtr	-	-	-	-0.155***
				(-2.73)
instr	0.0015	0.01	-0.008	0.01
	(0.07)	(0.43)	(-0.39)	(0.46)
edu	-0.305***	-0.316***	-0.283**	-0.322***
	(-2.76)	(-2.87)	(-2.52)	(-2.92)
health	-1.487**	-1.479**	-1.536**	-1.75***
	(-2.27)	(-2.27)	(-2.31)	(-2.72)
gdpcap	-0.0021*	-0.0024**	-0.0016	-0.0018
	(-1.77)	(-2.01)	(-1.39)	(-1.58)
R-square	0.70	0.7063	0.6795	0.7302
Number of observations	62	62	62	62

Note: ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.
t-statistics are reported in parentheses.

The results show that trade is statistically significantly and negatively related to poverty. An increase in trade openness by 1% results in a decrease in poverty by 0.13%. We find that education, health and GDP per capita are statistically significant and negatively related to poverty. We find that infrastructure is positively and insignificantly related to poverty. Imports and exports are

negatively and significantly related to poverty. Merchandise trade too has a statistically significant negative relationship with poverty. Particularly, imports and merchandise trade have a very highly significant relationship with poverty. An increase in imports by 1% results in a decrease in poverty by 0.27%. An increase in exports by 1% results in a decrease in poverty by 0.21%. An increase in merchandise trade by 1% results in a decrease in poverty by 0.15%. In all the regressions, we find that infrastructure has a statistically insignificant positive relationship with poverty. On the other hand, education and health have a significant negative relationship with poverty. Particularly, education is very highly significant. Predictably, we find that GDP per capita and poverty have a negative relationship. We can safely say that trade in all forms is a very effective engine to reduce poverty.

Next, in tables 2 and 3, we present the results of the instrumental variable regression (2SLS) model. Table 2 shows the first stage regression results and table 3 shows the final regression results. Panels 1, 2, 3 and 4 show the regression carried out for trade, imports, exports and merchandise exports, respectively.

TABLE 2: 2SLS - 1ST STAGE

Dependent variable: GDP per capita				
Independent variables	model 1	model 2	model 3	model 4
tra	-12.78***	-	-	-
	(-2.75)			
imp	-	-26.79***	-	-
		(-3.34)		
ex	-	-	-18.36*	-
			(-1.95)	
mtr	-	-	-	-10.76*
				(-1.77)
instr	7.98**	9.12**	6.55*	7.48*
	(2.11)	(2.41)	(1.73)	(1.81)
edu	-11.11	-11.96	-11.03	-11.03
	(-0.73)	(-0.82)	(-0.7)	(-0.73)
health	397.62***	382.3***	414.71***	401.71***
	(6.49)	(6.35)	(6.54)	(6.04)
centered R-square	0.5936	0.6077	0.5747	0.5718
uncentered R-square	0.8725	0.8769	0.8665	0.8657
Number of observations	62	62	62	62

Note: ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.
t-statistics are reported in parentheses.

In the first stage regressions, we find that trade, imports, exports and merchandise trade, all have a negative and significant relationship with GDP per capita. On one hand, infrastructure and health have a positive and very highly significant relationship with GDP per capita, whereas on the other hand, education has a negative and insignificant relationship with GDP per capita.

TABLE 3: 2SLS - 2ND STAGE

Dependent Variable: Poverty				
Independent Variables	model 1	model 2	model 3	model 4
tra	-0.187***	-	-	-
	(-3.65)			
imp	-	-0.351***	-	-
		(-4.73)		
ex	-	-	-0.318***	-
			(-2.81)	
mtr	-	-	-	-0.245***
				(-4.59)
gdpcap	-0.005***	-0.005***	-0.005***	-0.005***
	(-5.30)	(-5.77)	(-4.83)	(-5.42)
edu	-0.689***	-0.707***	-0.681***	-0.67***
	(-5.58)	(-5.89)	(-5.23)	(-5.54)
Number of observations	62	62	62	62
F-statistic	47.37	53.64	42.32	45.55
Hansen J Statistic	0.54	1.47	0.02	1.19

Note: ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.
t-statistics are reported in parentheses.

The second stage regressions show us that GDP per capita and education have a negative and a very highly significant effect on poverty. We see that trade is negatively related to poverty and highly significant. For every 1 percent increase in trade, poverty falls by 0.18 percent. Imports, exports and merchandise trade are found to be negatively related to poverty and the relationships are highly significant again. For every 1 percent increase in imports, poverty falls by 0.35 percent. For every 1 percent increase in exports, poverty falls by 0.31 percent. For every 1 percent increase in merchandise trade, poverty falls by 0.24 percent. Our 2SLS results, like our random effects results imply that trade is highly effective in reducing poverty.

4. CONCLUSION

This paper explored the relationship between poverty with trade and its components. We have found that poverty has a negative and significant relationship with total trade, imports, exports and merchandise trade. The human capital (education) has negative impact on poverty. We also found that infrastructure and health have a positive impact on per capita GDP. To reduce poverty, it implies that trade liberalization is a very helpful measure. This paper supports the view that an inward-oriented trade policy is neither good for growth nor for poverty.

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APPENDIX 'A'
LIST OF DEVELOPING COUNTRIES INCLUDED

Argentina, Armenia, Bangladesh, Belarus, Columbia, Dominican Republic, Ecuador, Georgia, India, Indonesia, Kyrgyz Republic, Macedonia FYR, Madagascar, Mexico, Moldova, Montenegro, Panama, Paraguay, Peru, Romania, Serbia, Tunisia, Turkey, Ukraine, Uruguay.

APPENDIX 'B'
DATA DESCRIPTION AND SOURCE

VARIABLE	DESCRIPTION
povt	Poverty headcount ratio at $1.25 a day (PPP) (% of population)
tra	Trade (% of GDP)
gdpcap	GDP per capita (constant 2005 US$)
imp	Imports of goods and services (% of GDP)
ex	Exports of goods and services (% of GDP)
mtr	Merchandise trade (% of GDP)
instr	Telephone lines and mobile cellular connections (per 100 people)
edu	Primary completion rate (% of relevant age group)
health	Life expectancy at birth, total (years)

Source: World Development Indicators April 2013

APPENDIX 'C'
DESCRIPTIVE STATISTICS OF VARIABLES

Variable:	2000			2005			2010		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
povt	19	17.61	21.51	25	12.24	17.19	25	9.68	18.39
tra	25	72.83	34.89	25	77.91	31.30	25	78.66	32.42
imp	25	39.10	18.75	25	42.17	18.47	25	43.95	19.37
ex	25	33.72	17.37	25	35.74	14.75	25	34.7	14.89
mtr	23	54.33	28.67	25	61.92	24.20	25	63.15	24.83
gdpcap	25	2546.4	1906.2	25	2948.3	1999.7	24	3468.5	2276.1
health	25	70.19	3.96	25	71.24	3.50	25	72.49	3.13
edu	20	90.28	14.62	22	98.39	12.92	24	95.4	11.79
instr	23	20.28	13.42	25	56.55	30.21	25	122.28	40.80

APPENDIX 'D'
COUNTRIES WITH THE HIGHEST AND LOWEST OBSERVATIONS

Variable:	Country with lowest observations			Country with highest observations		
Year	2000	2005	2010	2000	2005	2010
povt	Belarus (0.33%)	Serbia (0%)	Montenegro (0%)	Madagascar (79.33%)	Madagascar (67.83%)	Madagascar (81.29%)
tra	Argentina (22.62%)	Columbia (35.63%)	Columbia (33.7 %)	Belarus (142.39%)	Panama (144.54%)	Panama (144.95%)
imp	Argentina (11.63%)	Columbia (18.78%)	Columbia (17.76%)	Moldova (75.43%)	Moldova (91.67%)	Kyrgyz Republic (81.67%)
ex	Argentina (10.98%)	Bangladesh (16.58%)	Columbia (15.93%)	Panama (72.57%)	Panama (75.48%)	Panama (76.16%)
mtr	Argentina (18.11%)	Columbia (28.93%)	Columbia (28.11%)	Belarus (125.39%)	Moldova (113.21%)	Belarus (108.97%)
gdpcap	Madagascar ($285.96)	Madagascar ($275.47)	Madagascar ($275.36)	Mexico ($7723.43)	Mexico ($7858.76)	Mexico ($8114.35)
health	Madagascar (58.47 years)	India (63.36 years)	India (65.13 years)	Panama (75.11 years)	Uruguay (75.60 years)	Mexico (76.68 years)
edu	Madagascar (35.88%)	Madagascar (57.77%)	Bangladesh (66.55%)	Paraguay (101.85%)	Ukraine (117.43%)	Georgia (115.74%)
instr	Bangladesh (0.59)	Madagascar (3.36)	Madagascar (37.91)	Turkey (54.26)	Montenegro (113.94)	Montenegro (212.11)