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Estimating the Impact of
Trade Specialization and Trade Policy
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Estimating the Impact of Trade Specialization and Trade Policy on Poverty in Developing Countries

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Abstract

The paper investigates the impact of trade specialization and trade policy on poverty. The empirical findings show that manufacturing exports contribute to poverty reduction in developing countries in general while agriculture exports have a more significant impact in low income countries. The results also show that the impact of tariffs is ambiguous for all countries. The investigation confirms that trade specialization reduces poverty but only if the right complementary policies and institutions are in place.

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Note

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1. Introduction

Trade can play an important role in the development process; however the linkages can be direct or indirect and the benefits are not necessarily instantaneous. International trade can impact welfare directly, in a number of ways, via changes in relative factor and good prices, factor movements, and the nature of technological change and knowledge spillover. Trade policy has the potential to generate benefits in terms of both resource allocation and economic growth. But trade policy is not neutral and trade liberalization is unlikely to produce widespread beneficial results for all countries (Winters et al 2004; Goldberg and Pavnick, 2007).

In the short run, trade liberalisation can put great stress on certain actors in the economy, and in the long run open regimes may leave some behind in poverty (Winters, 2000).¹ Many studies suggest that globalization has been associated with rising inequality and that the poor do not always share in the gains from trade. The links between trade, trade policy, and poverty depend on a range of factors including a country's domestic policies and institutional capacities (Winters et al, 2004; UNCTAD, 2004). For instance, Chang et al (2009) observe that although trade openness appears to, on average, be beneficial for economic growth the effect varies considerably across countries. Importantly, complementary reforms can boost the growth effects expected from pursuing a more open trade regime.

The literature on trade, trade policy and poverty is voluminous but studies focusing on low income countries are scarce. This paper aims to contribute by analyzing the link between trade specialization and poverty with special focus on low income and least developed countries. The paper also analyses the relative impact of trade policy measures on poverty dynamics. Looking at poverty incidence by specialization patterns, for example, LDCs that specialize in food and agriculture have higher poverty ratios than countries specializing in manufactures (Figure 1). Fuel exporting LDCs have lower poverty incidence than their peers, regardless of the chosen poverty line or period of time, mostly due to the income value of their exports and lower financial constraints.² Moreover, there is evidence that the poorest and most vulnerable countries face more challenges in adjusting to openness in comparison to countries that have achieved a relatively more sophisticated level of industrialization (e.g. Pattillo et al., 2005; Hausmann, et al 2007).

The rest of the paper proceeds as follows. Section 2 discusses the link between trade and poverty. Section 3 describes the empirical specification. Section 4 presents the results. Section 5 concludes.

¹ Countries are considered more outward-oriented if their trade reforms become more neutral or liberal. Specifically, a shift towards neutrality involves equalising incentives (on average) between the exporting and importing competing sectors. A trade regime is regarded as more liberal when the general level of policy intervention is limited, by a reduction in import barriers, or via the introduction of a symmetric system of export subsidies. However, the first policy implies a reduction in the intervention of the trade policy whilst the latter implies an increase (Edwards, 1989, for a detailed discussion on this issue).

² See Figure 1 and the Descriptive Statistics in the Appendix. The difference is smaller between sectors when setting the poverty line at \$2/day.

2. Literature Review

The transmission mechanisms between trade and poverty involve macroeconomic and microeconomic channels expected to impact development and welfare, and ultimately households and individuals. The trade-poverty link is expected to operate via various channels including (Winters et al, 2004): changes in relative prices (both product and factor prices); factors income; the nature of specialization, technical progress and the technological diffusion process; and impact on volatility and vulnerability, including export earning, terms of trade, and other factors that influence both the demand for exports and supply capacity. The globalization-trade-poverty channels are related and the net effect on poverty depends on the relative strength of the positive and negative forces. Importantly, the impact of trade and trade policy is mostly associated with the price transmission mechanisms, and will depend on the individuals' sources of income and employment conditions (Winters et al. 2004; Porto 2006).³ However, the empirical analysis has mostly focused on the indirect linkages, particularly on how the households adjust to the price shocks, whether adverse or positive (Harrison, 2007; Winters et al 2004).

The link between trade and poverty reduction would also be determined by the implications for income levels and economic growth, which have been a major concern of empirical studies of the welfare implication of trade reforms. However, the poverty implications will further depend on whether trade policies will also change the distribution of income. More trade and higher trade opening on balance tends to generate positive aggregate income effects, but not all countries and groups within countries benefit to the same degree and some lose in the process. The employment-distribution-poverty effects tend to show more mixed evidence, depending on the country case, especially on the initial production structure and options for finding new “specializations” and on the functioning of the labour markets.

UNCTAD (2004) examines the trends in average private consumption per capita - the most common used measure of welfare - and exports specialization, demonstrating that export expansion, has not generally been associated with poverty reduction. The Report discusses three types of trade-poverty relationships across countries:

- A virtuous trade effect, where average private consumption per capita is rising along with export growth;
- An immiserizing trade effect, where average private consumption per capita is falling along with export growth; and
- An ambiguous trade effect, where there is no clear association between changes in average private consumption per capita and increased export growth.

Thus, given the trends and relationship between exports and average private consumption per capita, it is evident that the links between trade and poverty are not unambiguously pro-poor in the LDC context. This also challenges the usual view of the relationship between trade, liberalization and poverty. It is evident that trade liberalization is likely to have adverse effects in the short run -

³ See also Hanson and (1999), Harrison (2007), Goldberg and Pavnick (2007), Ravallion (2007), and Nissanke and Thorbecke (2006, 2007). There are numerous studies looking at important channels such as skill-biased technological change and the trade-employment-poverty channel, but these issues are beyond the scope of this paper (see for instance Feenstra, 2008; Wood, 1995).

particularly as social groups that formerly benefited from a protectionist tariff regime are exposed to international competition – but that in the long run, the effects will depend on the growth potential of the economy and the role that national policies play.

In this regard, policies and institutions play an important role in cushioning the effects, and providing the safety nets to counteract the impacts of globalization on income distribution and poverty (Ali and Thorbecke, 2000; and Fosu, 2010). Research shows that the gains from trade are highly unequal, and the poor do not always benefit from globalization (e.g. Harrison, 2007). Much of the benefits expected from reforming the trade policy regime can be realized only if trade liberalization is accompanied by policies aimed at absorbing shocks, if there is adequate economic management and governance. This underscores the need for carefully targeted safety nets, such as income support from the governments to corn farmers in Mexico and food aid in Ethiopia (Thorbecke, 2014).

Empirical studies reaffirm the importance of balancing policy choices. In cases like India and Colombia, complementary policies such as labour mobility schemes were implemented in conjunction with trade reforms (Goldberg and Pavnick, 2007). For Sub-Saharan Africa, Fosu and Mold (2008) show limited or negative impact of liberalization on poverty due to the sharp contraction in the import competing sector, and a lack of compensating policies.

As shown by Nicita (2006) for the case of Madagascar, export-led growth in the textile and apparel sector had only a small positive effect on overall poverty because a large majority of the poor are unable to benefit from the new employment opportunities due to their lack of skills required by the expanding textile and apparel export industry. Also, most of the poor reside in rural areas, where the employment effect is very small. The results indicate that the effects of an increase in exports of textiles for poverty reduction are observed only in urban areas, mostly through creation of employment rather than increases in wages. Accordingly, the poor must be assisted in obtaining the skills demanded of the growing industries.

In the context of the employment channel, manufacturing activities are more likely to be conducive to specialization and the division of labour, and offer greater potential for innovation and increasing returns to scale. Provided that labour and social protection policies are in place, productivity growth has the potential to benefit a large proportion of the population, and hence lead to welfare gains, including poverty reduction (UNCTAD, 2014b).

In addition to the welfare impacts, trade has a crucial role in the improvement and full utilization of productive capacities via accumulation of physical, human and organizational capital; structural transformation and dynamic change in trade specialization; and technological progress. Trade can enable more efficient use of a country's resources if it specializes in the production where it has a comparative advantage. Some empirical studies argue that countries exporting high-productivity goods grow faster and experience better social economic outcomes than countries with comparative advantages in lower-productivity exports (Hausmann et al 2007). Trade can also help in lifting the balance-of-payment constraint which can inhibit developing countries' growth, and can also improve returns on investment by lowering production costs or enabling economies of scale, and can be associated with the acquisition of technology (UNCTAD 2004, p. 80). The positive effects from international trade, via the development of a country's capacity to produce and export, have the potential of enhancing economic performance and in doing so reducing poverty. However, the link between trade, the development of productive capacities and poverty is also complex.

Export sophistication and higher technology intensity are likely to act as a catalyst for broad-based economic growth, provided certain economic conditions and right macroeconomic policies are met, such as an open economy regime, the exchange rate is not overvalued, and there are good

information flows about trade and market opportunities (see for example, Hausmann et al, 2007 and Anand et al, 2012). However, the trend has been less obvious in low income countries, where challenges such as low skilled labor force, poor macroeconomic management and unrelenting institutional constraints persist. The literature confirms a shift in goods and manufacturing sophistication mostly in Asia, away from resource-based production into more medium and high-tech manufacturing. In developing countries such as China and India the level of sophistication and technology intensity of exports has increased over time (Hausmann et al, 2007; Santos-Paulino, 2012), yet, the levels of export sophistication are in general relatively low in low income countries, and in particular in Sub-Saharan Africa.

Songwe and Winkler (2012) estimate the impact of exports and export diversification on value added, labor productivity, and conditional and unconditional labor demand using a panel of 30 sub-Saharan African countries over the 1995-2008 period. They show that exports have a positive impact on value added, labor productivity and labor demand. The results also suggest that sub-Saharan African countries, particularly resource-based economies, need to concentrate on improving productivity in areas where they have a comparative advantage and on moving up the value chain in those commodities. Some studies also identify the role of exports and diversification, or export growth, in growth accelerations, for example Pattillo et al. (2005).

Finally, Le Goff and Singh (2014) look at the connection between trade liberalization and poverty in 30 African countries between 1980s-2000s using panel data. Their results suggest that trade does tend to reduce poverty, but only under specific conditions that would allow to take advantage of the possibilities offered by trade, that is: in countries where financial sectors are deep, education levels are high and governance is strong.

3. Empirical Framework

The paper estimates the link between trade specialization and poverty in a sample of developing countries using panel data econometric techniques, and data for the period 1980-2011.⁴ Limiting the sample to developing countries aims to avoid unwanted heterogeneity concerning the determinants of poverty between advanced and developing economies. The panel is unbalanced. The missing data is not random, that is, missing observations are due to data constraints in some LDCs or low income countries. However, there is no significant efficiency loss due to the unbalanced nature of the panel given the long time dimension of the data and the number of countries considered.

The main objective is to estimate the impact of trade specialization on poverty, also controlling for a set of trade related factors.⁵ The channels through which export expansion enhances aggregate productivity and growth are well-known. Exports allow for specialization in a country's comparative advantage sector and thereby increase growth. The theoretical justifications behind the specialization-growth-poverty link go back to the classical theory of comparative advantage, which holds that countries benefit by specializing in the production of those goods with the lowest opportunity cost and trading the surplus of production over domestic demand, taking as given appropriate exchange-rate regimes. However, new trade theory (e.g. and Krugman, 1985; and Grossman and Helpman, 1991) advanced the focus from the static gains from trade to dynamic ones

⁴ Developing countries are defined according to UNCTAD's classification. The period of analysis corresponds to data availability, in particular for LDCs.

⁵ The Low Income Countries in our sample are those that met the World Bank's criteria for a low-income economy in the year 2013, i.e. if they had a GNI per capita of \$1,045 or less.

whereby higher investment, knowledge and technology associated with increased productivity growth can transform trade patterns and accelerate overall economic growth, and in turn affect welfare variables such as poverty and inequality.

The empirical evidence does not provide evidence of countries with low levels of export sophistication achieving sustained long-term growth. Indicators such as Hausman et al (2006) export specialization index measuring the productivity associated with a country's export basket and income, the Hirschman-Herfindahl Index (HHI) of market and product concentration, or trade to GDP ratios have been used to gauge the effect of trade specialization on various economic variables. The analyses show that developing countries need to diversify their export base away from less sophisticated primary commodities into high-productivity sectors such as manufacturing in order to enjoy faster growth. Other authors extend the regression specification by allowing the poverty reduction effect of openness to vary with some country characteristics, and by interacting the trade openness measure with each of the conditional variables (e.g. Le Goff and Singh, 2013).

The investigation proceeds to estimate the following econometric model

$$poverty_{it} = \alpha + \beta_0 p_{i0} + \beta_1 trade_{it} + \beta_2 growth_{it} + \beta_3 LIC_i + \beta_4 trade_{it} * LIC_i + \beta_5 growth_{it} * LIC_i + \eta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where '*poverty*' is the headcount ratio of the population living below the poverty line, '*p₀*' is the initial level of poverty, '*trade*' represents a vector of different trade specialization variables (manufactures exports, agricultural raw material exports and commodities exports, respectively, as share of total exports), *Growth* is the average growth rate of real GDP, LIC is a dummy variable for Low Income Countries. Country fixed effects and time fixed effects are denoted by η_i and λ_t , and ε_{it} is an idiosyncratic error term. Time-invariant country specific characteristics such as geography, demographics and institutional characteristics are likely to be correlated with the explanatory variables but uncorrelated with the idiosyncratic error term. The independent variables are assumed to be endogenous and causality may run in both directions.

In terms of the expected impacts and signs of the estimated coefficients, previous comparative studies have found that growth reduces poverty but the estimated relationship varies widely across countries, thus the expected sign of '*growth_{it}*' could be either positive or negative (+,-), depending on the impact on the distribution of income within countries (See Santos-Paulino, 2011). Similarly, the impact of trade or trade policy on poverty is not conclusive according to the empirical evidence, where the analysis of diverse measures of global integration suggest that globalization produces both winners and losers within countries and among the poor, thus the estimated coefficients of *trade_{it}* and / or *tariff_{it}* could be positive or negative.

An extended regression model includes the control variable '*tariffs*', a vector of import tariffs on manufactures and agriculture, as a proxy for trade policy

$$poverty_{it} = \alpha + \beta_0 p_{i0} + \beta_1 trade_{it} + \beta_2 tariffs_{it} + \beta_3 Growth_{it} + \beta_4 LIC_i + \beta_5 trade_{it} * LIC_i + \beta_6 tariffs * LIC_i + \beta_7 growth_{it} * LIC_i + \eta_i + \lambda_t + \varepsilon_{it} \quad (2)$$

The average tariff level is considered an adequate approximation of the restrictiveness of a country's trade regime, and arguably less controversial than other measures frequently employed. Goldberg and Pavcnik (2005) conclude that tariffs capture relatively well the combined effects of trade policy changes. Also, Gourdon et al (2008) use tariffs as a measure of openness, and find that the conditional effects of trade liberalization on inequality are correlated with factor endowments. In order to investigate if the links between trade and poverty differs across developing countries, the

dummy variable for low income countries (LICs) is included. The LIC dummy was used in the empirical analysis, as opposed to the Least Developed Countries, since the latter is more heterogeneous and shows various patterns of specialization despite having a common denominator, which are the LDC-criteria. The detailed definitions of the variables and data sources are presented in the appendix.⁶

Equations (1) and (2) entail some econometric issues. First, given the presence of the country fixed effects, OLS estimates would be biased and inconsistent. In all specifications, most of the explanatory variables are likely to be endogenously determined, therefore we use the system Generalized-Method-of-Moments (GMM) panel estimator, proposed by Arellano and Bond (1991) and Blundell and Bond (1998). The GMM system estimator relies on a system combining the estimating Equation in levels and in first-differences. First-differencing allows controlling for the fixed effects. In order to control for the possible endogeneity of the regressors, a dynamic system, that is, once lagged first-differences of the regressors are used as instruments in the level equation, and twice or more lagged levels of the regressors are used as instruments in the first-differenced equation. The inclusion of the regression in levels in addition to that in first-differences helps address the weak-instrument biases.⁷ By lagging the independent variables by two years we also address the issue of reverse causality.

4. Empirical results

The results are summarized in Tables 1 and 2. The basic model, specified as equation (1), and presented in Table 1 shows that the initial levels of poverty determine the change in the poverty ratios across time. Also, the increases in economic growth are associated with a reduction in poverty rates for all developing countries (i.e. the whole sample) as well as for low income countries, corroborating the previous findings in the literature.

The LIC dummy variable, which controls for the sub-sample of low income countries, is positive and statistically significant, as expected, given the initial high levels of poverty in low income countries.. Concerning export specialization, the specialization on manufacturing exports is associated with a poverty reducing effect, on average, for developing countries in general: if the share of manufactures exports increase by one percentage point (pp), the poverty headcount ratios will decrease by 0.011 percentage points. However, for low income countries the additional effect is zero, that is, there is no difference between the impact on middle and low income countries.

The results concerning the impact of agriculture exports specialization and poverty reduction are not statistically conclusive for all developing countries, i.e. the results are ambiguous. But for low income countries agriculture exports have a statistically significant impact on poverty, i.e. reduces poverty. The headcount ratio decreases by 0.03 percentage points for every percent increase in agriculture exports share in low income countries. This could be explained by the high export concentration in agricultures in low income countries, and also by the observed diversification within agriculture related manufacturing in such countries.

One of the key findings is that specialization in commodity exports, or moving into commodities exports, has a negative impact on poverty across all developing countries, whereas for

⁶ Robustness tests were undertaken for LDCs but the results were not statistically conclusive.

⁷ A random effects model was also considered, given that the risk of a bias caused by correlation between regressors and the error term to be non-negligible. The estimations using a random effects model generated results similar to those with the GMM model, in terms of signs and fitness of the estimated parameters for most of the variables.

low income countries the effect is the opposite but insignificant. Given the diverse results experienced on average for all developing countries, or when controlling for the low income country sub-sample, the message is not necessarily to completely specialize in agriculture or manufacturing but promoting diversification within and between sectors.

Low-income countries and LDCs are highly dependent on commodities for a significant share of their export earning, thus fluctuations in commodity markets and prices directly affect the incidence of poverty, as the large majority of the poor depend on primary commodities for their livelihoods. Price fluctuations also hamper the income of the producers. The literature has highlighted the relationship between developing countries' dependence on extractive industries and their poor performance on poverty-related indicators, that is, high persistence of poverty, which could help in explaining the empirical results herein. Living standards in oil and mineral dependent countries are markedly lower than they should be, given their per capita incomes; higher levels of mineral dependence are strongly correlated with higher poverty rates (see, for example, DfID 2009). Moreover, the mismanagement of natural resources can increase fragility and lead to conflict and poor social outcomes (Naudé et al, 2011).

Agriculture is more diffused, and has more linkages in the economy than the commodities sector, that is, has more potential spillover effects and diversification to industrial activities than enclave type of commodities exports. Also, in low income countries, the agricultural sector employs more people, there is potential for small land-owners development, and there is possibility for backward linkages. There are theoretical foundations and empirical evidence that suggests that agriculture is not only pro-poor, but even more than other sectors of the economy, particularly in low income countries and LDCs (UNCTAD LDC Report 2013). Agricultural expansion and the development of the rural sector contribute to poverty reduction directly and indirectly. The direct impact operates by increasing the income and own consumption of small farmers. Small holders are usually not only inadequately endowed with land, but also lack other assets such as physical and human capital. And, the indirect mechanism by reducing food prices, increasing the income generated by the non-farm rural economy, and rising employment and wages of the unskilled as agriculture is usually intensive in unskilled labor (Anriquez and Stamoulis, 2007).

Other research also shows that sustained and accelerated development of agriculture is key to economic development and poverty reduction in the LDCs (FAO, 2001). Although LDCs have considerable agricultural potential, and the prospects to move from low-based agriculture to agroindustry, the potential has to been realized due a number of reasons, including structural and technological constraints, inappropriate domestic policies and an unfavorable external economic environment. As a result, the expected benefits in terms of economic growth and welfare have been limited, particularly in terms of increasing undernourishment and continuous marginalization in the global economy.

Table 2 presents the results from further robustness tests, including the changes in import tariffs in agriculture and manufacturing as a proxy for trade policy, as specified in equation (2). In general the findings validate the results for the basic model (presented in Equation 1) in terms of the ambiguous effect of trade specialization, the significant poverty-reducing impact of growth, and the importance of the manufacturing sector for developing countries in terms of poverty reduction (Column 1). The assessment of the relative impact of changes of imports tariff on manufacturing and agriculture can help to understand the impact of possible distributional policies on poverty (i.e. how the use of government revenues from trade taxes might affect poverty). However, the results are ambiguous. For all developing countries, the impact of tariffs in manufacturing is not statistically conclusive (i.e.

the effect cannot be verified), whereas increases in tariffs in agriculture appear to worsen poverty - i.e. higher tariffs in agriculture increase poverty (see Column 1).

Table 2 (column 2) also portrays the estimations for the differential effect on low income countries, that is, how the slopes differ between low and middle income countries. The results concerning the impact of trade specialization in manufacturing are inconclusive for all developing countries, i.e. the impact is ambiguous. This can be explained by the different levels of development and in specialization patterns within manufactures across developing countries. Moreover, on average, for the whole sample of developing countries, specializing in agriculture appears to worsen poverty. However, when controlling for the impact on low income countries, i.e. when including the LIC dummy variable, a significant poverty reduction impact is verified, that is, increases in agricultural exports reduce poverty in such countries. The findings also indicate that import tariffs in manufacturing have a poverty reduction effect for all developing countries on average, as denoted by the negative and statistically significant coefficient. When looking at tariffs on agriculture, the findings confirm that increases in agricultural tariffs increase poverty, but for low income countries the impact is marginal - almost zero.

In relation to the empirical results discussed above, developing countries have made important strides in reforming and streamlining their trade policy regimes. The reforms have reduced average tariffs and also the large dispersion of tariff rates across industries, but the final impact is difficult to unravel due to the different comparative advantages and specialization across developing countries. In the case of tariffs on Agriculture, and the results presented herein, higher tariffs seem to increase poverty, thus reducing the tariffs on agriculture should benefit the poor. Moreover, non-tariff barriers, such as import licenses, quotas and other administrative procedures have also largely been eliminated; although there is growing evidence of a shift in policy away from the use of tariffs towards a mix of higher non-tariff barriers (NTBs) in relation to tariffs, subsidies and other trade facilitation measures. Thus, it is expected that improved international competition are likely to have positive impacts on individuals, households and countries through lower prices, improved quality and variety of goods and inputs, and increased specialization of production.

However, such qualifications should be analysed with caution. As discussed before, the benefits of trade reform are not equally accrued across countries or individuals within countries. For instance, a study by Topalova (2005) records that Indian communities with a concentration of industries that lost protection have experienced smaller declines in poverty than the national trend. This highlights the complex links between trade, trade policy and poverty which might work through various channels such as employment or productive resources as discussed at the onset.

The findings have important implications, in a context of tariffs-led structural transformation, particularly if countries aim to protect the sectors where the poor are. The poor might gain from tariff reductions on goods that they consume. If globalization leads to increases in the prices of goods produced by the poor—such as agricultural products marketed by farmers—then poverty is also likely to decline. Using aggregate data does not allow to identify from which specific policy the increase in manufacturing shares have a poverty reducing effect. This highlights the importance of adopting manufacturing strategies that would warrant the success of firms in terms of productivity. However, such strategies are only part of broader set of trade and industrial policies that, in addition to economic fundamentals, will determine higher exports performance. Based on our results, For LIC the type of trade policy based on tariffs on manufacturing appears to have a negative impact on poverty (i.e. increases poverty).

One of the key messages from the empirical analysis is the importance of developing productive capacities through higher sophistication and technological content of exports. We can see in Figure 2

that more sophisticated exports seem to be associated with a higher share of manufactured exports in developing countries, controlling for the level of income. In this regard, further robustness tests were also performed using the alternative export specialization index, and results are robust to the export specialization ratios used in empirical analysis.⁸

5. Concluding Remarks

The paper investigates the impact of trade specialization on poverty in developing countries. The findings show that trade specialization reduces poverty but only under specific patterns and policy conditions. In all developing countries manufacturing exports contribute to poverty reduction, whereas for low income countries the share of agriculture exports has additional poverty reduction effects.

Agriculture constitutes a key sector in most low-income economies and is generally the primary source of income in rural areas, both directly by crop production and indirectly through on-farm and off-farm employment in agriculture-related industries. Moreover, for low income countries, moving out from commodities into agriculture would lead to a poverty-reducing scenario, as the agriculture sector has more potential spillover effects and backward linkages than enclave type of commodities exports.

Poverty is multi-dimensional and thus cannot be treated in a simplistic way. The benefits from trade are not automatic and policies are needed as a complement, to address both the welfare impacts and the factors that affect a country's trade specialization and productive capacity. As the UN and development partners move forward with the post-2015 global development agenda, the right policy approach is needed to strengthen productive sectors and diversify export profiles to accomplish the sustainable development goals (SDGs) in general, and in particular the goals related to improved livelihoods, jobs and productive capacity, trade and enabling the global trading environment for sustained and inclusive development. Further research should focus on understanding the distributional impacts of trade and trade policy, looking at broader measures of trade policy, notably Non-tariff barriers.

⁸ Further robustness tests were performed using the export specialization index (EXPY), and the results are robust to the export specialization ratios used in Tables 1 and 2. The changes in export specialization (EXPY) have a poverty reducing effect, on average, for developing countries sample. On the contrary, for low-income countries export specialization tend to increase poverty, which can be explained by their low income value of exports in comparison to other developing countries, which affect their terms of trade negatively.

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Figure 1: Incidence of poverty in Least Developed Countries by export specialization

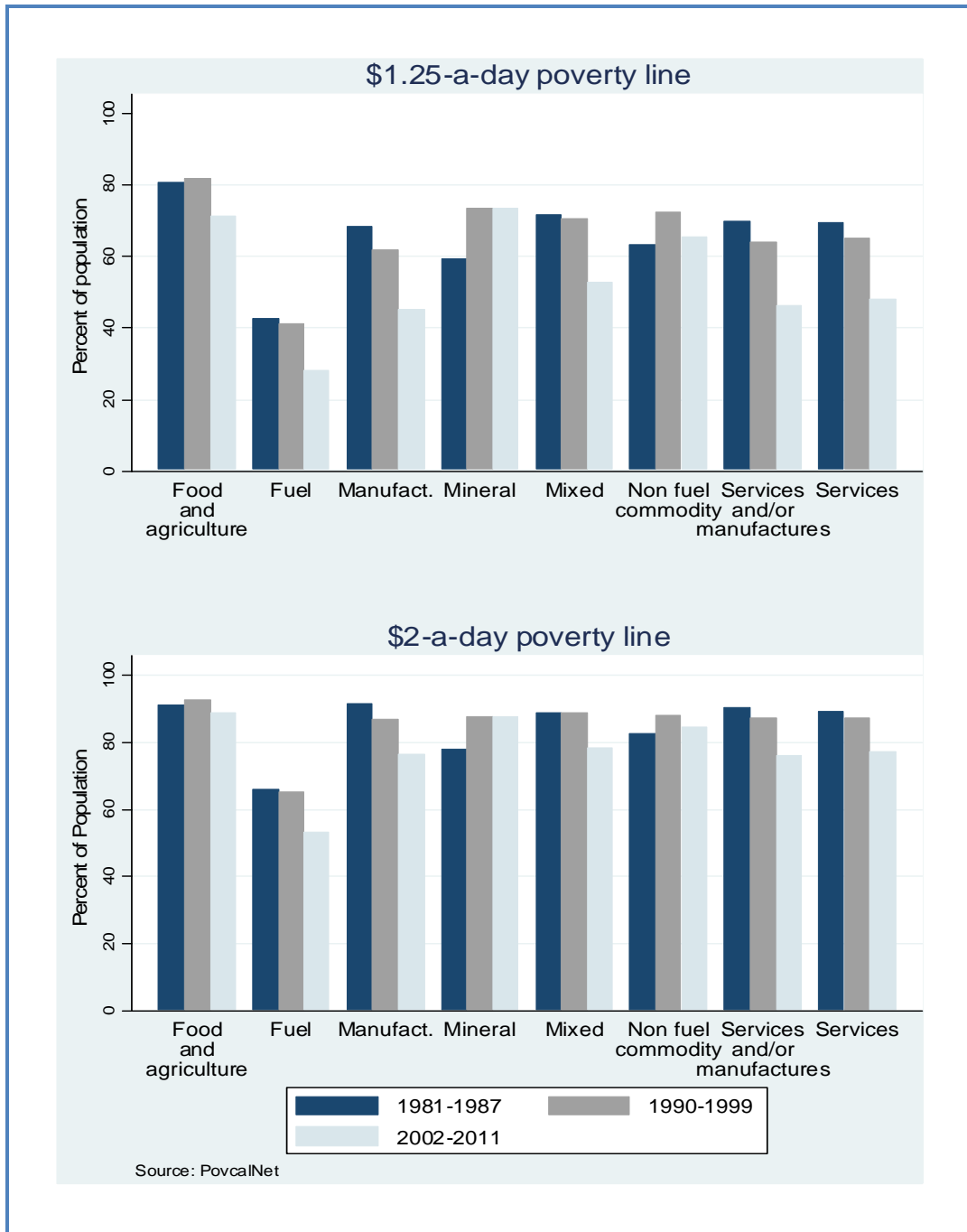
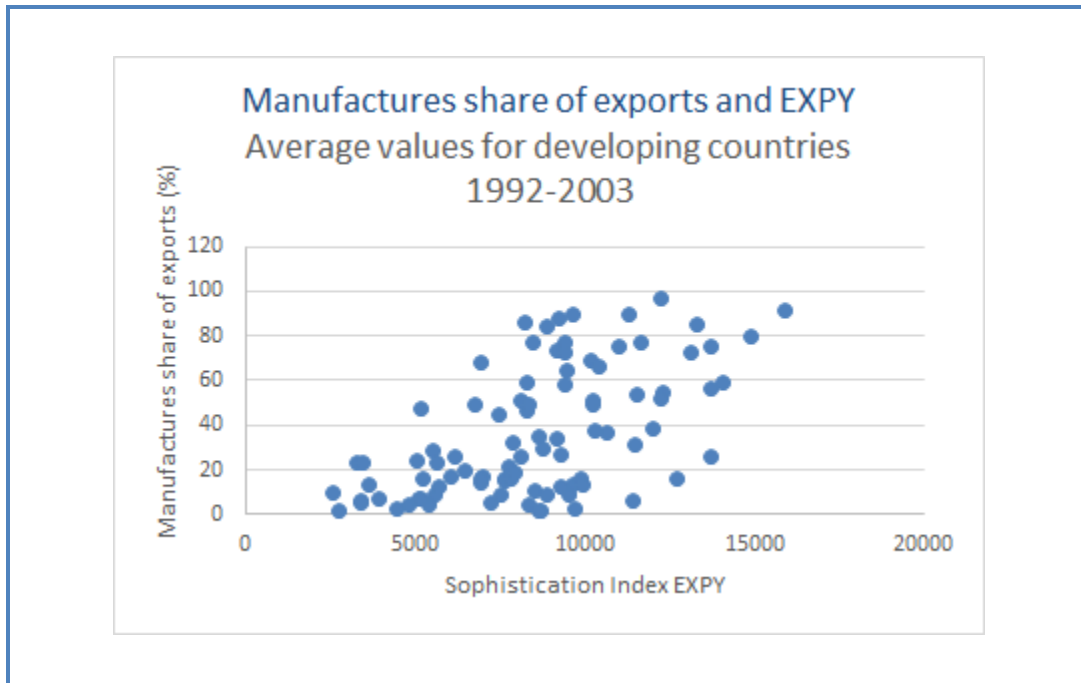


Figure 2: Correlation between Manufactures exports and Export Productivity Index in Developing Countries



**Table 1: Relationship between trade and poverty,
panel data estimates 1980-2011**

Dependent Variable:	Poverty headcount ratio at \$1.25 per day, i.e. the percentage of the population living below \$1.25 a day			
	(1)	(2)	(3)	(4)
Poverty (P ₀)	0.995*** (240.86)	1.004*** (232.47)	0.971*** (199.02)	0.974*** (164.79)
Manufacturing	-0.0112** (-2.82)		-0.00851* (-2.14)	
Agriculture	-0.000567 (-0.11)		0.0134 (1.44)	
Growth	-0.191*** (-11.72)	-0.205*** (-11.63)	-0.148*** (-8.68)	-0.154*** (-8.63)
Commodities * LIC		0.00858* (1.96)		0.0121** (2.70)
Low Income Countries			1.857*** (5.48)	1.424*** (3.58)
Manufacturing* LIC			-0.00179 (-0.34)	
Agriculture* LIC			-0.0279** (-2.69)	
Growth* LIC			-0.0570* (-2.19)	-0.0564* (-1.98)
Commodities* LIC				-0.00242 (-0.39)
Constant	0.983*** (4.78)	0.761*** (3.31)	0.989*** (4.60)	1.216*** (5.45)
m2	-1.00	-0.98	-0.98	-0.99
Sargan (p-value)	0.99	0.99	0.99	0.99
Observations	1313	1313	1313	1313

GMM estimates. *t* statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The first-differenced equation and their first-difference lagged once in the levels equation. Test statistics and standard errors (in parentheses) are asymptotically robust to heteroskedasticity. m2 is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as $N(0,1)$ under the null of no serial correlation. The Sargan statistic is a test of the over-identifying restrictions, distributed as chi-square under the null of instrument validity.

Table 2. Relationship between trade and poverty, panel data estimates 1980-2007

Dependent Variable: Poverty headcount ratio at \$1.25 per day, i.e. the percentage of the population living below \$1.25 a day		
	(1)	(2)
Poverty (P_0)	0.989 ^{***} (216.61)	0.977 ^{***} (160.57)
Manufacturing	-0.00887 [*] (-2.34)	-0.00194 (-0.47)
Agriculture	-0.00143 (-0.27)	0.0357 [*] (2.54)
Growth	-0.127 ^{***} (-6.89)	-0.118 ^{***} (-6.08)
Imp tariffs on Manufacturing	-0.00941 (-0.88)	-0.0407 [*] (-2.53)
Imp tariffs on Agriculture	0.0382 ^{**} (2.58)	0.0695 ^{***} (3.74)
Low Income Countries		1.622 ^{**} (2.65)
Manufacturing*LIC		-0.00850 (-1.23)
Agriculture*LIC		-0.0459 ^{**} (-3.04)
Growth*LIC		-0.0301 (-0.81)
Imp tariffs on Manufacturing*LIC		0.0428 [*] (2.17)
Imp tariffs on Agriculture*LIC		-0.0634 ^{**} (-2.64)
Constant	0.625 ^{**} (2.99)	0.373 ^{**} (2.55)
m2	-1.02	-1.05
Sargan (p-value)	0.99	0.99
Observations	506	506

GMM estimates. t statistics in parentheses; ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$. The first-differenced equation and their first-difference lagged once in the levels equation. Test statistics and standard errors (in parentheses) are asymptotically robust to heteroskedasticity. m2 is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as $N(0,1)$ under the null of no serial correlation. The Sargan statistic is a test of the over-identifying restrictions, distributed as chi-square under the null of instrument validity.

Table A1: List of countries included in the sample (76)

Angola [‡]	Liberia**
Argentina	Madagascar**
Bangladesh**	Malawi**
Benin**	Malaysia
Bolivia	Mali**
Botswana	Mauritania [‡]
Brazil	Mexico
Burkina Faso**	Mongolia
Burundi**	Mozambique*
Cambodia**	Namibia
Cameroon	Nepal**
Cape Verde	Nicaragua
Central African Republic**	Niger**
Chad**	Nigeria
Chile	Pakistan
China	Panama
Colombia	Papua New Guinea
Congo, Dem. Rep.* [‡]	Paraguay
Costa Rica	Peru
Cote d'Ivoire	Rwanda**
Djibouti [‡]	Senegal [‡]
Dominican Republic	Sierra Leone**
Egypt, Arab Rep.	South Africa
El Salvador	St. Lucia
Ethiopia**	Sudan [‡]
Gambia, The**	Suriname
Guatemala	Swaziland
Guinea**	Tanzania**
Guinea-Bissau**	Thailand
Guyana	Togo**
Haiti**	Trinidad and Tobago
Honduras	Tunisia
India	Turkey
Indonesia	Uganda**
Jordan	Uruguay
Kenya*	Vietnam
Lao PDR [‡]	Yemen, Rep. [‡]
Lesotho [‡]	Zambia

* Low Income Country, [‡] LDC.

Table A2: Summary statistics for the full sample

Variable	Obs.	Mean	Min	Max
Poverty	2006	36.09817	0.5347	86.5387
Agriculture	1387	8.753846	0	93.8238
Manufacturing	1386	33.97429	0	97.6932
Commodities	2505	41.46552	-98.19122	.998593
Growth	2046	3.673553	-51.0309	106.2798
Import tariff on Agriculture	566	10.08479	0	67.66
Import tariff on Manufacturing	566	11.74952	0.57	112.03
Margin of Preference	566	1.025247	0	12.56
Merchandise trade/GDP	2007	54.86653	5.000988	986.6469
Trade Specialization (EXPY)	516	8221.815	2177.975	16102.6

Table A3: Summary statistics for Low Income Countries

Variable	Obs.	Mean	Min	Max
Poverty	715	60.62426	25.3334	86.5387
Agriculture	365	16.58863	0.10568	93.8238
Manufacturing	365	26.35779	0	97.6932
Commodities	2505	-7.587981	-98.4685	0.704056
Growth	715	3.125481	-51.0309	106.2798
Import tariff on Agriculture	144	16.56361	0.11	57.69
Import tariff on Manufacturing	144	14.26715	2.53	112.03
Margin of Preference	144	0.767292	0	12.56
Merchandise trade/GDP	689	45.04063	5.000988	986.6469
Trade Specialization (EXPY)	160	5228.829	2177.975	13240.25

Table A4: Summary statistics for Least Developed Countries

Variable	Obs.	Mean	Min	Max
Poverty	869	57.78107	13.1012	86.5387
Agriculture	414	15.78208	0.0009	93.8238
Manufacturing	411	25.63122	0	97.6932
Commodities	2505	-8.266598	-98.4685	0.998593
Growth	883	3.241085	-51.0309	106.2798
Import tariff on Agriculture	171	15.79205	0	57.69
Import tariff on Manufacturing	171	14.3252	2.24	112.03
Margin of Preference	171	0.840643	0	12.56
Merchandise trade/GDP	847	49.02967	5.000988	986.6469
Trade Specialization (EXPY)	178	5328.259	2177.975	13240.25

Note: The lists of countries and data sources are presented in the Appendix (Tables A1 and A3).

Table A5: Variable Descriptions and Data Sources

Variable	Description	Data Source
variable*LIC	Interaction term for the low income countries	Own calculations
Poverty	Poverty headcount ratio at \$1.25 per day, i.e. the percentage of the population living below \$1.25 a day	Karshenas, Massoud (2010)
Agriculture	Agricultural raw materials exports (% of merchandise exports). Comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).	World Development Indicators (2013)
Manufactures	Manufactures exports (% of merchandise exports) comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).	World Development Indicators (2013)
Commodities	Commodities exports (% of merchandise exports) Comprise SITC section 2, divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), 28 (metalliferous ores and scrap) and division 68 (non-ferrous metals).	World Development Indicators (2013)
Growth	Real GDP annual average growth rate (%)	World Development Indicators (2013)
Import Tariff on Agriculture	Tariff rate, applied, weighted mean, agricultural raw materials imports (%)	World Integrated Trade Solution (2013)
Import Tariff on Manufactures	Tariff rate, applied, weighted mean, manufactures imports (%)	World Integrated Trade Solution (2013)
Margin of Preference	Difference between MFN applied tariff rate and effectively applied tariff rate. Weighed means, all products (%)	World Integrated Trade Solution (2013)
Trade/GDP	Merchandise trade (% of GDP)	World Development Indicators (2013)
EXPY	Export specialization: index of export sophistication of each country's export mix	Hausmann et al. (2006)