Centre de Recherche en Économie et Management
*Center for Research in Economics and Management*

University of Caen

University of Rennes 1

Working Paper

# What Diversification of Trade Matters for Economic Growth of Developing Countries?

**Fabien Rondeau**
*CREM UMR CNRS 6211, University of Rennes 1, France*

**Nolwenn Roudaut**
*IREA - University of South Britanny, France*

Avril 2014 - WP 2014-07

# What Diversification of Trade Matters for Economic Growth of Developing Countries?

F. RONDEAU[a]*, N. ROUDAUT[b]

[a] *CREM CNRS 6211 - University of Rennes 1* [b] *IREA - University of South Britanny*

April 2014

**Abstract**

This paper underlines the influence of trade diversification on GDP per capita growth. Using methodologies developed by Brenton and Newfarmer (2007) and Amurgo-Pacheco and Pierola (2008), we breakdown exports of 64 developing countries into intensive margin (old traded flows), extensive margin by new partners (geographic diversification) and extensive margin by new products (product diversification). Estimations of the augmented Solow model by system-GMM for the period 1990-2009, first confirm that trade diversification has a positive effect on growth. However, this positive effect of diversification tends to decrease with the level of GDP per capita. Finally, the effect of product diversification is twice as large as the effect of geographic diversification: to implement economic growth, developing countries should extend exports of new products rather than exports to new partners.

Keywords: Trade, Diversification, Growth, Extensive Margin.
JEL: F14, F43, O11

*Corresponding author: fabien.rondeau@univ-rennes1.fr. 7 place Hoche, 35000 Rennes, FRANCE

# 1 Introduction

The aim of the paper is to empirically test the contribution of export diversification to the long term economic performance of developing countries. In the literature, endogenous growth models (Rivera-Batiz and Romer, 1991, and Grossman and Helpman, 1990, 1991a, 1991b) show a positive impact of trade on growth: trade leads to knowledge spillovers and increases both productivity and growth. Empirical studies[1] confirm that trade promotes international diffusion of technology. Furthermore, Dollar (1992), Ben David (1996), Ben-David and Loewy (1998), Slaughter (1997), and Wacziarg and Welch (2008) among others, show that openness induces convergence in income per capita and in Total Factor Productivity (TFP) accross countries. Convergence is observed for countries that trade between each other. However, even if most developing countries promote exports to the richest countries, few have growth rates higher than developed countries and do not converge with the highest values of GDP per capita. Other factors should be considered to explain the non-linearity between trade and growth. Some authors find that the composition of exports could explain the relationship between trade and growth. For example, Hausmann, Hwang and Rodrik (2007) find that countries that export goods associated with higher productivity levels grow more rapidly. Other authors identify the diversification of trade as a key factor of the impact of trade on growth. Feenstra and Kee (2008) show that the doubling of product varieties observed over 1980-2000 explains a 3.3% cumulated increase in country-level TFP. According to Cadot, Carrère and Strauss-Kahn (2011), the degree of trade specialization decreases with the level of development when countries are poor (below 22,000 and 25,000$) and increases when countries are rich (see figure 1). The pattern of the relationship between trade specialization and GDP per capita is described as a "U-curve"[2] (as for the relationship between production specialization and GDP per capita). Within the group of developing countries, the higher the GDP per capita, the lower the concentration index. Variations of the level of trade diversification is mainly due to the evolution of the extensive margin (between-groups): "The evolution of the between component of the Theil index corresponds to changes at the extensive margin, whereas the evolution of the within component of the Theil index reflects changes at the intensive margin"[3]. In this paper, we focus on this positive relationship between the extensive margin of trade and GDP per capita for developing countries.

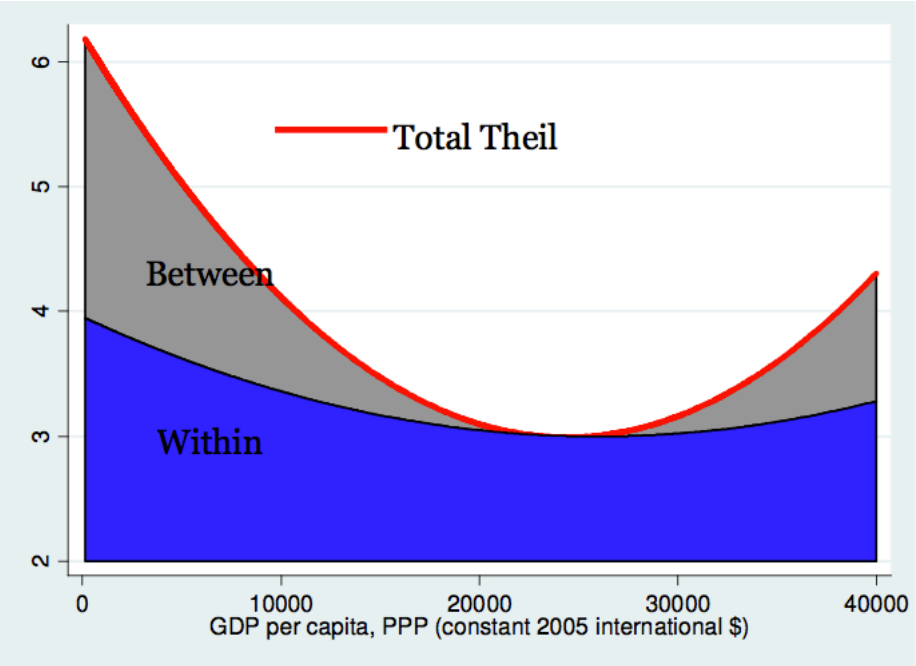
This relationship has been recently analyzed: Herzer and Nowak-Lehnmann (2006), Saviotti and Frenken (2008), Hesse (2008), and Papageorgiou and Spatafora (2012) have found a positive effect of diversification on growth for developing countries. By estimating an augmented Solow growth model, Hesse (2008) finds that export concentration has a significant negative coefficient on growth. Papageorgiou and Spatafora (2012) find similar results: "increases in diversification have been associated with lower volatility and higher growth, especially since 1995 and in low income countries with better institution".
However, these studies do not distinguish between product and geographic diversifications. Brenton and Newfarmer (2007) and Amurgo-Pacheco and Pierola (2008) have developed methodologies to distinguish exports growth between intensive margin (existing products to existing markets), extensive margin by products (new products to existing markets), extensive margin by new markets (old products to new markets) and extensive margin by new products and new markets. Amurgo-Pacheco and Pierola (2008) find that a large part of exports growth of developing countries is

[1] Benhabib and Spiegel (1994), Coe and Helpman (1995), Edwards (1998), Alcalá and Ciccone (2004), Coe et al. (2009) among others.

[2] Imbs and Wacziarg (2003) were the first to show empirically this "U-curve". Kaulich (2012) confirms this curve for trade specialization.

[3] Cadot et al. (2011), p.595.

Figure 1: Contributions of within- and between-groups (respectively intensive and extensive margin) to overall concentration




Source: Cadot et al. (2011)

explained by the extensive margin: the share of the extensive margin is equal to 37% for the Sub-Saharan African countries. Brenton and Newfarmer (2007) found similar results: 57% for African countries and 35% for low-income countries. In both articles, a large part of the extensive margin is explained by exports to new markets (geographic extensive margin) but with a high degree of disparity between countries.

Using the methodology of Amurgo-Pacheco and Pierola (2008) to distinguish between geographic and product diversification, this paper investigates the relationship between exports specialization and growth for developing countries. We consider exports from 64 developing countries to 29 developed countries from 1990 to 2009. Our results confirm that diversification matters to economic growth for developing countries. More specifically, we show that developing countries with high level of product diversification tend to have higher GDP growth rates than other developing countries.

The next section presents the data and variables used. Section 3 presents the empirical analysis and the final section concludes.

# 2 Measure of Diversification

## 2.1 Data

We use the CEPII-BACI database[4] (Gaulier and Zignago, 2009) to extract trade values between 1997 and 2009 for 64 developing countries[5] and 29 developed countries. Data for GDP per capita, from 1990 to 2009, are extracted from the Penn World Table. The 64 countries used are presented in appendix (see table 4). We consider exports to 29 rich countries and members of the OECD: Australia, Austria, Belgium-Luxembourg, Canada, Chile, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Mexico, Netherlands, New-Zealand, Norway, Poland, Portugal, Republic of Korea, Spain, Sweden, Switzerland, Turkey, USA, United Kingdom.

## 2.2 Breaking down exports into intensive and extensive margins

According to Brenton and Newfarmer (2007) and Amurgo-Pacheco and Pierola (2008), we distinguish exports relative to their destinations and their variety. The intensive margin of trade refers to exports of goods that have already been exported. It concerns existing traded products to current markets. The extensive margin concerns new exported products and/or new markets.
In the table 1, trade is broken down into four groups: a country can export an old product (OPOD) or a new product (NPOD) to an existing destination. A country can export a good already exported (OPND) or a new good (NPND) to a new destination.

Table 1: Intensive and Extensive Margin

| | **Old Products** | **New Products** |
|---|---|---|
| **Old Destinations** | OPOD | NPOD |
| **New Destinations** | OPND | NPND |

We define old and new dummy variables as following[6]
Old Products (OP): takes the value 1 for the country $i$ and the product $k$ if the number of non-zero values (positive exports of $k$ from $i$ to $j$) between 1997 and 1999 is at least equal to 2.
New Products (NP): takes the value 1 for the country $i$ and the product $k$ if OP=0 and if the number of non-zero values between 2000 and 2009 is at least equal to 5.
Old Destination (OD): takes the value 1 for the country $i$ and the country $j$ if the number of non-zero values between 1997 and 1999 is at least equal to 1 in at least one sector[7].
New Destination (ND): takes the value 1 for the country $i$ and the country $j$ if OD=0 and the number of non-zero values between 2000 and 2009 is at least equal to 1 within the sector (HS-5 digit).
OPOD is equivalent to the intensive margin of trade (IM) and the sum of NPOD, OPND and NPND to the extensive margin of trade (EM). We define two kind of extensive margin: extensive margin by new products (EMP=NPND+NPOD) and by new destinations (EMD=NPND+OPND).

[4]BACI provides bilateral values and quantities of exports at the HS 6-digit: 5,000 products.

[5]We consider countries with GDP per capita less than 10,000$ in 1990 and countries at war (Afghanistan, Iraq, Rwanda, Liberia, Sierra Leone, Sudan, Mozambique, Chad) are dropped.

[6]To define old and new trade flows, we use similar criteria as Amurgo-Pacheco and Pierola (2008). According to our criteria, some trade flows are neither old, nor new: these flows represent only 1% of the total value of exports.

[7]According to Amurgo-Pacheco and Pierola (2008), we have defined 5-digit "sector-specific destinations".

For the period 2000-2009, we calculate for each country the share of each trade variable in the value of total exports:

$$OPOD_i = \sum_{t=1}^{T}\sum_{j=1}^{J}\sum_{k=1}^{K}\left(\frac{X_{ijk,t}|_{OP=1\&OD=1}}{X_{ijk,t}}\right) \quad (1)$$

$$NPOD_i = \sum_{t=1}^{T}\sum_{j=1}^{J}\sum_{k=1}^{K}\left(\frac{X_{ijk,t}|_{NP=1\&OD=1}}{X_{ijk,t}}\right) \quad (2)$$

$$OPND_i = \sum_{t=1}^{T}\sum_{j=1}^{J}\sum_{k=1}^{K}\left(\frac{X_{ijk,t}|_{OP=1\&ND=1}}{X_{ijk,t}}\right) \quad (3)$$

$$NPND_i = \sum_{t=1}^{T}\sum_{j=1}^{J}\sum_{k=1}^{K}\left(\frac{X_{ijk,t}|_{NP=1\&ND=1}}{X_{ijk,t}}\right) \quad (4)$$

## 2.3 Stylized facts

In appendix (see table 4), we can see that, on average, 92.9% of the value of exports from developing countries to developed countries concern already exported goods to old destinations (OPOD). Old Products and New destinations (OPND) represents 3.8%, New Products and Old Destinations (NPOD) 1% and both New Products and New Destinations (NPND) 2.4%. The contribution to trade growth of the intensive margin (92.9%) dominates that of the extensive margin (7.1%). As Brenton and Newfarmer (2007) and Amurgo-Pacheco and Pierola (2008), we find that geographic diversification (EMD=6.2%) is more important than product diversification (EMP=3.4%). In figure 2, the extensive margin seems to decrease with the level of GDP per capita. The share of the extensive margin is higher than 10% in 16 countries (Albania, Benin, Egypt, Ivory-Coast, Jordan, Lao, Mauritania, Mongolia, Nicaragua, Niger, Panama, Togo, Tanzania, Uruguay, Zambia and Zimbabwe) but only Panama and Uruguay have a GDP per capita higher than 4,000$. This figure is in line with the results of Cadot et al. (2011) (see figure 1).

From figure 3, we can see that most of the countries tend to increase their share of new partner countries greater than their share of new exported products. Only 6 countries promote their traded products more than their destinations (Cambodia, Mauritania, Mongolia, Nicaragua, Niger and Uganda). Figure 4 shows that the richest countries tend to have large shares of EMD and low shares of EMP. There is more heterogeneity between the poorest countries: some have large EMP (Mauritania for example) and some have large EMD (China for example).

According to these stylized facts, a negative relationship exists between the level of GDP and the share of the extensive margin: when a country's wealth increases, the country tends to export mainly the same products to the same destinations. This higher specialization of exports is due to the fact that developing countries no longer exports new products (lower EMP).
In the next section, the empirical application shows that a significant relationship exists between trade diversification, the size of GDP per capita and growth.

Figure 2: Extensive Margin (EM) and the GDP per capita in 1990 ($y_0$)

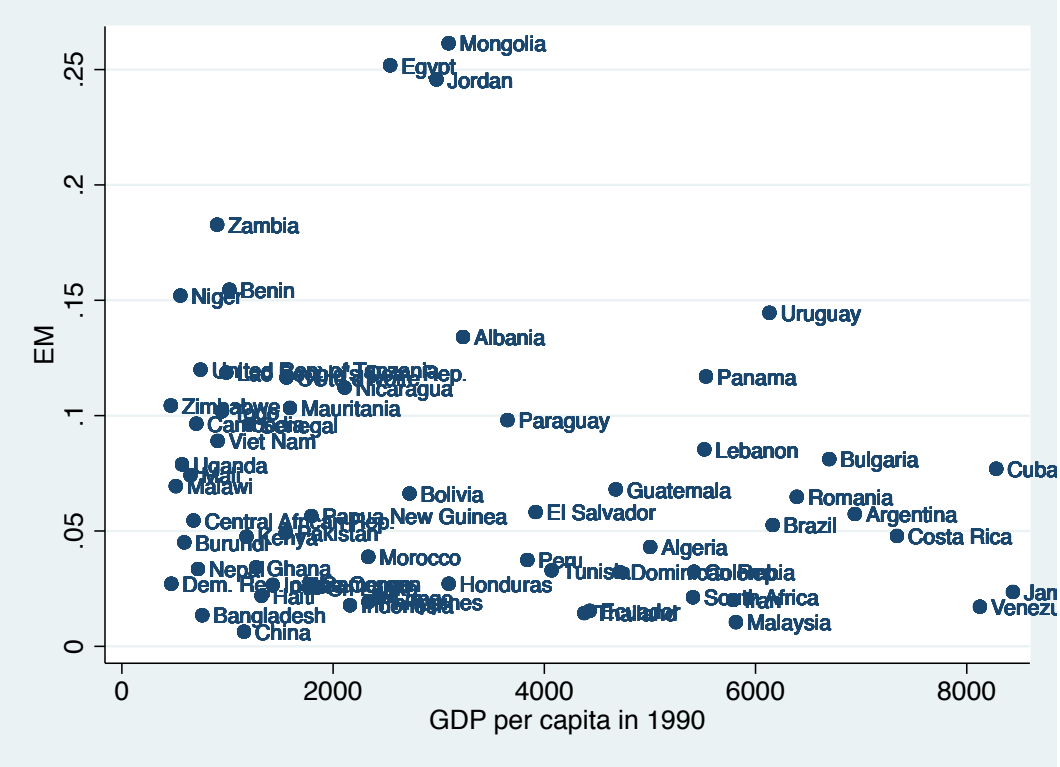



Figure 3: Extensive Margin by Product (EMP) and by Destination (EMD)

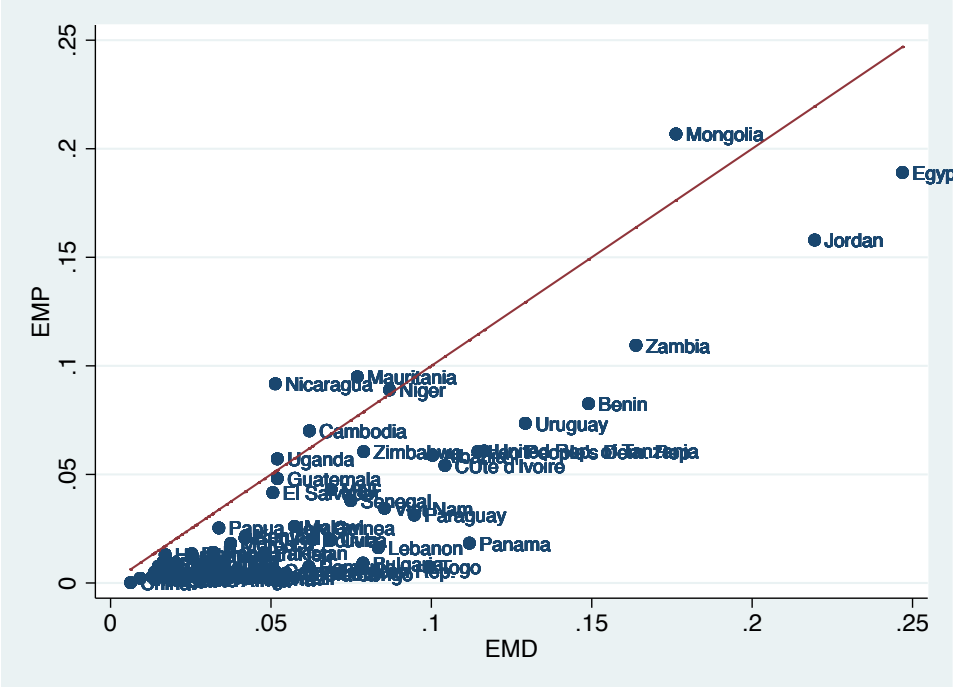
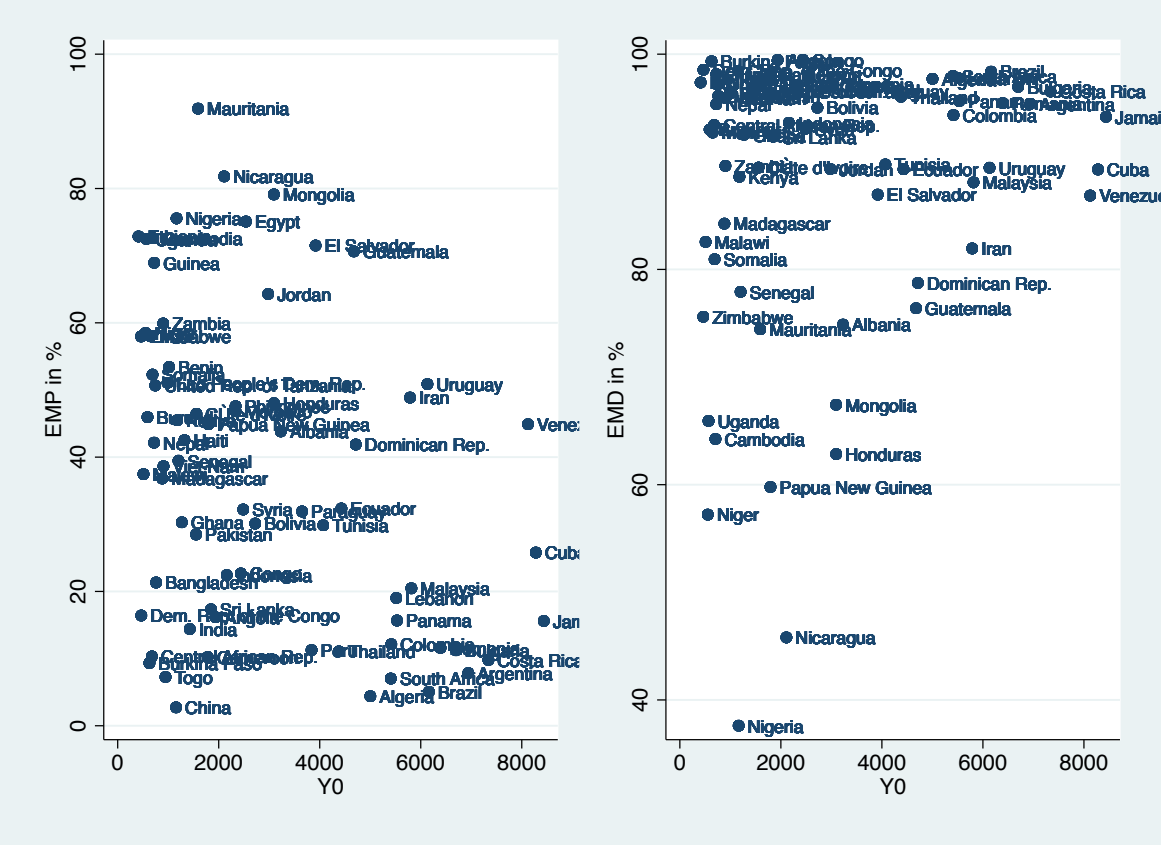


Figure 4: EMP and EMD and in % of EM and the level of GDP per capita in 1990 (Y0)




# 3 Empirical Analysis

## 3.1 The System-GMM estimator

We estimate the augmented Solow model (Mankiw, Romer and Weil, 1992) in order to explain the GDP per capita growth rate ($\Delta y_{i,t}$). The estimated general growth equation is the following:

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta y_{i,0} + \gamma x_{i,t} + \theta_t + d_i + v_{i,t} \tag{5}$$

where $\Delta y_{i,t}$ denotes the log difference of income per capita in period $t$, $y_{i,0}$ is the initial income per capita, $x_{i,t}$ is the vector of explanatory variables, $\theta_t$ represents the time-dummy variables, $d_i$ are the unobserved country-specific effects and $v_{i,t}$ is the residual error component. Equation 5 is estimated by the GMM system developed by Arellano and Bover (1995) and Blundell and Bond (1998). Concerning growth equations, the GMM system is a more efficient estimator than the first-difference GMM estimator (see Hesse, 2008 and Lederman and Maloney, 2003).
Explanatory variables ($x_{i,t}$) consist in the level of education ($SCHOOL$), the population growth rate ($POP$) and the share of investment ($INV$) and trade variables. Trade variables include intensive margin ($IM$, equivalent to $OPOD$), extensive margin ($EM$), extensive margin by new products ($EMP$) and extensive margin by new destinations ($EMD$). Data for investment and population come from the Penn World Table and data for education are extracted from the Barro and Lee database (log of years of schooling). According to the theory, we expect $SCHOOL$ and $INV$ to have a positive impact and $y_0$ and $POP$ to have a negative effect on growth.

To implement estimations, *INV* and *POP* are considered as endogenous variables, $\Delta y_{i,t-1}$ and *SCHOOL* as predetermined variables. The initial GDP per capita ($y_0$) and trade variables are exogenously determined. As instruments, lagged levels and differences up to *t-9* are used[8].

## 3.2 Results

Coefficients in table 2 have the expected signs: *INV* and *SCHOOL* have significant and positive impact on growth. The initial GDP per capita ($Y_0$) has a negative impact on growth and the lag of growth ($\Delta y_{i,t-1}$) and population (*POP*) do not have significant effects on growth. Results show that diversification does not matter for economic growth for our panel of 64 developing countries: coefficients of the intensive margin (*IM*) and the extensive margin (*EM*) are no significant (equations (i) to (v)). Morevoer, it does not matter if a country increases its share of traded goods (*EMP*) or its share of destinations (*EMD*), both are not significant. According to Cadot et al. (2011), the degree of trade specialization decreases with the level of GDP per capita. Furthermore, as shown by the stylized facts, the richest countries tend to develop their destinations more. To take into account the crossed effects between the size of GDP and the diversification of trade, each trade variable is multiplied by the initial GDP per capita: *EM_GDP*, *IM_GDP*, *EMP_GDP* and *EMD_GDP*.

Equations (vi) to (x) of table 2 show that diversification matters for economic growth when we take into account the level of development: for low initial level of development, trade diversifications have a significant and positive effect on growth. This is the case for *EM*, *EMP* and *EMD*. These positive effects decrease with the size of GDP and become negative for higher levels of GDP. According to these results, the poorest countries that diversify their exported products tend to have higher GDP per capita growth than the other countries. Table 2 shows that the effect of product diversification (0.452) is twice as large as the effect of geographic diversification (0.221) for the poorest countries. This result could explain why some poor countries are able to significantly increase their growth rates and why some other countries are not.

To test for robustness, we propose an alternative method to take into account the level of GDP: countries are divided into 2 groups according to their initial level of GDP per capita ($y_0$).

A country $i$ belongs to the "High" group if $y_{0,i} > \bar{Y}$ and to the "Low" group if $y_{0,i} \leq \bar{Y}$. We have two dummy variables:

$$I_h = 1 \quad \text{if} \quad Y_{0,i} > \bar{Y}$$
$$I_l = 1 \quad \text{if} \quad Y_{0,i} \leq \bar{Y}$$

Each trade variable (noted $T$) is then separated into groups (h and l):

$$Th = X \times I_h$$
$$Tl = X \times I_l$$

We use two breakvalues: 1500$ and 2334$ in order to have approximately two-thirds of the rich countries and one-third of the poor countries in the first case and half of the rich and half of the poor countries in the second case. Results are shown in table 3 and confirm that i) diversification contributes to growth for the poorest countries (equation (xi), 0.141) and ii) effects of product

[8] As recommended by Roodman (2009), we take half of the total number of years.

diversification are twice as large as the effects of geographic diversification and (equations (xiv) and (xv), 0.308 and 0.142 respectively). In the last equations, from (xvii) to (xx), there is no significant effect of trade variables on growth for poor and rich countries. It confirms that effects of diversification decrease with the size of GDP.

Table 2: Extensive Margin, GDP and Growth

| | Gr_GDP | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (x) |
| Gr_GDP(1) | 0.0846 | 0.0793 | 0.0793 | 0.0778 | 0.0812 | 0.0815 | 0.0792 | 0.0815 | 0.0827 |
| | (0.178) | (0.209) | (0.209) | (0.216) | (0.196) | (0.201) | (0.209) | (0.204) | (0.193) |
| SCHOOL | 0.0168** | 0.0320** | 0.0320** | 0.0320** | 0.0326** | 0.0344** | 0.0312** | 0.0329** | 0.0339** |
| | (0.0307) | (0.0168) | (0.0168) | (0.0164) | (0.0151) | (0.0317) | (0.0157) | (0.0153) | (0.0248) |
| POP | -0.140 | -0.134 | -0.134 | -0.121 | -0.139 | -0.131 | -0.134 | -0.183 | -0.119 |
| | (0.751) | (0.749) | (0.749) | (0.770) | (0.747) | (0.750) | (0.751) | (0.666) | (0.776) |
| INV | 0.00122* | 0.00101* | 0.00101* | 0.000996* | 0.00101* | 0.00102* | 0.00101* | 0.00105* | 0.00102* |
| | (0.0557) | (0.0870) | (0.0870) | (0.0842) | (0.0909) | (0.0789) | (0.0860) | (0.0661) | (0.0829) |
| Y0 | | -4.42e-06** | -4.42e-06** | -4.32e-06** | -4.52e-06** | | | | |
| | | (0.0465) | (0.0465) | (0.0456) | (0.0470) | | | | |
| EM | | 0.0257 | | | | 0.203* | | | |
| | | (0.608) | | | | (0.0853) | | | |
| IM | | | -0.0257 | | | | -0.0137 | | |
| | | | (0.608) | | | | (0.786) | | |
| EMP | | | | 0.0405 | | | | 0.452** | |
| | | | | (0.580) | | | | (0.0467) | |
| EMD | | | | | 0.0301 | | | | 0.221* |
| | | | | | (0.553) | | | | (0.0635) |
| EM_GDP | | | | | | -6.25e-05* | | | |
| | | | | | | (0.0861) | | | |
| IM_GDP | | | | | | | -4.57e-06** | | |
| | | | | | | | (0.0452) | | |
| EMP_GDP | | | | | | | | -0.000149* | |
| | | | | | | | | (0.0516) | |
| EMD_GDP | | | | | | | | | -6.71e-05* |
| | | | | | | | | | (0.0760) |
| Constant | -0.0477 | -0.0533 | -0.00440 | -0.0545 | -0.0535 | -0.0771* | -0.0425 | -0.0732* | -0.0768** |
| | (0.222) | (0.164) | (0.942) | (0.144) | (0.165) | (0.0507) | (0.464) | (0.0549) | (0.0490) |
| Observations | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 |
| Number of code | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 |
| AB test for AR(1) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| AB test for AR(2) | 0.336 | 0.343 | 0.345 | 0.345 | 0.339 | 0.338 | 0.345 | 0.340 | 0.335 |
| Hansen test | 0.682 | 0.678 | 0.683 | 0.681 | 0.679 | 0.699 | 0.691 | 0.698 | 0.700 |

Robust $p$ values in parentheses: *** if $p < 0.01$, ** if $p < 0.05$, and * if $p < 0.1$.
All estimations include time-dummy variables for each year and allow for robust standard errors.

Table 3: Extensive Margin, Groups of Countries and Growth

| | Gr_GDP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Breakvalue=1500 (41 rich, 23 poor) | | | | Breakvalue=2334 (32 rich, 32 pauvres) | | | |
| | (xi) | (xii) | (xiii) | (xiv) | (xv) | (xvi) | (xvii) | (xviii) |
| Gr_GDP(1) | 0.0807 | 0.0805 | 0.0791 | 0.0813 | 0.0809 | 0.0825 | 0.0789 | 0.0818 |
| | (0.203) | (0.200) | (0.211) | (0.198) | (0.208) | (0.191) | (0.219) | (0.199) |
| SCHOOL | 0.0341** | 0.0319** | 0.0349** | 0.0338** | 0.0362** | 0.0366** | 0.0355** | 0.0362** |
| | (0.0182) | (0.0143) | (0.0153) | (0.0150) | (0.0286) | (0.0163) | (0.0241) | (0.0215) |
| POP | -0.196 | -0.178 | -0.192 | -0.180 | -0.162 | -0.149 | -0.144 | -0.159 |
| | (0.645) | (0.673) | (0.650) | (0.673) | (0.700) | (0.722) | (0.728) | (0.709) |
| INV | 0.00100* | 0.000966* | 0.000979* | 0.000994* | 0.000956* | 0.000962* | 0.000918* | 0.000957* |
| | (0.0774) | (0.0960) | (0.0788) | (0.0875) | (0.0855) | (0.0899) | (0.0957) | (0.0922) |
| Y0 | -3.38e-06* | -1.84e-06 | -3.43e-06* | -3.56e-06* | -3.66e-06* | -1.64e-06 | -3.83e-06* | -3.72e-06* |
| | (0.0951) | (0.327) | (0.0956) | (0.0913) | (0.0607) | (0.397) | (0.0578) | (0.0742) |
| EMh | -0.00989 | | | | -0.00701 | | | |
| | (0.864) | | | | (0.909) | | | |
| EMl | 0.141* | | | | 0.109 | | | |
| | (0.0837) | | | | (0.216) | | | |
| IMh | | -0.0398 | | | | -0.0458 | | |
| | | (0.412) | | | | (0.344) | | |
| IMl | | -0.0198 | | | | -0.0254 | | |
| | | (0.684) | | | | (0.608) | | |
| EMPh | | | -0.0128 | | | | -0.00860 | |
| | | | (0.877) | | | | (0.923) | |
| EMPl | | | 0.308** | | | | 0.181 | |
| | | | (0.0478) | | | | (0.216) | |
| EMDh | | | | -0.00326 | | | | -0.00270 |
| | | | | (0.960) | | | | (0.968) |
| EMDl | | | | 0.142* | | | | 0.126 |
| | | | | (0.0864) | | | | (0.169) |
| Constant | -0.0624* | -0.0300 | -0.0639* | -0.0619* | -0.0667* | -0.0376 | -0.0648* | -0.0667* |
| | (0.0968) | (0.592) | (0.0815) | (0.0994) | (0.0915) | (0.540) | (0.0794) | (0.0926) |
| Observations | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 | 1.152 |
| Number of code | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 |
| AB test for AR(1) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| AB test for AR(2) | 0.340 | 0.340 | 0.344 | 0.339 | 0.339 | 0.334 | 0.343 | 0.336 |
| Hansen test | 0.697 | 0.702 | 0.689 | 0.704 | 0.701 | 0.708 | 0.695 | 0.706 |

Robust $p$ values in parentheses: *** if $p < 0.01$, ** if $p < 0.05$, and * if $p < 0.1$.
All estimations include time-dummy variables for each year and allow for robust standard errors.

# 4 Conclusion

This article analyses the relationship between trade, diversification and growth. In line with Lederman and Maloney (2003), Herzer and Nowak-Lehnmann (2006), Hesse (2008), Saviotti and Frenken (2008) and Papageorgiou and Spatafora (2012), the results confirm that trade diversification matters for economic growth. However, in this article, we have distinguished between geographic and product diversifications and between poor and rich developing countries. We show that only poor countries benefit from diversification. The impact on growth is greater if poor countries develop their share of new export products relative to their share of geographic diversification. These results are important to enhance the development of very poor countries and suggest the implementation of economic policy in favor of new export products.

# References


Alcalá, F., and A. Ciccone (2004): "Trade and Productivity," *The Quarterly Journal of Economics*, 119(2), 612–645.

Amurgo-Pacheco, A., and M. D. Pierola (2008): "Patterns of export diversification in developing countries : intensive and extensive margins," Policy Research Working Paper Series 4473, The World Bank.

Arellano, M., and O. Bover (1995): "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics*, 68(1), 29–51.

Ben-David, D. (1996): "Trade and convergence among countries," *Journal of International Economics*, 40(3-4), 279–298.

Ben-David, D., and M. B. Loewy (1998): "Free Trade, Growth, and Convergence," *Journal of Economic Growth*, 3(2), 143–70.

Benhabib, J., and M. M. Spiegel (1994): "The Role of Human Capital in Economic Development Evidence from Aggregate Cross-country Data," *Journal of Monetary Economics*, 34(2), 143–173.

Blundell, R., and S. Bond (1998): "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics*, 87(1), 115–143.

Brenton, P., and R. Newfarmer (2007): "Watching more than the Discovery channel : export cycles and diversification in development," Policy Research Working Paper Series 4302, The World Bank.

Cadot, O., C. Carrre, and V. Strauss-Kahn (2011): "Export Diversification: What's behind the Hump?," *The Review of Economics and Statistics*, 93(2), 590–605.

Coe, D. T., and E. Helpman (1995): "International R&D Spillovers," *European Economic Review*, 39(5), 859–887.

Coe, D. T., E. Helpman, and A. W. Hoffmaister (2009): "International R&D spillovers and institutions," *European Economic Review*, 53(7), 723–741.

Dollar, D. (1992): "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985," *Economic Development and Cultural Change*, 40(3), 523–44.

Edwards, S. (1998): "Openness, Productivity and Growth: What Do We Really Know?," *Economic Journal*, 108(447), 383–98.

Feenstra, R., and H. L. Kee (2008): "Export variety and country productivity: Estimating the monopolistic competition model with endogenous productivity," *Journal of International Economics*, 74(2), 500–518.

Gaulier, G., and S. Zignago (2009): "BACI: International Trade Database at the Product-level: The 1994-2007 Version," Working Paper 2009-05, CEPII Research Center.

Grossman, G. M., and E. Helpman (1990): "Trade, Innovation, and Growth," *American Economic Review*, 80(2), 86–91.

Grossman, G. M., and E. Helpman (1991a): *Innovation And Growth in the Global Economy*. Cambridge MA: MIT press.

Grossman, G. M., and E. Helpman (1991b): "Quality Ladders in the Theory of Growth," *Review of Economic Studies*, 58(1), 43–61.

Hausmann, R., J. Hwang, and D. Rodrik (2007): "What you export matters," *Journal of Economic Growth*, 12(1), 1–25.

Herzer, D., and N.-L. Felicitas (2006): "What does Export Diversification do for Growth? An Econometric Analysis," *Applied Economics*, 38(15), 1825–1838.

Hesse, H. (2008): "Export Diversification and Economic Growth," Working Paper 21, Commission on Growth and Development.

Imbs, J., and R. Wacziarg (2003): "Stages of Diversification," *American Economic Review*, 93(1), 63–86.

Lederman, D., and W. F. Maloney (2003): "Trade structure and growth," Policy Research Working Paper Series 3025, The World Bank.

Mankiw, N. G., D. Romer, and D. N. Weil (1992): "A Contribution to the Empirics of Economic Growth," *The Quarterly Journal of Economics*, 107(2), 407–37.

Papageorgiou, C., and N. Spatafora (2012): "Economic Diversification in LICs: Stylized Facts and Macroeconomic Implications," IMF Staff Discussion Notes 12/13, International Monetary Fund.

Rivera-Batiz, L. A., and P. M. Romer (1991): "Economic Integration and Endogenous Growth," *The Quarterly Journal of Economics*, 106(2), 531–55.

Roodman, D. (2009): "How to do xtabond2: An introduction to difference and system GMM in Stata," *Stata Journal*, 9(1), 86–136.

Saviotti, P., and K. Frenken (2008): "Export Variety and the Economic Performance of Countries," *Journal of Evolutionary Economics*, 18(2), 201–218.

Slaughter, M. J. (1997): "Per Capita Income Convergence and the Role of International Trade," NBER Working Papers 5897, National Bureau of Economic Research, Inc.

Wacziarg, R., and K. H. Welch (2008): "Trade Liberalization and Growth: New Evidence," *World Bank Economic Review*, 22(2), 187–231.

# Appendix

Table 4: Intensive and Extensive Margin for groups of countries (in %)

| | OPOD | OPND | NPOD | NPND |
|---|---|---|---|---|
| East Asia & Pacific | 93.1 | 2.8 | 1.5 | 2.6 |
| Europe & Central Asia | 90.7 | 6.8 | 1.3 | 1.2 |
| Latin America & Caribbean | 94.2 | 3.6 | 0.8 | 1.4 |
| Middle East & North Africa | 89.7 | 4.5 | 0.6 | 5.2 |
| South Asia | 97.0 | 2.2 | 0.1 | 0.7 |
| Sub-Saharan Africa | 91.8 | 4.2 | 1.2 | 2.8 |
| Total | 92.9 | 3.8 | 1.0 | 2.4 |

Country data are available upon request.