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Export diversification and Regionalization of Trade: what are the destinations of newly exported goods?

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Abstract:

This paper studies the extent to which export diversification is related to the regionalization of trade by examining the destination pattern of newly exported goods. Using a panel database of bilateral trade between 123 countries of 1057 HS4 manufacturing goods over the period 2000-2010, I first show that for almost all countries in the sample, the destinations of newly exported goods are on average more "accessible" in terms of distance, language or tariffs preferences compared to destinations of traditional goods. Based on a theoretical gravity model, I identify two types of factors that explain this stylized fact. First, newly exported goods incur a costly discovery phase during which it is only profitable to export towards the most accessible markets (transitional regionalization). Second, newly exported goods emerge in industries in which countries have an export comparative disadvantage, i.e. high permanent production and export costs (structural regionalization). Empirically, I find evidence for both types of factors. It follows that export diversification is, at least partially, structurally associated with trade regionalization and deep regional trade agreements are conductive to newly exported goods.

Keywords: Export diversification, trade costs, new exported goods, regional trade

JEL Classification: F1, 01

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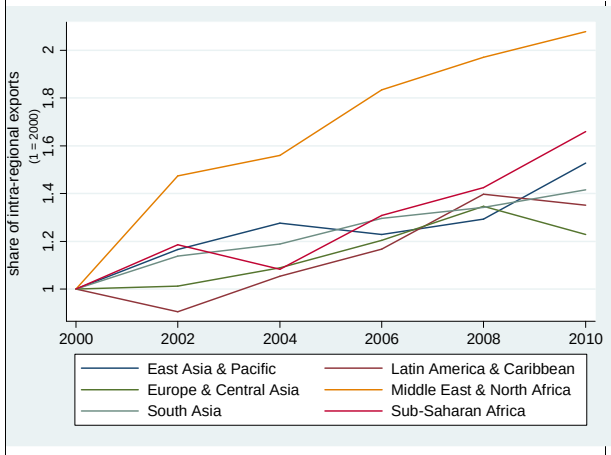
1. Introduction

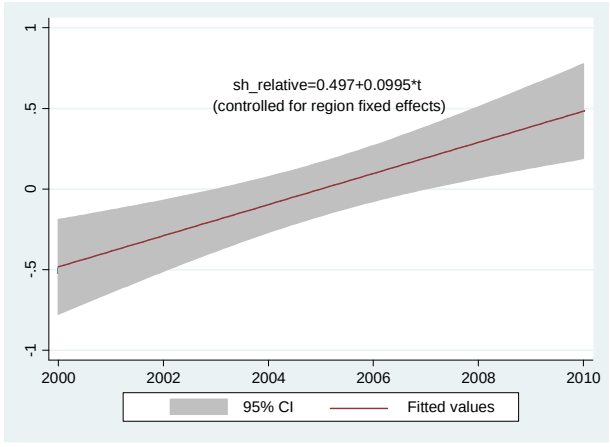
There are two trends in the recent evolution of developing countries' trade which are contradictory at first sight. First, the share of developing countries in world trade and the number of products exported by these countries has grown substantially during the last decade. Second, whereas trade growth should lead to greater market expansion, developing countries regionalize their trade, i.e. export increasingly to geographically close destinations (Carrere et al., 2012; Brun et al, 2005; Disdier and Head, 2008; Berthelon and Freund, 2008) [2]. In their paper on African exports, Easterly and Reshef (2010) comment "From 1994 to 2008 exports of goods per capita from Sub-Saharan Africa have increased more than fourfold, or 13% per year on average. Much of the African export growth is regional. The share of exports from the average Sub-Saharan country to destinations outside Sub-Saharan Africa has steadily declined from 71% in 1994 to 53% in 2008". This growth of regional trade is higher than expected given the relative economic growth of these regions (see figure 1). This observation raises the concern of the integration of developing countries into world trade markets (Freund and Ornelas, 2010). However, if regional markets are the main destinations of newly exported goods (as they are often the most accessible in terms of transport costs and tariffs), this regionalization would be the natural consequence of the increasing exports diversification of developing countries. In this paper, I study the destinations and the performance in terms of market expansion of newly exported goods.

Figure 1: Evolution of the share of intra-regional trade between 2000 and 2010.

a) Evolution of the share of intra-regional trade in developing regions



b) Time trend of the share of intra-regional trade in developing regions, once controlled for "potential intra-regional" trade due to regional economic growth *



Source: author's computations based on CEPII's panel database of bilateral trade.
*Sh_relative is the share of intra-regional trade divided by the potential share of intra-regional trade. The potential share of intra-regional trade is the ratio between potential exports within the region and total potential exports. Potential bilateral exports are computed as the product of GDPs of the importer and of the exporter divided by the bilateral distance. Coefficients on the linear prediction in figure b are significant at 1%. t is the time trend.

[2] The regionalization of trade is related to the increase of the distance-elasticity of bilateral trade over time highlighted by a large strand of literature, the so-called "distance puzzle" (Carrere et al., 2012; Brun et al, 2005; Disdier and Head, 2008).

The paper starts by highlighting a striking stylized fact. For 96% of countries in the sample of 123 countries, the average distance of destinations of newly exported goods over the period 2000-2010 is lower than the distance of traditional exports. Moreover, destination countries of these new goods are twice as likely to be contiguous and are relatively more likely to have a common language or to be part of a trade agreement with the exporting country than the destinations of traditional goods.

To explain this observation, I develop a model similar to Helpman et al. (2008) but at the country-industry level instead of country level. In this model, there is a continuum of products in each industry and I focus on the determinants of countries' decision of exporting their goods across destinations. Countries sell their goods only in destinations where the export revenue generated overcome the trade costs. These trade costs vary across destinations mainly according to bilateral trade barriers. I define a "destination ladder" on which destination countries are ranked from most accessible at the bottom to least accessible at the top according to bilateral trade barriers. In each country, exported products are homogeneous within industries but differ across industries according to production costs, fixed export costs and sensitivity to bilateral trade barriers. These factors determine how far up the ladder goods can "climb" and in this way define how many destination markets they can reach on their way up. Goods in industries with low production costs, export costs and sensitivity to trade barriers generate higher export revenues and therefore penetrate a higher number of destinations among which there are also the least accessible ones.

Moreover, in the model, I consider that the export process of a product includes a succession of phases, the first one being the discovery phase as in Brenton and Newfarmer (2007) and in the literature on the product cycle (Vernon, 1966). I assume that when goods are "discovered", i.e are exported for the first time, they face a discovery cost similar to an additional fixed entry cost in destination markets. This assumption is in line with the literature on export discoveries (e.g. Freund and Pierola 2010, Hausmann and Rodrik, 2003; and Klinger and Lederman, 2004, 2006). From this model, two possible explanations emerge to account for the observation that new goods are exported to the most accessible destinations: new goods incur a costly discovery phase and new goods are in industries which generate low export profit, i.e. incur high domestic production and fixed export costs or are more sensitive to bilateral trade barriers.

Using a panel of 123 trading partners and 1057 HS4 products over the period 2000-2010, I test these predictions in two steps. First, I determine if newly exported goods, i.e. goods which have not been exported before the period 2000-2010, are exported towards most accessible destinations only during the costly discovery phase (defined as the two first years of export) or permanently. To this end, I study the relationship between the share of new goods in bilateral exports and bilateral trade cost variables before and after the discovery phase[3]. I find a significant negative impact of trade costs on the share of new goods, and a weak mitigation of this effect after the discovery phase. This result reveals that destinations of newly exported goods remain more accessible than destinations of traditional goods after their discovery phase. It suggests that newly exported goods have higher domestic production and fixed export costs or higher sensitivity to bilateral trade barriers than traditional goods.

Second, to identify production costs, fixed export costs and sensitivity to bilateral trade barriers of industries where newly exported goods have emerged, I study the determinants of the probability that

[3] If new goods are exported to the same type of destinations than traditional goods, the relative number of new goods in bilateral exports shouldn't vary with bilateral trade costs.

a country enters markets with goods in each HS2 industry (90 regressions). I introduce country fixed effects in each industry regression which capture country-specific production costs and fixed export costs and I estimate sensitivity to trade barriers in each industry. I then examine the number of newly exported goods across industry's estimated production and export costs and industry's estimated sensitivity to trade barriers. I find no significant differences of sensitivity to trade barriers between industries where most new goods have emerged and industries composed of a majority of traditional goods. However, most newly exported goods have emerged in industries where domestic production and fixed export costs are high. For example, Pakistan has a very high share of newly exported goods in the industry of "photographic and cinematographic goods (HS37)", one of the most costly industries in terms of production costs and export fixed costs in this country. Similarly, India' new goods are concentrated in industries with highest estimated domestic production and fixed export costs, as for example in "Rails, tramway and locomotives". In each industry regressions, I also evaluate the sensitivity of exports to trade barriers, production costs and export costs during the discovery phase. I find higher fixed export costs, similar across destinations, during the discovery phase in a majority of industries, which reflect the discovery costs.

The paper is located at the intersection between the recent literature on the dynamic of firms' exports and the literature on newly exported goods (Hausmann and Rodrik, 2003; Klinger and Lederman, 2004, 2006). It provides a structural framework for the study of the destination pattern of newly exported goods and of their export dynamics. On the one hand, as in the literature on export discoveries, I focus on export diversification of developing countries towards manufacturing goods and therefore I examine new exports in a more aggregated view than firm level studies. On the other hand, as in the literature on firms' exports, I study the geographical expansion of exports across markets. However, compared with this literature, I do not analyze exports of goods which do not survive after the first year as I focus on structural consequences of export diversification on the destination pattern of exports[4].

In parallel, a growing literature shows that export expansion of existing products towards geographical markets is a more important share of export growth than export diversification in terms of products (Evenett and Venables, 2002; Besedes and Prusa, 2011; Shepherd, 2010; Brenton and Newfarmer, 2007). This paper contributes to this literature by showing that the expansion of new products across markets is relatively low. In that sense, it shows that, while export diversification may be viewed as a way to mitigate the volatility of export revenues and to promote growth (as shown by Loayza and Raddatz, 2007; Haddad, Lim and Saborowski, 2010; Di Giovanni and Levchenco, 2009 and 2010), it is not a driving force of the geographical expansion of exports across markets.

The rest of the paper is as follows. Section 2 presents data and examines the pattern of destinations of newly and traditionally exported goods, section 3 presents the theoretical framework and section 4 tests its predictions. Section 5 concludes.

[4] Whereas the literature on newly exported goods ignores the geographical dynamic of exports, the literature on firm's exports scarcely examines the specific dynamics of newly exported goods (an exception is Freund and Pierola, 2010). The literature on firms' exports shows the need of firms to experiment as exporters in one market before they extend exports to other international destinations (Eaton et al, 2008; Cadot et al, 2011) and examines the sequential dynamics in exporting firms' destinations (Defever et al, 2011). This literature has motivated a number of theoretical papers to model fixed costs and uncertainty related to firms' first exports (Albornoz et al, 2012; Krautheim, 2012, Morales, 2011). Uncertainty is needed because it explains high entry and exit rates during the first year of export. Here, I study only the new goods which are exported more than three years after their discovery and therefore I do not assume uncertainty in the export process of goods.

2. Newly exported goods and Regional Destinations.

This section provides definitions for newly and traditionally exported goods (or "new" and "traditional" goods) and shows that new goods are exported towards markets relatively more accessible than the markets of traditional goods.

2.1. Data and definitions.

I study the destination pattern of newly exported goods using CEPII's panel database of bilateral trade between 123 countries (97 developing countries) over the period 1995-2010[5]. Originally, these data are disaggregated at the HS6-level (4998 lines) but I aggregate to the HS4 (around 1241 lines) level to ensure that differences between lines reflect differences between products and not differences between varieties of the same product. This also allows to iron out potential statistical inconsistency of HS6 data for low-income countries highlighted by Easterly and Reshef (2010). As export discoveries are mainly manufacturing goods, I keep only the 1057 HS4 lines (over the 1241) that correspond to manufacturing goods[6].

I use two main definitions for new goods. The first and preferred definition states that a good is "new" for an exporting country over the period 2000-2010 if it is exported for at least three consecutive years over this period (with no more than one year of interruption) after not having been exported at all for a minimum of two years[7]. Alternatively I use a second and stricter definition which states that goods are "new" if they are exported at least during three consecutive years over the period 2000-2010 (with no more than one year of interruption) and have not been exported by the country at least during the five-year benchmark period of 1995-1999[8]. I denote respectively new^{large} and new^{strict} the new goods as defined by the "large" (the first one) and the "strict" (the second one) definition. Importantly, as I want to compare destinations of new goods with destinations of traditional goods independently to the age of new goods, when a good is defined as "new", it cannot become "traditional" over the period.

[5] BACI CEPII's panel database on disaggregated bilateral trade flows) is constructed using an original procedure that reconciles the declarations of the exporter and the importer. Original data are provided by the United Nations Statistical Division (COMTRADE database). The harmonization procedure enables to extend considerably the number of countries for which trade data are available, as compared to the original dataset. All 123 countries have at least one export discovery during the 2000-2010 period.

[6] I build a correspondence table between the HS4 classification and the ISIC Rev.3 classification using correspondence table between the HS6 classification and the CPC classification and between the CPC classification and the ISIC Rev.3 classification. Then, I keep goods belonging to chapters 15-97 of the ISIC Rev.3 classification (manufactures) except chapter 23:" Manufacture of coke, refined petroleum products and nuclear fuel".

[7] This definition is close to this used by Klinger and Lederman (2011). These authors define "export discoveries", which are equivalent to "new goods" in this paper, as goods which were not exported by the country over 1994–1996, were exported at least one year over the period 1997-2002 and are exported both in 2002 and in 2003.

[8] In line with the high exit rate after the first entry found in the literature on firms' exports, in my sample, a high proportion of goods newly exported stop being exported the year following their first entry (Table B.1 and B.2 of the appendix B).This high exit rate after the first export is explained in the theoretical literature by the uncertainty faced by new exporters regarding their potential export profit. By taking only goods which survived at least three years, I remove from my sample these "export trials" so to focus on the sustained export of new products. Similarly, Klinger and Lederman (2011) keep only "established discoveries". Note that the main results of this paper also hold without this restriction.

Traditional goods of an exporting country are the complement of new goods, i.e. are the goods which are positively exported over the period but are not "new" according to the above definition.

Both definitions of "new goods" have their advantages. The "strict" one identifies the export of goods never exported previously by the country (at least since 1995), whereas the "large" one includes also products where export trials could have occurred previously but have failed. For that reason, the "large" definition could be biased towards low-productivity goods. However, the "strict" definition limits sharply the number of new goods by country and therefore makes difficult the econometric identification of a pattern of new goods' destinations. Besides, with this last definition, a large number of goods are marked as traditional, including goods which are only exported a few years over the period.

The period 1995-1999 is used as the benchmark period for the strict definition of new goods so I restrict my analysis of the pattern of destinations to the 2000-2010 period while new goods' first entry could only occur between 2000 and 2008 (as I keep only those exported at least during three years). This period of time, dictated by data availability, seems adequate to examine the evolution of destinations of newly exported goods as the literature examining new exporting firms has shown that most either fail the first year they export, or rapidly expand their exports (Albornoz et al., 2012, Eaton et al., 2008, Freund and Pierola, 2010). This issue is discussed further in section 4.2 when I define the length of phases of the export process.

2.2. Stylized patterns.

Table 1 shows the average number of new goods over the period 2000-2008 by income categories. Low-income and Lower Middle income countries have strongly increased their number of exported goods. For these countries, the number of new goods discovered between 2000 and 2008 represents respectively 37.8% and 25.3% of the number of their traditional goods, according to the "large" definition. According to the "strict" one, these shares are of respectively 4.5% and 2.9%. A similar table disaggregated at the level of geographic regions in Appendix B (table B.4) shows that export diversification is especially high in countries from Sub-Saharan Africa and South Asia.

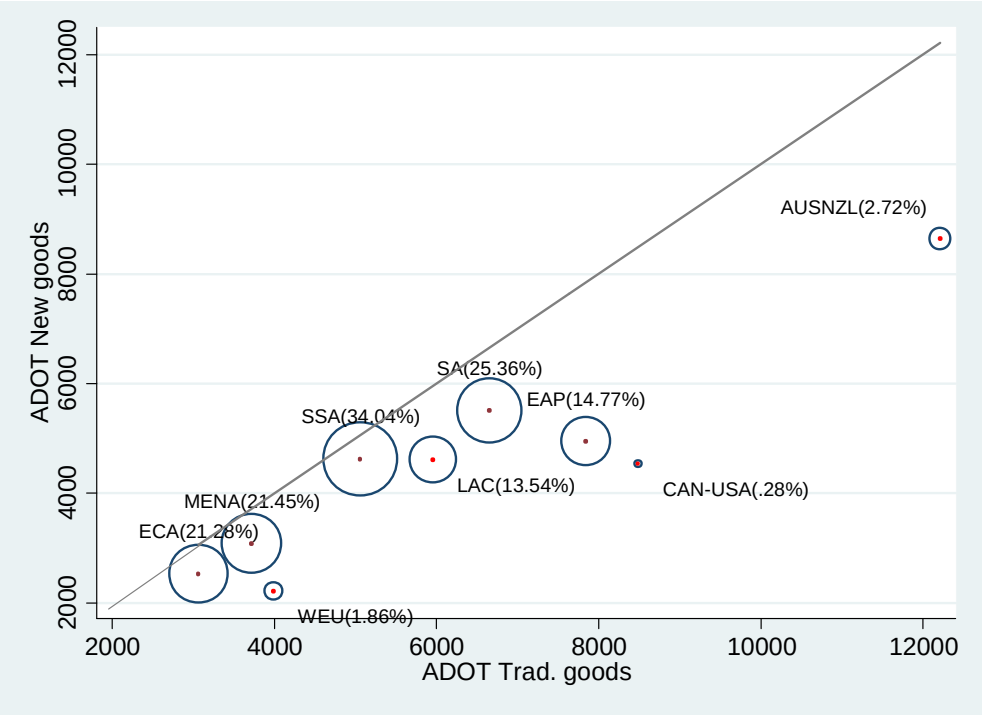
Table 1: Number of new and traditional goods by income group, over the 2000-2008 period (average by country and income group) *

Income Group	**New^{large}**	**Trad.^{large}**	**% new goods**	**New^{strict}**	**Trad.^{strict}**	**% new goods**
	(1)	(2)	(1)/(2)	(4)	(5)	(4)/(5)
Low income	130.7	367.7	37.8%	26.7	612.3	4.5%
Lower middle income	127.2	624.6	25.3%	21.9	830.3	2.9%
Upper middle income	79.8	805.1	12.9%	11.7	926.3	1.5%
High income	29.2	1002.8	3.5%	2.2	1042.0	0.2%

* HS4: 1054 potential lines

I now compare destinations of exports of new and traditional goods to evaluate to which extent new goods are exported towards regional destinations compared to traditional goods. For each country i, I first compare the average distance of destinations ($ADOT_{it}$) where new goods and traditional goods are exported using the number of exported goods as weights.

Figure 2: Average distance of trade (ADOT) of new* and traditional goods by region (average over 2000-2010)**.



Notes: * "large" definition of new goods as defined in section 2.1. ** The marker size reflects the average diversification rate (in brackets next to regions' name) over the period. For example, 25.36% for SA means that, in South Asian countries, the number of newly exported goods over the period represents on average 25.36% of the traditional goods. AUSNZL: Australia and New Zealand ; EAP: East Asia and Pacific; ECA: Europe and Central Asia; MENA: Middle East and North Africa; CAN-USA: Canada and USA; SA: South Asia; SSA: Sub-Saharan Africa ;WEU: Western Europe.

Figure 2 plots for each region the average distance of countries' new exports (y-axis) against the average distance of countries' traditional exports (x-axis) over the 2000-2010 period for the large definition of new goods. The farther a country is from the origin, the higher the average distance of this country's exports, so countries far from the biggest world markets (e.g. New Zealand and Australia) are the farthest from the origin. All regions are below the 45° line indicating that exports of new goods are on average to closer markets than exports of traditional goods. Figure B.1 in appendix B replicates Figure 2 at the country-level instead of the region-level and shows that for a large majority of countries (96%) new goods are exported on average to geographically closer destinations. Similar results hold with the strict definition of new goods (see Figure B.2).

The pattern in Figure 2 captures two effects. First, there are some destinations, relatively far away, where only traditional goods are exported. Therefore, $ADOT^{new}$ is not computed over the same set of destinations as $ADOT^{trad}$ and some far away destinations do not to attract new goods. Second, among the destinations where new goods are exported, new exports are relatively more concentrated on close destinations than traditional exports.

Table 2: Comparison of trade partners between new and traditional goods (large definition)

	Obs.	$Dist_{ij}$	$Contig_{ij}$	$comlang_{ij}$	RTA_{ijt}	$Deepness\_RTA_{ijt}$	$gdppc_{jt}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Av. ratio: New/Trad	123	0.78	2.36	1.38	1.53	1.77	0.99
T-test (for difference from 1)		a/	a/	a/	a/	a/	-

a/ denotes estimates significant at 1%. $Dist_{ij}$ is the bilateral distance between countr y i and j, $contig_{ij}$ is a dummy for contiguity, $comlang_{ij}$ is a dummy for common language, RTA_{ijt} is a dummy for a regional trade agreement, $Deepness\_RTA_{ijt}$ is an index reflecting the level of integration of the agreement and gdp_{jt} is the GDP per capita in Purchasing Power Parity of the importer j. Further information about these variables is provided in section 4.2.

Table 2 explores further the destinations of new and traditional exports according to average values for variables included in gravity estimates. This table shows ratio between the average value of each gravity variable for new goods and for traditional goods. Figures suggest that new goods are exported relatively more toward: geographically close destinations compared to traditional goods (column 1), on destinations with a common border (column 2), a common language (column 3) and/or with whom the degree of trade integration is relatively high (columns 4 and 5). For example, new goods are 2.36 times more likely to be exported towards a contiguous destination than traditional goods. However, there is no significant difference of GDP per capita between destinations of new and traditional goods (column 7). This finding is common to a large majority of countries, independently of their income or region. It supports the idea that export diversification, i.e. the emergence of new exports, leads to a regionalization of trade regardless of income levels. To examine factors that could explain that new goods are exported on accessible destinations, a theoretical framework is useful.

3. The pattern of destinations of exports: A theoretical framework.

In this section, I develop a gravity model which provides the determinants of a country's decision of exporting a product across destinations. By distinguishing production costs, fixed export costs and sensitivity to trade barriers between industries and adding discovery costs during the discovery phase of exported goods, the model provides factors that could explain why new goods are exported on most accessible destinations compared to traditional goods. The building blocks of the model are presented in section 3.1. and destination patterns for new and traditional goods are explored in section 3.2..

3.1. The model

The model takes a similar framework to Helpman et al (2008), but at the industry level. It also borrows from Freund and Pierola (2010) and Hausmann and Rodrik (2003) the assumption of a specific cost incurred by countries during the discovery phase in the export process, called export discovery cost. I also follow Morales (2011) and Krautheim (2012) who, consistently with observations, assume that fixed export costs are increasing with gravity variables related to trade costs.

I focus on a given country industry z characterized by the standard Dixit-Stiglitz assumption of monopolistic competition[9]. There is a continuum of (representative) homogeneous firms in this industry, each producing a single differentiated good k. Firms in an industry only differ according to their "age" as an exporter. I assume that some just start to export their good k for exogenous reasons[10] while some others already export their goods since several years. When firms are new as exporter, their exported good are also new for the country, i.e. weren't exported by the country before. Similarly to the literature on the product cycle (Vernon, 1966) I call the first phase of an exported good in the export process "discovery phase". All consumers in the world have the same CES sub-utility function across goods in each industry, $\pm > 1$ being the elasticity of substitution between goods. International trade barriers between i and j, τ_{ij}, are a source of iceberg trade costs, $\tau_{ij}^{\dagger(z)}$, which vary across industries, with $\dagger(z)$ the elasticity of trade costs to trade barriers in industry z. Profit maximization implies that the price in country j for good k exported by i, $p_{ij}(k,z)$ is proportional to iceberg trade costs and to the unit cost incurred by firms of country *i* exporting goods from industry z, $c_i(z)$:

$$p_{ij}(k,z) = \frac{\pm}{\pm - 1} c_i(z) \tau_{ij}^{\dagger(z)} \quad (1)$$

The firm producing *k* in country *i* decides to export to country *j* if and only if it generates enough revenue to overcome the fixed cost of exporting good k from *i* to *j*, $F_{ij}(k,z)$. I denote $r_{ij}(z)$ the export revenue in destination country *j* for a good in country *i*'s industry *z*. It takes the following form:

$$r_{ij}(z) = E_j(z)\left(\frac{\pm}{\pm - 1}\frac{P_j(z)}{c_i(z)\tau_{ij}^{\dagger(z)}}\right)^{\pm - 1} \quad (2)$$

Where $E_j(z)$ is the expenditure in country j on industry z[11] and $P_j(z)$ the CES price index in the importer's market. The revenue for firms in country *i* exporting goods to destination *j* increases with consumers' expenditures ($E_j(z)$) and the price index ($P_j(z)$) in the destination market, and decreases with variable trade costs ($\tau_{ij}^{\dagger(z)}$) and unit production costs ($c_i(z)$). The model is fully developed in appendix A.

The fixed cost of exporting good k faced by the firm every year has two components. The first one is a national permanent fixed export costs, specific to the exporting country's industry, and is incurred by any firm from the country which exports a good from this industry towards any destination. This cost includes, among other costs, dealing with administrative procedures, paying workers with export skills. The second component, destination-specific, is the costs of entry on a specific market. Given that fixed entry costs are likely to be higher the more different and far the destination market is from

[9] I take the model at the industry level rather than country level so that all determinants of bilateral exports could differ between industries (empirical equivalents of industries are HS2 groups of products, and products are HS4 lines). It is convenient to group products into broader industries reflecting potential comparative advantages to examine differences of new and traditional goods for given comparative advantages. Similarly, Klinger and Lederman (2011) group products into 10 categories defined by Leamer (1984) and these categories should reflect potential comparative advantage and be associated with different relative factor endowments. As I have only manufacturing products, Leamer's classification may not be appropriate in my case. Therefore, I rather follow Freund and Pierola (2012) who examine pattern of comparative advantages across HS2 industries.

[10] Factors of export diversification are discussed in Imbs and Wacziarg (2003, 2012), Cadot et al (2011) and Brenton et al (2009).

[11] With a two-tier utility function leading to constant expenditure shares by industry z, the aggregate expenditure on a given industry in country j is proportional to the income in this country.

the home country (e.g., paying for foreign marketing campaigns and study of market preferences may be higher in far and different markets), this specific destination costs is assumed, in line with the empirical literature, to be increasing with gravity variables related to trade costs, so that they increase with bilateral trade barriers τ_{ij} [12].

In addition, I assume that when a firm exports a good which has never been exported from the exporting country before, it incurs export discovery costs. These discovery costs have the same form as additional fixed export costs and are only incurred during the discovery phase of the good. Discovery costs account, among other factors, for the costs of building distribution networks, hiring workers with specific skills (e.g. knowledge of foreign languages), and acquiring information about country-specific preferences and legal requirements needed to commercialize the product. As permanent fixed export costs, this discovery cost has a national component and a destination-specific component[13].

Thereby, denote $disc_i(k,z)$, a variable equal to one if good k of industry z exported by *i* is in the discovery phase, and zero otherwise. Fixed export costs of a good k exported from *i* to *j* take the following form:

$$\ln F_{ij}(k,z) = \begin{cases} \ln F_i^{perm}(z) + \ln F_i^{disc}(z) + \left(\circ^{perm}(z) + \circ^{disc}(z)\right)\ln \tau_{ij} & \text{if } disc_i(k,z) = 1 \\ \ln F_i^{perm}(z) + \circ^{perm} \ln \tau_{ij} & \text{if } disc_i(k,z) = 0 \end{cases} \quad (3)$$

Where $F_i^{disc}(z)$ and $F_i^{perm}(z)$ are respectively the discovery cost and the permanent fixed export cost of country *i* in industry z that are independent of destinations. Moreover, in (3), $\circ^{disc}(z)$ and $\circ^{perm}(z)$ are the sensitivity of respectively discovery costs and permanent fixed export costs to bilateral trade barriers in industry z. The resulting export profit takes the following form:

$$\pi_{ij}(k,z) = \frac{1}{\sigma} r_{ij}(z) - F_{ij}(k,z) \quad (4)$$

This profit is positive if and only if:

$$\ln\left(\frac{r_{ij}(z)}{\sigma F_{ij}(k,z)}\right) \geq 0 \quad (5)$$

Operating profits are positive for sales in the domestic market because $F_{ii} = 0$, so that all the goods of country i are sold domestically.

3.2. Determinants of the destination pattern of exports.

Country decisions to export goods towards destinations are a conditional function of profit, with positive exports of k from *i* to *j* if the profit defined in (4) is positive i.e. if (5) holds. Denote $PX_{ij}(k,z)$ a

[12] According to the empirical literature, fixed/sunk costs to export to markets could decrease with: the number of goods the firm already exports to this market (Eaton et al, 2008); the number of other domestic firms exporting in this market (Cadot et al., 2011); distance and cultural similarities (Defever et al., 2011; Morales et al, 2011; Albornoz et al. , 2012). This results in the introduction of fixed entry costs increasing with gravity variables (Evenett and Venables, 2002; Morales, 2011).

[13] Similarly, Brenton, et al., 2009 use contiguity, proximity and common language as variables which influence the search cost of buyers for a new good.

variable equal to one when the good k of country i is exported to destination j and zero otherwise. Except where needed, the 'z' notation is suppressed. Variable $PX_{ij}(k)$ takes the following expression:

$$PX_{ij}(k) = 1\left(\ln\left(\frac{r_{ij}}{\pm F_{ij}(k)} \right) \geq 0 \right) = \begin{cases} \Gamma\left(\underset{-}{\tau_{ij}}, \underset{+}{P_j}, \underset{+}{E_j}, \underset{-}{c_i}, \underset{-}{F_i^{perm}}, \underset{-}{F_i^{disc}}, \underset{-}{\sigma}, \underset{-}{\gamma^{perm}}, \underset{-}{\gamma^{disc}} \right) \text{ if } disc_i(k) = 1 \\ \Gamma\left(\underset{-}{\tau_{ij}}, \underset{+}{P_j}, \underset{+}{E_j}, \underset{-}{c_i}, \underset{-}{F_i^{perm}}, \underset{-}{\sigma}, \underset{-}{\gamma^{perm}} \right) \text{ if } disc_i(k) = 0 \end{cases} \quad (6)$$

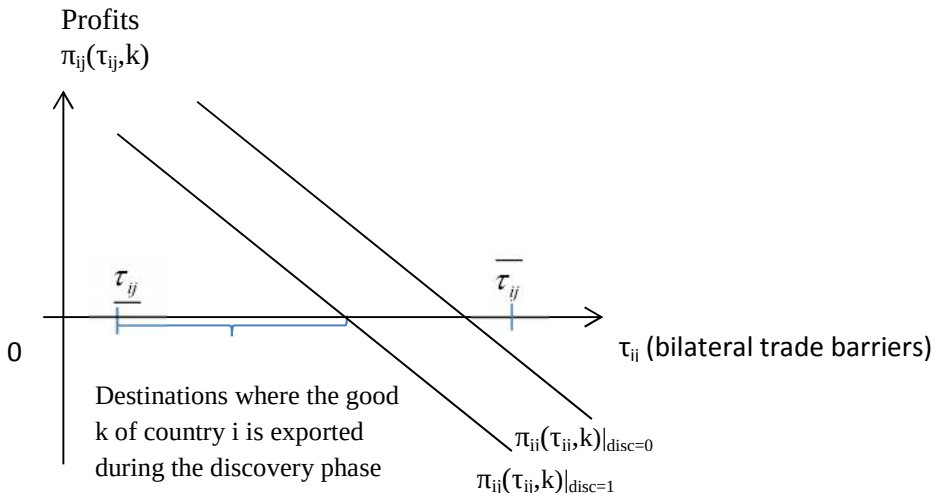
where Γ is a binary function which could attribute either one or zero and where signs below variables in the function indicate the sign of the relationship between these variables and the decision to export the good k between i and j, $PX_{ij}(k)$. Expression (6) shows that country *i* exports product k only to destinations where the export revenue r_{ij} is sufficiently high compared to fixed export costs $F_{ij}(k)$. Given (2) and (3), this is more likely to occur in destinations where trade barriers (τ_{ij}) are sufficiently low compared to consumers' expenditures and price indexes (respectively E_j and P_j). Moreover equation (6) also show that the probability that a firm of country i decides to export good k towards destinations decreases with domestic production costs (c_i), permanent fixed export costs (F_i^{perm}) and permanent sensitivity to trade barriers (σ and γ^{perm}) of the industry. It is also lower when firm incur additional discovery costs (F_i^{disc} and γ^{disc}), i.e. when they begin to export.

Figure 3 illustrates the destination pattern of exports of good k during and after the discovery phase when all destination countries have identical consumers' expenditure and price indexes in all industries, i.e. $E_j(z)=1$ and $P_j(z)=1$ for all *j* and z. Then the rank of destinations is the same for all goods for any country *i* and depends only on the level of bilateral trade barriers[14]. Destinations are ranked, on the horizontal axis of figure 3, from the lowest trade barriers $\underline{\tau_{ij}}$ to the highest trade barriers $\overline{\tau_{ij}}$ and the vertical axis give export profits for good k. Good k is exported to all destinations where trade barriers are sufficiently low so that the export profit is positive. Those are destinations located on the left of the intersection of the profit function with the horizontal axis (i.e. when the profit is equal to zero).

Consider first the profit curve of good k of industry z which is not in the discovery phase, (the curve $\pi_{ij}(\tau_{ij},k)|_{disc=0}$ in Figure 3). The higher is the profit of exporting good k to any destination (the farther the profits curve from the origin), the larger is the number of destinations over which the good is exported. Therefore, goods in industries with low production costs, permanent fixed export costs and permanent low elasticity to trade barriers will reach a higher number of destinations (see figure B.3. in the Appendix). Now compare the profit curve of the good during and after the discovery phase (respectively $\pi_{ij}(\tau_{ij},k)|_{disc=1}$and $\pi_{ij}(\tau_{ij},k)|_{disc=0}$ in Figure 3). The figure shows that during the costly discovery phase, product k is exported to a lower number of destinations.

[14] Without the assumption of $E_j(z)=1$ and $P_j(z)=1$ for j and z, one can define an index α_{ijk} which ranks destinations from the most to the least profitable to export good k. This index would be increasing with trade costs but would also be decreasing with consumers' expenditure and market price indexes in the importing country. To simplify, I ignore the effect of destination-industry specifics characteristics, so that destinations are ranked similarly for all goods of an exporting country from the least to the most profitable. This help focusing on trade costs which are the most important characteristics of regional trade.

Figure 3: Destination pattern of exported goods.



Consider first the profit curve of good k of industry z which is not in the discovery phase, (the curve $\pi_{ij}(\tau_{ij},k)|_{disc=0}$ in Figure 3). The higher is the profit of exporting good k to any destination (the farther the profits curve from the origin), the larger is the number of destinations over which the good is exported. Therefore, goods in industries with low production costs, permanent fixed export costs and permanent low elasticity to trade barriers will reach a higher number of destinations (see figure B.3. in the Appendix). Now compare the profit curve of the good during and after the discovery phase (respectively $\pi_{ij}(\tau_{ij},k)|_{disc=1}$and $\pi_{ij}(\tau_{ij},k)|_{disc=0}$ in Figure 3). The figure shows that during the costly discovery phase, product k is exported to a lower number of destinations.

The model gives two potential explanations for the observation in the data that new goods are concentrated on the most accessible destinations. First, new goods incur a costly discovery phase which limits the set of profitable destinations to the most accessible ones. Second, goods may have "permanent" costs and sensitivity to trade barriers that limit the number of destinations where exports are profitable, even after their discovery.

Denote $shnew_{ij} = {}^{nnew_{ij}}\!/_{n_{ij}}$ with n_{ij} ($nnew_{ij}$) the number of goods (new goods) exported bilaterally from i to j. The model predicts that, for identical product characteristics between new and traditional goods and identical price indexes and consumer expenditure in destination markets, this ratio is negatively related to trade cost variables during the discovery phase as new goods are only exported to the most accessible destinations (see proof in Appendix A).

If product characteristics (production costs, fixed export costs and trade costs elasticity) differ between new and traditional goods so that the profit of exporting new goods after the discovery is lower than the profit of exporting traditional goods, there is a permanent negative relationship between the share of new goods in bilateral exports and trade costs (see proof in appendix A). Note also that in that case, the negative relationship holds also during the discovery phase, and should be stronger due to discovery costs.

In the next section, I first evaluate the impact of trade costs on the share of new goods in bilateral exports during and after the discovery phase of new goods. This allows to disentangle discovery costs

and permanent costs effects. I then estimate determinants of export profits across industries based on equation (6).

4. Econometric estimates.

The model's predictions are now explored using the same database as in section 2. Section 4.1 documents the numbers of destinations of new goods with respect to the number of year of previous exports and compares them to the number of destinations of traditional goods. Section 4.2 tests the role of trade costs on the share of new goods in exports during and after the discovery phase. Section 4.3 estimates the determinants of the probability of bilateral exports of goods, which is conditional to the export profits.

4.1. The number of destinations of new and traditional goods: descriptive statistics.

Table 3 shows the average number of destinations of exports of traditional goods and of new goods during their five first years of export. First, new goods are exported to fewer destinations than traditional goods, reaching on average 1.7 destinations during the first year whereas traditional goods are exported on average towards 20.9 destinations. Whereas the number of destinations reached by new goods does not vary much across income groups (e.g. new goods are exported to 1.6 destinations in low income countries and to 1.8 in high income countries), the number of destinations where traditional goods are exported is much lower in the poorest countries (e.g. traditional exports of low income countries reach on average 7 destinations whereas high income countries export their traditional goods towards 32 destinations). Second, in all income groups, the number of destinations where new goods are exported increases slightly between the first and the fifth year of export but remains much lower (2.5 destinations on average) than the number of destinations of traditional exports (20.9 destinations). According to these figures, new goods may never be exported to as many destinations as traditional goods. Similar patterns hold when new goods are defined according to the "strict" definition (table B.6 of the Appendix).

Table 3: Number of destinations of exports of new and Traditional goods by income group, over the 2000-2010 period (average by country and year).

	New goods (large)*					**Trad. Goods***
Income group	**1st year**	**2nd year**	**3rd year**	**4th year**	**5th year**	
Low income	1.6	1.8	2.0	2.2	2.3	7.1
Lower-Midlle income	1.6	1.9	2.2	2.4	2.5	16.5
Upper middle income	1.6	1.8	2.1	2.3	2.4	22.5
High income	1.8	2.0	2.3	2.4	2.5	37.4
Average	**1.7**	**1.9**	**2.1**	**2.3**	**2.5**	**20.9**

* The goods are only those which have been exported at least five consecutive years (therefore, this table reports the number of destinations of the same new goods from the first to their fifth years of survival).

As the number of destinations reached by new goods does not evolve substantially along the five first years of exports, destination characteristics of new goods highlighted in section 2 are not likely to differ substantially according to the export phase. Table B.7 of Appendix B confirms that the average

distance of trade of new goods does not change substantially with respect to the number of years of export and is always substantially lower than the average distance of traditional goods. As an example of this pattern, Mozambique started to export "Baths shower-baths sinks wash-basins bidets lavatory pans" to South Africa in 2000 and kept exporting it only to this market after that, except for one year where there was a trial of export towards Portugal. Similarly, Georgia started to export for the first time "Candles tapers" towards Armenia and France in 2003 and remained only on these markets until 2010.

These descriptive statistics give a first insight into the pattern of destinations of new goods over the period. First, when the country gains experience in exporting the good, the number of destinations slightly increases, then suggesting that the "discovery" might be costly. Second, even after five years, goods discovered over the period are exported to a lower number of destinations and on more accessible ones compared to traditional goods.

4.2. The share of new goods in regional destinations.

I now evaluate the impact of trade costs variables on the relative number of new goods in bilateral exports during and after their discovery phase. The variable $shnew_{ijvt}=nnew_{ijvt}/n_{ijt}$ is the share of new goods exported since v years in bilateral exports from country *i* to country *j* at time t, with $nnew_{ijvt}$ being the number of new goods exported since v years by *i* and exported to *j* at t and n_{ijt} being the number of goods exported bilaterally from i to j at time t. Note that $shnew_{ijvt}$ is equal to zero on destinations where none of the country's new goods are exported and positive otherwise. It follows that a negative relationship between $shnew_{ijvt}$ and trade barriers could be due both to a decreasing relative number of new goods over destinations where new goods are exported and to a relatively high number of zeros on destinations with high trade costs. To take into account that the variable $shnew_{ijvt}$ is censored at zero, I use tobit regressions. Furthermore, for each exporting country, I keep only the trade partners with whom the country exports at least one traditional good over the period.

As in the theory, I decompose the export process of goods into two phases: a "discovery phase" during which the firm discover the good and expand its exports, and a "maturation phase" during which the good is "established"[15]. Traditional goods have already reached their maturation phase, and new goods go first through a discovery phase and second through a "maturation" phase.

The specification to examine destinations of new goods compared to traditional goods over the 2000-2010 period is therefore:

$$shnew_{ijvt} = \sim + ¢_i + ¢_j + ¢_t + \Psi T_{ijt} + \Lambda T_{ijt}.disc_{ivt} + disc_{ivt} + £_{ijvt} \quad (7)$$

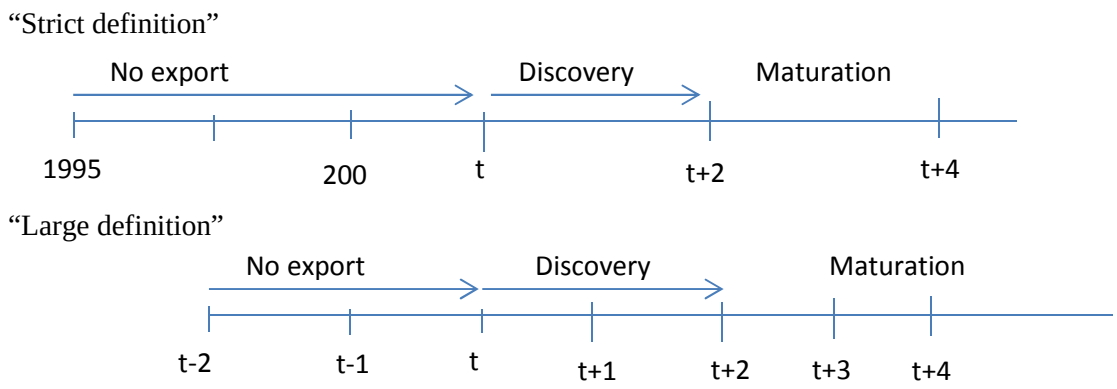
with $i \in \{1,...,123\}$; $j \in \{1,...,123\}$; $t \in \{2000;...;2010\}$; $v \in \{1;...;10\}$. In (7), I control for all time invariant exporter and destination characteristics and for time fixed effects[16]. The dummy, $disc_{ivt}$,

[15] Brenton and Newfarmer (2007) define the export process of a goods through four phase: a "discovery phase" during which firms launch a new product into a foreign market; a phase of "rapid growth" in which successful firms reinvest and expand across geographic markets; a "maturation phase" in which successful firms focus on maintaining market share by improving quality and productivity and; a "declining phase" in which successful firms exploit existing products for rent that are invested in new activities. However, as I am interested mainly in comparing newly exported goods and traditional goods, I simplify this pattern by defining only two phases.

[16] Based on Monte Carlo experiments, Greene (2004) shows that the incidental parameters problem does not cause fixed effect Tobit to be inconsistent, even in short panels.

identifies goods' discovery phase, and equals unity when the country i new good's "age", v, is lower than two at time t. For robustness checks, I also use the three first years of exports for the discovery phase (in that case, the corresponding dummy is $disc2_{ivt}$). The empirical definition of the length of the export discovery phase, i.e. of the adequate period of time before an exported good reach the "maturation phase", is crucial in this paper to examine differences of destination patterns of new goods before and after the discovery phase. However, this length is not yet clearly determined in the literature. The literature examining new exporting firms shows that most either fail the first year they export, or rapidly expand their exports (Albornoz et al., 2012, Eaton et al., 2008, Freund and Pierola, 2010) which could suggest that the "maturation phase" is quickly reached after the first year of export. Moreover, most papers studying export discoveries call discovery phase the first year of export of a good after a period of one or two years of no export (Brenton and Newfarmer, 2007; Brenton et al, 2009; Klinger and Lederman, 2011, Eaton et al, 2008). The preferred definition for the discovery phase in this paper takes the two first years (or three first years) of exports because it should encompass both the beginning of the export process and the "rapid expansion". Figure 4 illustrates the export process of new goods, respectively as defined with the strict and the large definition presented in section 2.1, and by assuming a discovery phase of two years,

Figure 4: Discovery phase, Maturation phase and definition of new goods



T_{ijt} is the vector of variables which proxy for trade barriers

$T_{ijt} = [\ln Dist_{ij} \ - contig_{ij} \ - comlang_{ij} \ - RTA_{ijt} \ - deepness\_RTA_{ijt}]^{T}$. It includes the bilateral distance $dist_{ij}$ which is positively associated with trade barriers and a set of other variables negatively associated to trade barriers (that is why there is a negative sign before). Those are $contig_{ij}$, a dummy equal to one if the partners share the same border and zero otherwise, $comlang_{ij}$, a dummy equal to one if the partners share the same official language and zero otherwise, RTA_{ijt} a dummy equal to one if there exists a regional trade agreement between the exporter and the importer notified at the WTO and zero otherwise and $Deepness\_RTA_{ijt}$, an index of the degree of integration between trading partners, built for this paper. To this end, I have computed the number of additional measures to WTO negotiations included in the agreement and qualified as "legally enforceable" by the WTO.[17] This index ranges from 0 to 48 and varies across years according to the date of adoption of the several

[17] The list of additional measures is based on a classification proposed by Horn, Mavroidis, and Sapir (2010) and by the World Trade Report (2011). It includes "WTO+" provisions, i.e. commitments that already exist in WTO agreements but go beyond the WTO disciplines and "WTO-X" provisions, i.e. issues lying outside the current WTO mandate.

additional measures. Gravity variables are taken from the CEPII database and GDPs per capita from the World Development Indicators of the World Bank.

Vectors Ψ and Λ include respectively coefficients on trade costs variables and coefficients on interaction terms between the discovery dummy and trade costs variables. To confirm the existence of discovery costs, I expect: $\Lambda < 0$. That is, new goods should be exported to destinations with low trade barriers during their discovery phase. The sign of coefficients in Ψ will reveal the profitability of exports of new goods compared to traditional goods after the discovery phase. If new goods are structurally less profitable to export than traditional goods, all coefficients in Ψ should be negative.

Table 4 shows the results for the large definition of new goods. Column 1 shows the coefficients on trade cost variables without separating the effects according to the phase in the export process. Column 2 introduces the interaction term between the distance and the dummy for the discovery phase and column 3 adds interaction terms between all trade costs variables and the dummies for the export phases. Column 4 and 5 show similar estimations but when the dummy variable for the discovery phase takes the value of one during the three first years of export, i.e. one year more than "disc" (in this case the dummy is called "disc2").

Firstly, in all columns, the coefficients on the gravity variables are in line with the finding of section 2.2. They reveal that new goods are exported on relatively close, contiguous destination markets, with a similar official language and with a "deep" regional trade agreement compared to traditional goods. They are invariant across specifications. A higher distance of 1% reduces the share of new goods in bilateral exports by 4.9 percentage points (the average value being around 0.5%). Moreover, the share of new goods in bilateral exports is greater by 4.7 percentage points in contiguous destinations and by 3.4 percentage points in destinations with a common language.

Secondly, in columns 2 and 3, most coefficients on interaction terms between trade costs variables and the dummy for the discovery phase are not significant[18]. Only the coefficient on the interaction term with the dummy for a common language is positive and significant, although very small. This suggests that new goods are more likely to be exported towards destinations with a common language during the discovery phase and may capture discovery costs. In column 3, the share of new goods during the discovery phase is higher by 0.0052 on destinations with a common language. Moreover, in all columns coefficients on trade cost variables are almost unchanged so the average destination's profile of new goods barely changes between phases. These results show that in this sample, new goods are exported towards most accessible destinations during and after their discovery and confirm the pattern in table 3. Similar results are obtained, in column 4 and 5.

[18] I do not introduce the interaction term between the dummy for the existence of an RTA and the discovery phase because the dummy for the existence of an RTA is strongly correlated with the variable of deepness of the RTA and therefore, coefficient on both interaction terms are unstable. However, the variable "deepness_RTA" is positive if there exist a deep RTA between the countries and zero otherwise. Therefore, the interaction term with the "deepness" variable includes the effect of the existence of an RTA.

Table 4: Destination patterns of goods discovered between 2000 and 2010 (large definition). Panel estimations over 2000-2010. Tobit estimates (censored at zero).

VARIABLES	Expected sign	(1) shnew	(2) shnew	(3) shnew	(4) shnew	(5) shnew
lndist	(<0)	-0.0489***	-0.0488***	-0.0490***	-0.0483***	-0.0487***
		(0.00125)	(0.00127)	(0.00128)	(0.00129)	(0.00131)
contig	(>0)	0.0468***	0.0468***	0.0468***	0.0468***	0.0465***
		(0.00316)	(0.00316)	(0.00327)	(0.00316)	(0.00336)
comlang	(>0)	0.0336***	0.0336***	0.0321***	0.0336***	0.0314***
		(0.00214)	(0.00214)	(0.00219)	(0.00214)	(0.00224)
RTA	(>0)	0.0138***	0.0137***	0.0137***	0.0137***	0.0137***
		(0.00233)	(0.00233)	(0.00233)	(0.00233)	(0.00233)
deepness_RTA	(>0)	0.000346***	0.000351***	0.000346***	0.000356***	0.000342***
		(8.81e-05)	(8.83e-05)	(8.95e-05)	(8.84e-05)	(9.12e-05)
lndistxdisc	(<0)		-0.000422	0.000158		
			(0.000676)	(0.000877)		
contigxdisc	(>0)			-5.87e-05		
				(0.00214)		
comlangxdisc	(>0)			0.00522***		
				(0.00156)		
deepness_RTAxdisc	(>0)			1.72e-05		
				(6.63e-05)		
lndistxdisc2	(<0)				-0.00139**	-0.000619
					(0.000646)	(0.000851)
contigxdisc2	(>0)					0.000595
						(0.00210)
comlangxdisc2	(>0)					0.00519***
						(0.00149)
deepness_RTAxdisc2	(>0)					3.54e-05
						(6.22e-05)
Constant		0.194***	0.194***	0.195***	0.191***	0.194***
		(0.0145)	(0.0146)	(0.0146)	(0.0147)	(0.0148)
Exporter Fixed Effects		Yes	Yes	Yes	Yes	Yes
Importer Fixed Effects		Yes	Yes	Yes	Yes	Yes
Time Fixed Effects		Yes	Yes	Yes	Yes	Yes
Observations		605,041	605,041	605,041	605,041	605,041
Pseudo-Rsquared		0.505	0.507	0.507	0.507	0.507

Standard errors adjusted for clustering around country pairs. *** p<0.01, ** p<0.05, * p<0.1. Columns (2) and (3) (respectively (4) and (5)) include also separately the dummy for the discovery phase, disc (respectively disc2).

In table B.9 of the appendix, I include the total import expenditures of the importing country in the exporter's new goods (taken in logarithm), $\ln Mnew_{ij}$, in order to control for the preferences and the purchasing power of the destination country. As expected, I find a positive and significant coefficient on this variable while the coefficients on the other variables are weakly affected. I also find similar results with the "strict" definition of new goods and with an ordinary least squares estimator rather than a tobit estimator censored at zero (Tables B.10 and B.11 in Appendix B).

Finally, these results suggest, in the theoretical framework of section 3, that there may exist a discovery cost. Furthermore, they confirm the low market performance in terms of number of destinations of new exports compared to traditional exports in the middle-run, which suggest that new

goods are less profitable to export than traditional goods even after their discovery. To identify the reasons why this profit is lower after the discovery, I estimate in the next section a reduced form close to the profit function. More precisely, to infer the determinant of the profit function, I examine the probability of bilateral exports by industry which is a conditional function of the export profit.

4.3. Discovery costs, trade costs and production costs.

This section identifies the determinants of the country's decisions to export goods across industries and destinations based on equation (6) of the model. In the data, industries z of the model are the HS2 categories of products, and products are HS4 sub-divisions. As almost all variables of equation (6) differ among industries, I estimate empirically the following equation for each subsample of bilateral exports of HS2 industries (90 regressions):

$$P(PX_{ijkt} = 1 / \text{observed variables}) = \Phi\left(A + ¢_j + ¢_i + ¢_t + ¢_k + \mathrm{B}T_{ijt} + \mathrm{N}T_{ijt}\mathrm{x}disc_{ikt} + \sim disc_{ikt}\right) \quad (8)$$

with $i \in \{1,...,123\}$; $j \in \{1,...,123\}$; $k \in \{1, ..., \mu(z)\}$; $t \in \{2000;...;2010\}$; $\mu(z)$ is the number of HS4 lines in the sample of goods of industry z ($z \in \{1,...,90\}$). In (8), PX_{ijkt} is a variable equal to one if good *k* is exported from country *i* to country *j* at time *t* and Φ is the cumulative normal distribution. In (8), $¢_j$ is a fixed effect which counts for variables specific to the industry of the importing country j, and therefore control for consumers' expenditures and for the price index in the market; $¢_i$ is a fixed effect for the exporting country i that captures the permanent domestic cost of producing and exporting in the industry; $¢_t$ control for time fixed effects. I also include product fixed effect, $¢_k$, which count for specific characteristics of products within industries. This variable would therefore capture potential differences of production factor intensity of production technology between products of the same industry[19]. As in the previous section, T_{ijt} is the vector of trade costs variables and B and N are respectively the vector of coefficients on these trade costs variables and of coefficients on interaction terms between trade costs variables and the dummy for the discovery phase. Note that the dummy $disc_{ikt}$ counts now for the discovery phase of each good k[20]. I expect that coefficient on trade costs are negative for all industries ($\mathrm{B} < 0$).

Estimations of this equation by industry provide two types of information relevant for the study of the destination pattern of new goods over the period. First, negative and significant coefficients on $disc_{ikt}$ and on interaction terms between this variable and trade costs variables ($T_{ijt}\mathrm{x}disc_{ikt}$) would confirm the

[19] A potential concern is that the industry equations may suffer from an aggregation bias. That is, since an HS 2-digit industry is comprised of different (HS4-digit) products, the equation may be misspecified even at the industry level. I think this is not a large problem because HS2-digit industries tend to capture goods with likely similar comparative advantage and distance elasticity (Freund and Berthelon, 2010 and Freund and Pierola, 2012). Moreover, I show in table A14 of the appendix that the average number of destinations for country exports differs more substantially between HS2 industries than within these industries. However, there could exist differences of production costs and export costs between products. Product fixed effects (at the HS4 level) allow to capture potential differences of production technology specific to products and common to all countries.

[20] For any exporting country, the counterfactuals of the dummy for the discovery phase of good k, $disc_{ikt}$, are the other phases of the same good k and the other goods (or HS4 lines) within the same industry z (or HS2) which are not in discovery phase.

existence of higher fixed export costs during the "discovery" phase, as already found in the previous section. I expect either $\sim < 0$ or $\mathrm{N} < 0$ or both. If one or both coefficients are negative, this confirms the existence of discovery costs. If $\mathrm{N} < 0$, fixed export discovery costs are higher on most distant destinations whereas if $\sim < 0$, exporting countries incur a national export discovery costs identical whatever their destinations.

Second, the coefficients on country dummies ($¢_i$) in by-industry estimations indicate, for each country and HS2 industry, the extent to which goods that are not in their discovery phase are likely to be exported across destinations. More precisely, these coefficients reflect countries' performance in the industry in terms of export destinations with respect to the US performance (as the omitted country dummy in each industry regression is the US dummy). According to theory, they reflect the relative domestic production and permanent fixed export costs in the country industry. For each exporting country, I collect the 90 coefficients which correspond to its relative performance in each industry and I use them to rank (HS2) industries from the most to the least performing in terms of export destinations (compared to the US). According to the model, this rank classifies industries from the most to the least costly to produce domestically and to export relatively to other countries, i.e. it classifies industries with respect to the country's comparative advantage[21]. I then examine the share of new goods with respect to industry ranks, i.e. with respect to countries' comparative advantage (or relative production and fixed export costs). Similarly, coefficients obtained on trade costs, B, reveal the sensitivity to trade barriers in each industry. I use the same method as for production and fixed export costs to determine if new goods are more concentrated in industries with a high sensitivity to trade barriers (e.g. perishable goods).

Figures 5a, 5b, 6 and 7 and Table 5 summarize the results of estimations of equation (8) for each HS2 industry over the period 2000-2010.

Firstly, Figures 5a and 5b report respectively the kernel distribution of industry coefficients for discovery costs obtained from estimations of equation (8) and Table 5 provides descriptive statistics of these coefficient estimates. To simplify, I assume that discovery costs vary bilaterally only according to the distance across importing countries instead of varying with all the trade cost variables. Therefore I show here results of estimation which include only the interaction term between the dummy for the discovery phase and the distance ($\mathrm{N}T_{ij}\mathrm{x}disc_{ikt}$ in equation (8) becomes $\mathrm{N}dist_{ij}\mathrm{x}disc_{ikt}$ in the estimated equation). In the majority of industries (63.3%), I find a negative and significant effect of the "discovery" phase on the probability of bilateral exports (α is negative). This finding supports the existence of fixed discovery costs that impede exports of new goods to reach many destinations during the discovery phase. However, there is no clear evidence that the sensitivity of fixed export costs to distance is higher during the discovery phase as N is not significant in 91.1% of cases. Only in 7.8% of HS2 industries, the distance-sensitivity of new goods is significantly higher (in absolute value). That means that in the large majority of industries, discovery costs do not vary across destinations. In most industry regressions, all trade cost variables have the expected signs (see table B.12 in the Appendix).

[21] The coefficients on the dummies allow first to rank countries in each industry according to their export performance. Then, for each country, I classify industries according to these ranks. So that industries are ranged for each country from the one with the lower rank (the most costly) to the one with the higher rank (the least costly).

Figure 5: Distribution of industry coefficients relative to the discovery phase of products, (90 HS2-industries).

Figure 5a: "discovery" coefficient

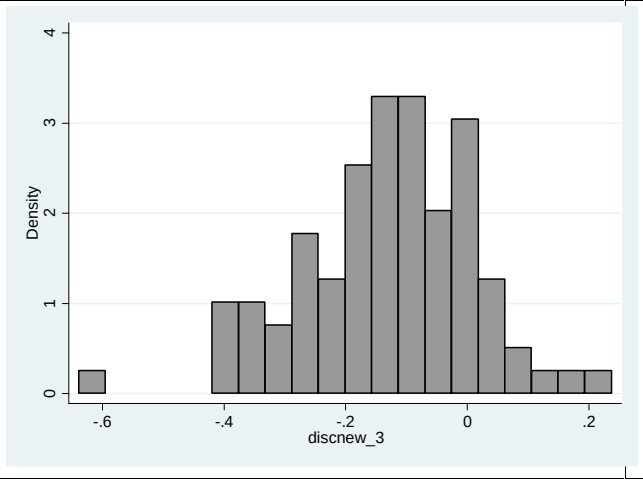
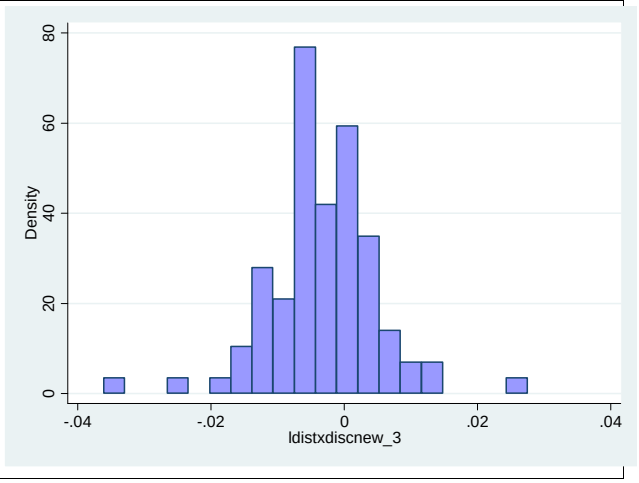


Figure 5b: "discovery x distance" coefficient



*These coefficients are results of estimations of equation (8) using Probit.

Table 5: Summary statistics of industry coefficient estimates relative to the discovery phase of products (90 HS2-industries).

Sign and Significance	Number of industries	Percentage industries	Average coefficient	Standard deviation	Minimum	Maximum
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coeff on "disc"						
Neg & Insig	20	22.2%	-0.040	0.033	-0.118	-0.001
Pos & Insig	10	11.1%	0.055	0.058	0.005	0.166
Neg & sig	57	63.3%	-0.210	0.111	-0.639	-0.044
Pos & sig	3	3.3%	0.121	0.101	0.0546	0.237
Total	90	100.0%	-0.132	0.143	-0.639	0.237
Coeff on "ldistxdisc"						
Neg & Insig	54	60.0%	-0.006	0.005	-0.025	0.000
Pos & Insig	28	31.1%	0.005	0.005	0.000	0.028
Neg & sig	7	7.8%	-0.017	0.009	-0.036	-0.009
Pos & sig	1	1.1%	0.013	0.000	0.013	0.013
Total	90	100.0%	-0.003	0.008	-0.036	0.028

*These coefficients are results of estimations of equation (8) using Probit.

The amplitude of coefficients on the dummy for the discovery (α) reflects differences in the number of destinations before and after the discovery phase in industries. Industries with the highest coefficients on the dummy for discovery include "Coffee, tea, mate and spices", "Raw hides and skins", "Prepared feathers and down and articles made of feathers or of down" and "Preparations of meat, of fish or of crustaceans". For these industries where goods are relatively homogenous across destination markets, most of export costs are incurred during the discovery phase and once the good has been exported, it rapidly extend towards other destinations. This finding is in line with results of Rauch (1999) who shows that search costs and matching are more difficult for differentiated products than for homogenous products. For example, in 2008 and 2009, Cambodia started to export (for the first time since at least 1995) "Wigs false beards eyebrows and eyelashes switches and the like" of the industry "Prepared feathers and down and articles made of feathers or of down". During the discovery (2008

and 2009), this country exports only this goods towards China. However, in 2010, it has extended its exports towards USA, Norway and Hong-Kong. Similarly, Latvia started to export this same good in 2004 and 2005 towards Finland and Lithuania and extend its exports to Belorussia, Russia and Ukraine in 2006 and then to France, Italia, Slovakia, Belgium, Netherland Norway and Poland in 2008.

Secondly, Figures 6 shows the share of new goods along countries' comparative advantage over the period, as measured by the rank of the industry in terms of domestic production and fixed export cost. In this figure, the horizontal gives industries' rank in term of countries' comparative advantage (1 being the comparative advantage and 90 the comparative disadvantage of countries). The figure shows that new goods have emerged in industries with a relatively high domestic production and fixed export cost, i.e. where the countries have a comparative disadvantage. For example, Pakistan has a very high share of new goods in "photographic and cinematographic goods" (HS37) classified as 79th most costly in terms of domestic production and export fixed costs. Similarly, India has no new goods in its seventy-three least costly sectors and have its new goods concentrated in "Pulp of wood and of other fibrous cellulosic mat", "Rails, tramway and locomotives" and "Cocoa and cocoa preparations" which are ranked respectively as 87th, 74th and 90th in terms of production and fixed export costs. This finding explains why new goods are exported towards a low number of destinations even after their discovery phase.

Figure 6: Share of new goods according to estimated rank in countries' comparative advantage (from the least to the most costly in term of relative domestic production and fixed export cost.)

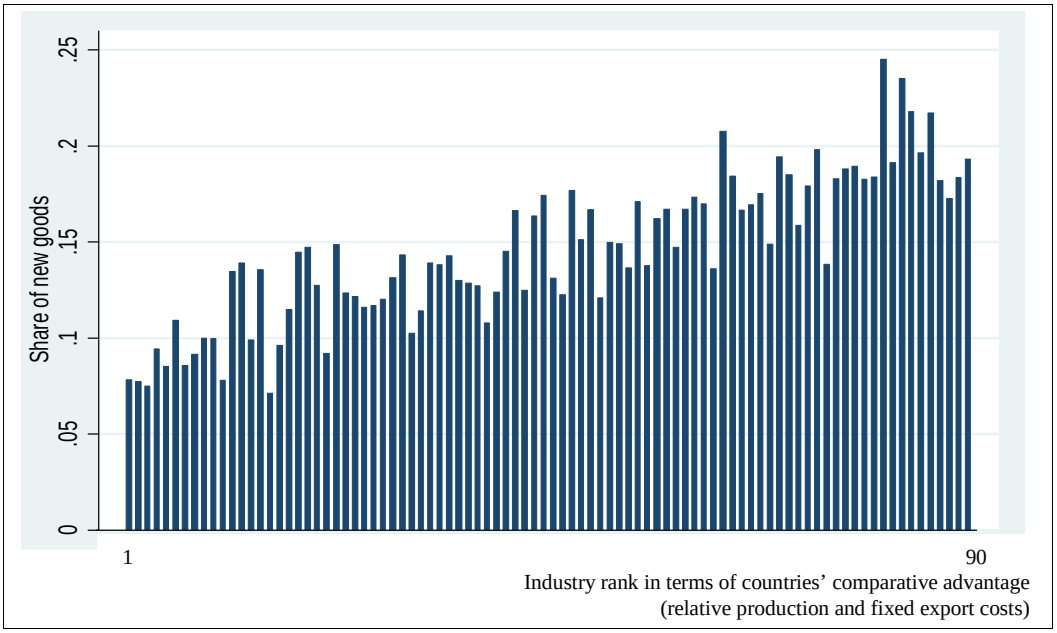
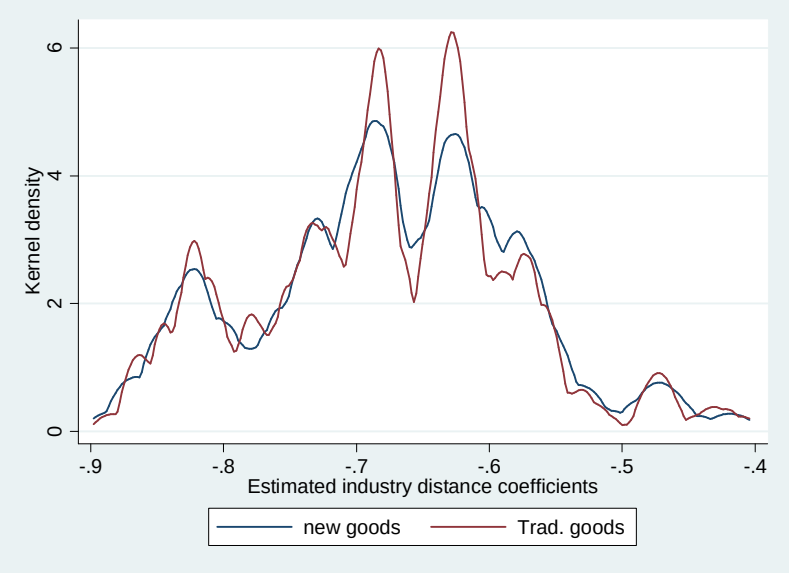


Figure 7: Kernel density of new and traditional goods over estimated (HS2) industries' distance elasticity.



Lastly, I examine the differences of sensitivity to trade barriers across industries which should be reflected in coefficients of trade costs variables. Figure 7 shows the kernel distributions of new and traditional goods across distance coefficients for HS2 industries found by estimating equation (8). These distributions are very similar. However, statistically, I find that the average distance elasticity of countries' new goods is slightly higher in absolute value than this of their traditional goods, but the difference is very small (see table B.13 in the appendix). This may suggest that new goods are in industries relatively more sensitive to trade barriers (distance) than traditional goods and can be an additional factor to explain that they are only exported towards most accessible destinations.

All these results are robust when: (i) introducing interaction terms between exporter dummies and distance[22], (ii) using logit and OLS estimators rather than probit, (iii) taking the three first years of exports for the discovery phase rather than the two first years, (iv) using the strict definition for the discovery phase.

In conclusion, I find strong support for a structural link between export diversification and regionalization of trade. Countries export their new goods towards most accessible destinations in terms of distance, language and trade facilitation (trade agreements). For example, over the period, the share of new goods in bilateral exports is higher by 4.68 percentage points on contiguous destinations. I find evidence for discovery costs which impede new goods of being exported on many destinations during the first years of export. However, I find also that new goods emerge in industries with high production and fixed export costs, and therefore are not exported to as many destinations as traditional goods even after their discovery phase. All these results suggest that improving market access of regional countries would lead to greater diversification of their exports but that new goods' exports are not prone to expand to other markets after their discovery. According to these results, countries with a high export diversification should persistently regionalize their trade.

[22] Not controlling for exporter fixed effects could bias coefficients if the countries with a higher number of new goods are also the most sensitive to distance or tend to reach a low number of destinations.

5. Conclusion

The recent export diversification of developing countries has been accompanied by a substantial regionalization of trade. This paper shows that this evolution is due, at least partly, to the low export performance of newly exported products.

I first show that for almost all countries in the sample, newly exported goods are sold on markets relatively more accessible in terms of trade costs (i.e. close, contiguous markets with deep regional trade agreements) than the destination markets of traditional goods. Second, I develop a theoretical framework that gives the determinants of the decision for a country to export a good towards destinations. This model highlights two main potential factors to explain the low distance of exports of new goods. First, new goods incur a costly discovery phase which impedes exports to reach the least accessible destinations. Second, newly exported goods emerge in industries where the countries have a comparative disadvantage (high domestic production and export cost, high elasticity to trade barriers) and therefore, these goods have a lower potential in terms of market expansion than traditional goods.

The model's predictions are then tested in a sample of 123 countries over the 2000-2010 period. According to the results, the relative number of new goods is higher on destinations which are close, contiguous with a common language or with a trade agreement during their discovery phase, but also after the discovery phase. The estimates also reveal the existence of discovery costs in a small majority of industries and a higher permanent domestic production and fixed export costs for goods discovered over the period. These results are in line with the evidence that trade liberalization between countries from the same region, through trade preferences and improvement of transport infrastructures is often accompanied by more export diversification (Sanguinetti et al, 2004; Dennis and Shepherd, 2011).

In this paper, differences of export profit among goods in any destination market are assumed to be due to differences of production and export costs. However, Baldwin and Harrigan (2011) have also introduced differences of quality among goods to explain the differences of destination pattern among goods. In a model where products differ not only according to their production and export costs but also according to their quality, the export profit would also be lower for low quality products. Therefore, the low profit of new goods find in this paper may be attributed both to the high domestic costs of these product and to their low quality. In future research, it could be interesting to identify both the quality and the domestic costs of new goods compared to traditional goods.

Finally, from a trade policy perspective, reducing regional trade costs between similar countries contributes to greater export diversification and hence to less growth volatility. However, goods newly exported by countries have a lower market expansion than traditional goods. Therefore, to improve the export performance of their goods, countries should keep investing in research and innovation or make efforts to attract foreign direct investments which are often source of technology spillover and therefore of productivity gains (Javorcik, 2004).

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Appendix

Appendix A: Model derivation and proof

Derivation of equation (4)

Consider a world with I countries indexed by *i=1, 2, …, I* with a certain number of industry z. Each industry includes a continuum of goods k. Country i's consumer expenditures in industry z is denoted $E_i(z)$ [23]. All consumers in the world have the same CES sub-utility function across goods in each industry and the quantity of product k consumed in i is denoted $q_i(z, k)$, so that the sub-utility function takes the following form:

$$U_i(z) = \left[\int_{k \in \Omega_i(z)} q_i(k,z)^{\pm/\pm - 1} dk \right]^{\pm - 1/\pm} \quad (9)$$

and

$$P_j(z) = \left[\int_{k \in \Omega_i(z)} p_{ij}(z,k)^{1-\pm} dk \right]^{1/1-\pm} \quad (10)$$

Where $\sigma > 1$ is the constant elasticity of substitution across products and $\Omega_i(z)$ the set of products in industry z available for consumption in country i.

Country i's demand for product k is:

$$q_i(k,z) = \frac{E_i(z)}{P_i(z)} (p_i(k,z))^{-\pm} \quad (11)$$

Where $p_i(k,z)$ is the trade-cost inclusive price of good k in market i.

There is monopolistic competition in each industry. A firm from country i produces each unit of product with a cost minimizing combination of inputs that cost $c_i(k,z)$. This cost $c_i(k,z)$ is country specific and reflects differences across countries in factor prices/level of technology. The demand function implies that a country i producer maximizes profits by charging the price $p_i(k,z) = \frac{\pm c_i(k,z)}{(\pm - 1)}$. There are positive international trade barriers between countries i and j, τ_{ij}, that are source of iceberg trade costs which vary across products, so that if country i producer of a product *k* sells to consumers in country j, it then sets a delivered price (in country j) equal to : $p_{ij}(k,z) = p_i(k,z)\tau_{ij}^{\phi(z)}$. Moreover, firms in industry z of country i face a fixed overhead cost to export to market j, $F_{ij}(z)c_i(z)$ so that they decide to export to country j if and only if the exports generate enough revenue to overcome the fixed export costs.

It follows that the associated operating profit from the sales of good k from country i to country j is:

$$\pi_{ij}(k,z) = \frac{1}{\pm}\left(\frac{\pm \tau_{ij}^{\phi(z)} c_i(k,z)}{(\pm - 1) P_j} \right)^{1-\pm} E_j(z) - c_i(k,z) F_{ij}(k,z) \quad (12)$$

[23] With a two-tier utility function leading to constant expenditure shares by industry z, the aggregate expenditure on a given industry in country j is proportional to the income in this country.

The relative share of new goods in bilateral exports in the model (proof).

Assume that for any exporting country i, exported goods are divided in two categories: the goods newly exported (k^{newi}) and the goods traditionally exported (k^{tradi}). Assume that in each category, all goods have the same profitability of being exported between i and any j: that is for all k$\in k^{newi}$, $®_{ij}(k) = ®_{ij}(k^{new})$, and for all k$\in k^{tradi}$, $®_{ij}(k) = ®_{ij}(k^{trad})$. Moreover, assume that $®_{ij}(k^{new}) < ®_{ij}(k^{trad})$.

Recall that $®(²_{ij}(k), k) = 0$. It follows that: $²_{iJ}(k^{new}) < ²_{iJ}(k^{trad})$

We have:

$\mathrm{PX}_{ij}(k^{newi}) = 1$ and $\mathrm{PX}_{ij}(k^{tradi}) = 1$ if $²_{iJ}(k^{new}) > ²_{ij}$

$\mathrm{PX}_{ij}(k^{newi}) = 0$ and $\mathrm{PX}_{ij}(k^{tradi}) = 1$ if $²_{iJ}(k^{new}) < ²_{ij} < ²_{iJ}(k^{trad})$

$\mathrm{PX}_{ij}(k^{newi}) = 0$ and $\mathrm{PX}_{ij}(k^{tradi}) = 0$ if $²_{ij} > ²_{iJ}(k^{trad})$

The relative number of new goods in bilateral exports in the model can be expressed as:

$$shnew_{ij} = \frac{\sum_{k \in k^{newi}} PX_{ij}(k)}{\sum_{k \in k^{newi}} PX_{ij}(k) + \sum_{k \in k^{tradi}} PX_{ij}(k)}.$$

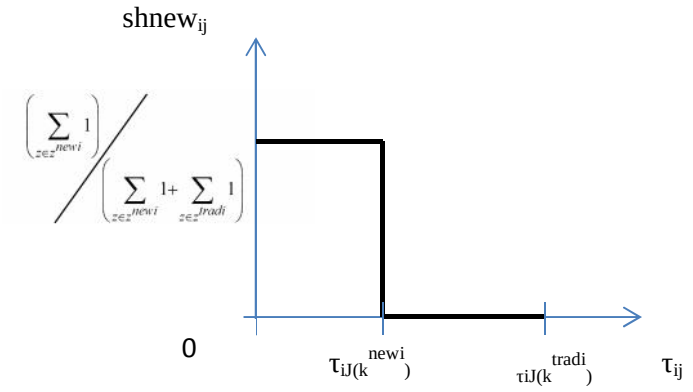
From above, shnew_{ij} take the following values:

$$shnew_{ij} = \begin{cases} \dfrac{\left(\sum_{k \in k^{newi}} 1\right)}{\left(\sum_{k \in k^{newi}} 1 + \sum_{k \in k^{tradi}} 1\right)} \text{ if } ²_{ij} < ²_{iJ}(k^{new}, z) \\ 0 \text{ if } ²_{iJ}(k^{new}, z) < ²_{\mathrm{ij}} < ²_{iJ}(k^{trad}, z) \end{cases}$$

Therefore, $\dfrac{dshnew_{ij}}{d²_{\mathrm{ij}}} = -\dfrac{\left(\sum_{k \in k^{newi}} 1\right)}{\left(\sum_{k \in k^{newi}} 1 + \sum_{k \in k^{tradi}} 1\right)} < 0$.

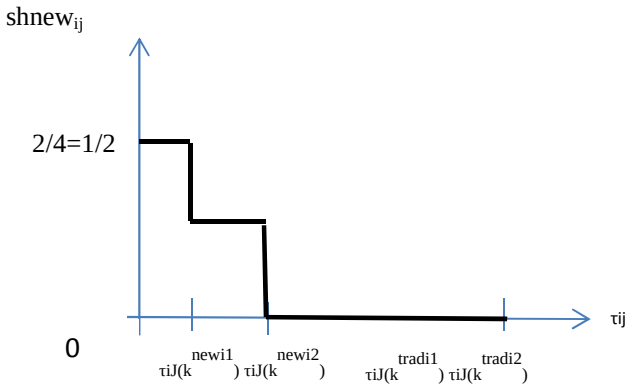
Figure A.1. illustrates the relationship between shnew_{ij} and $²_{\mathrm{ij}}$.

Figure A.1: Relationship between the relative number of new goods in bilateral exports and the bilateral trade costs (example with one type of new goods and one type of traditional goods).



A similar reasoning can be used with a large (continuum) number of goods and with all new goods having a lower value of being exported than traditional goods. In that case, shnew$_{ij}$ takes different values (is a continuous function) and will similarly decrease with τ_{ij}. Figure A.2 illustrates the case with two new goods (k^{newi1} and k^{newi2}) and two traditional goods (k^{tradi1} and k^{tradi2}) (and for any pair of goods (k_1,k_2) with $k_1 \in k^{newi}$ and $z_2 \in k^{tradi}$, $P(PX_{ij}(k_1)=1) < P(PX_{ij}(k_2)=1)$). As long as new goods have lower thresholds than traditional goods, the share of new goods decreases with the toughness of the destinations market.

Figure A.2: Relationship between the relative number of new goods in bilateral exports and the bilateral trade costs (example with two new goods and two traditional goods).



Therefore, as long as a good (or a group of goods) is less profitable than another good (or group of goods) towards any destination, the share of the first (group of) good(s) in bilateral exports is decreasing with trade costs. It follows that, given the model assumption, for identical product characteristics between new and traditional goods and identical destination-industry characteristics, the impact of trade costs on the share of new goods in bilateral exports is negative during the discovery phase (because of costly discovery), and should be equal to zero after the discovery. Besides, if the profit of exporting new goods after the discovery is lower than the profit of exporting traditional goods, there is a negative relationship between the share of new goods in bilateral exports and trade costs, after the discovery phase. This negative relationship should be stronger during the discovery phase.

Appendix B : Other Figures and Tables

Table B.1: Average number of new goods and number surviving (average by country-year). (Large definition).

Year of discovery	1st year*	2nd year*	3rd year*	4th year*	5th year*
2000	81.70	40.74	27.02	20.80	17.11
2001	71.07	34.67	23.02	17.91	15.30
2002	73.66	36.78	24.60	19.24	16.13
2003	78.06	38.92	27.52	21.45	17.89
2004	67.44	35.90	24.47	19.12	15.99
2005	76.01	39.12	26.07	20.15	15.79
2006	64.89	32.69	22.52	15.96	12.60
2007	71.54	36.15	23.19	17.02	.
2008	66.99	30.47	19.67	.	.
2009	58.91	27.86	.	.	.
2010	68.48	.	.	.	.
Average	70.79	35.33	24.23	18.96	15.83

*Number of year after the discovery.

Table B.2: Average number of new goods and number surviving (average by country-year). (Strict definition)

Year of discovery	1st year*	2nd year*	3rd year*	4th year*	5th year*
2000	28.15	9.20	4.78	2.99	2.13
2001	22.35	6.68	3.17	1.83	1.44
2002	19.43	5.35	2.44	1.49	1.05
2003	18.49	4.87	2.35	1.50	1.06
2004	14.11	4.17	1.95	1.17	0.86
2005	14.29	3.95	1.75	0.98	0.73
2006	11.30	2.93	1.43	0.80	0.52
2007	11.84	3.10	1.23	0.63	.
2008	11.92	2.56	1.04	.	.
2009	8.76	2.14	.	.	.
2010	8.21	.	.	.	.
Average	15.35	4.49	2.24	1.42	1.11

*Number of year after the discovery.

Table B.3: Number of new and Traditional goods by income group, over the 2000-2008 period (average by country)

Income Group	New^{strict}	Trad.	% new goods
	(1)	(2)	(1)/(2)
Low income	26.7	612.3	4.5%
Lower middle income	21.9	830.3	2.9%
Upper middle income	11.7	926.3	1.5%
High income	2.2	1042.0	0.2%

Table B.4.: Number of new and Traditional goods by region, over the 2000-2008 period (average by country, large definition of new goods)

	New	Trad.	Empty lines	% new goods
Region	(1)	(2)	(3)	(1)/(2)
Australia and New Zealand	26.5	1011	46	2.72%
East Asia & Pacific	58.9	810.4	246.6	14.77%
Europe & Central Asia	119.1	698.7	358.3	21.28%
Latin America & Caribbean	86.7	756.5	300.6	13.54%
Middle East & North Africa	112.6	717.1	339.9	21.45%
Canada and US	3	1053	4	0.28%
South Asia	138	668.3	388.7	25.36%
Sub-Saharan Africa	122.4	418.9	638.1	34.04%
Western Europe	18.5	1029.3	27.7	1.86%

Table B.5: Comparison of trade partners between new and traditional goods (large definition)

		Obs.*	$Dist_{ij}$	$Contig_{ij}$	$comlang_{ij}$	RTA	Deepness_RTA	$gdppc_{jt}$
Av. ratio: New/Trad	(1)	104	0.82	1.90	1.28	1.44	1.59	0.93
T-test (for difference from 1)	(2)		a/	a/	a/	a/	a/	b/

a/ denotes estimates significant at 1%, b/ at 5% and c/ at 10%.

*Number of country in the sample where there is at least one good discovered over the period 2000-2008.

Table B.6: Number of destinations of exports of new and Traditional goods by income group, over the 2000-2010 period (strict definition)

	New goods (strict)*					Trad. Goods*
Income group	1rst year	2nd year	3rd year	4th year	5th year	
Low income	1.4	1.6	1.8	1.8	1.9	6.6
Lower-Midlle income	1.5	1.7	1.9	2.2	2.5	15.8
Upper middle income	1.4	1.5	1.7	1.8	2.1	22.1
High income	1.5	1.7	1.9	2.4	2.8	37.2
Average	1.5	1.6	1.8	2.1	2.3	20.4

* The goods are only those which have been exported at least five consecutive years (therefore, this table reports the number of destinations of the same new goods from the first to their fifth years of survival).

Table B.7. Average distance of destinations and number of years of previous exports (large definition).

	New goods*			Trad. Goods*
Income group :	1irst year	3ird year	5th year	
Low income	4310.5	4191.7	4297.1	4685.6
Lower-Midlle income	3719.8	3580.3	3710.5	4548.9
Upper middle income	2985.5	2978.4	3087.3	4688.8
High income	3025.9	2854.7	2792.8	4931.0

* The goods are only those which have been exported at least five consecutive years (therefore, this table reports the number of destinations of the same new goods from the first to their fifth years of survival).

Table B.8. Descriptive Statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
$shnew_{ijvt}$ (large definition)	605’041	0.004	0.028	0	0.667
$lndist_{ij}$	605’041	8.584	0.810	4.742	9.886
$contig_{ij}$	605’041	0.032	0.177	0	1
$comlang_{ij}$	605’041	0.124	0.329	0	1
D_RTA_{ijt}	605’041	0.126	0.332	0	1
$deepness\_RTA_{ijt}$	605’041	1.881	7.597	0	48
$disc_{iv}$	605’041	0.294	0.456	0	1
$disc2_{iv}$	605’041	0.438	0.496	0	1

Table B.9: The relative destination pattern of exports of goods discovered between 2000 and 2010 (large definition). Panel estimations over 2000-2010. Tobit estimates (censored at zero).

VARIABLES	(1) shnew	(2) shnew	(3) shnew	(4) shnew	(5) shnew
lndist	-0.0489***	-0.0488***	-0.0483***	-0.0489***	-0.0485***
	(0.00125)	(0.00127)	(0.00129)	(0.00128)	(0.00131)
contig	0.0464***	0.0464***	0.0464***	0.0465***	0.0461***
	(0.00315)	(0.00315)	(0.00315)	(0.00327)	(0.00336)
comlang	0.0337***	0.0337***	0.0337***	0.0326***	0.0319***
	(0.00214)	(0.00214)	(0.00214)	(0.00219)	(0.00225)
RTA	0.0135***	0.0135***	0.0134***	0.0135***	0.0144***
	(0.00233)	(0.00233)	(0.00233)	(0.00233)	(0.00249)
deepness_RTA	0.000349***	0.000352***	0.000358***	0.000344***	0.000319***
	(8.76e-05)	(8.78e-05)	(8.78e-05)	(8.90e-05)	(9.21e-05)
lndistxdisc		-0.000297		0.000186	
		(0.000673)		(0.000875)	
contigxdisc				-0.000299	
				(0.00213)	
comlangxdisc				0.00402***	
				(0.00155)	
deepness_RTAxdisc				3.12e-05	
				(6.60e-05)	
lndistxdisc2			-0.00134**		-0.000875
			(0.000642)		(0.000863)
contigxdisc2					0.000779
					(0.00210)
comlangxdisc2					0.00436***
					(0.00156)
deepness_RTAxdisc2					9.81e-05
					(7.56e-05)
lnMnew	0.00719***	0.00687***	0.00695***	0.00687***	0.00683***
	(0.000213)	(0.000217)	(0.000216)	(0.000217)	(0.000217)
disc		-0.00458		-0.00952	-0.00482***
		(0.00545)		(0.00742)	(0.000888)
disc2			0.00503		0.00313
			(0.00521)		(0.00737)
Constant	0.106***	0.109***	0.105***	0.111***	0.108***
	(0.0145)	(0.0146)	(0.0147)	(0.0146)	(0.0149)
Observations	605,041	605,041	605,041	605,041	605,041

Standard errors adjusted for clustering around country pairs. *** p<0.01, ** p<0.05, * p<0.1. All regressions include importer, exporter and time fixed effects.

Table B.10: The relative destination pattern of exports of goods discovered between 2000 and 2010. Panel estimations over 2000-2010. Least Squares estimates.

VARIABLES	(1) shnew	(2) shnew	(3) shnew	(4) shnew	(5) shnew
lndist	-0.000760***	-0.000692***	-0.000607***	-0.000746***	-0.000717***
	(9.56e-05)	(9.63e-05)	(9.80e-05)	(9.64e-05)	(9.77e-05)
contig	0.00446***	0.00446***	0.00446***	0.00404***	0.00364***
	(0.000454)	(0.000454)	(0.000454)	(0.000423)	(0.000414)
comlang	0.000678***	0.000679***	0.000680***	0.000534**	0.000423*
	(0.000219)	(0.000219)	(0.000219)	(0.000223)	(0.000229)
RTA	0.000563**	0.000559**	0.000557**	0.000557**	0.000552**
	(0.000230)	(0.000230)	(0.000230)	(0.000230)	(0.000230)
deepness_RTA	-1.12e-05	-1.04e-05	-9.84e-06	-1.13e-05	-1.30e-05*
	(7.93e-06)	(7.94e-06)	(7.94e-06)	(7.85e-06)	(7.88e-06)
lndistxdisc		-0.000219**		-4.28e-05	
		(9.25e-05)		(0.000101)	
contigxdisc				0.00138***	
				(0.000500)	
comlangxdisc				0.000487*	
				(0.000282)	
deepness_RTAxdisc				3.15e-06	
				(8.42e-06)	
lndistxdisc2			-0.000336***		-9.43e-05
			(8.79e-05)		(9.41e-05)
contigxdisc2					0.00183***
					(0.000513)
comlangxdisc2					0.000580**
					(0.000264)
deepness_RTAxdisc2					7.91e-06
					(8.04e-06)
disc		0.00107		-0.000556	
		(0.000799)		(0.000885)	
disc2			0.00236***		0.000139
			(0.000761)		(0.000827)
Constant	0.00627***	0.00656***	0.00555***	0.00702***	0.00653***
	(0.00103)	(0.00103)	(0.00104)	(0.00103)	(0.00104)
Observations					
	605,041	605,041	605,041	605,041	605,041

Standard errors adjusted for clustering around country pairs. *** p<0.01, ** p<0.05, * p<0.1. All regressions include importer, exporter and time fixed effects.

Table B.11: The relative destination pattern of exports of goods discovered between 2000 and 2010 (strict definition). Panel estimations over 2000-2010. Tobit estimates (censored at zero).

VARIABLES	(1) shnew	(2) shnew	(3) shnew	(4) shnew	(5) shnew
lndist	-0.0445***	-0.0442***	-0.0442***	-0.0445***	-0.0443***
	(0.00217)	(0.00221)	(0.00224)	(0.00223)	(0.00229)
contig	0.0619***	0.0620***	0.0620***	0.0626***	0.0638***
	(0.00511)	(0.00511)	(0.00511)	(0.00534)	(0.00558)
comlang	0.0306***	0.0307***	0.0308***	0.0292***	0.0275***
	(0.00363)	(0.00364)	(0.00364)	(0.00369)	(0.00380)
RTA	0.0177***	0.0175***	0.0175***	0.0173***	0.0174***
	(0.00409)	(0.00409)	(0.00409)	(0.00409)	(0.00409)
deepness_RTA	0.000313*	0.000325*	0.000321*	0.000280	0.000287
	(0.000173)	(0.000174)	(0.000174)	(0.000176)	(0.000180)
lndistxdisc		-0.000969		-1.08e-05	
		(0.00133)		(0.00175)	
contigxdisc				-0.00237	
				(0.00399)	
comlangxdisc				0.00548*	
				(0.00308)	
deepness_RTAxdisc				0.000246	
				(0.000155)	
lndistxdisc2			-0.000795		-0.000513
			(0.00129)		(0.00170)
contigxdisc2					-0.00433
					(0.00395)
comlangxdisc2					0.00757**
					(0.00303)
deepness_RTAxdisc2					0.000114
					(0.000152)
disc		-0.0187*		-0.0283*	
		(0.0106)		(0.0146)	
disc2			-0.0189*		-0.0228
			(0.0104)		(0.0143)
Constant	0.0374	0.0358	0.0350	0.0385	0.0370
	(0.0295)	(0.0297)	(0.0299)	(0.0298)	(0.0302)
Observations	281,629	281,629	281,629	281,629	281,629

Standard errors adjusted for clustering around country pairs. *** p<0.01, ** p<0.05, * p<0.1. All regressions include importer, exporter and time fixed effects.

Table B.12 : Summary statistics of coefficients on control variables on by industry regressions.

Variable	Obs	Average coefficient	Standard Deviation	Minimum	Maximum
lndist	90	-0.67	0.10	-0.90	-0.40
contig	90	0.55	0.10	0.30	0.86
comlang_off	90	0.47	0.10	0.30	0.87
RTA	90	0.17	0.07	-0.01	0.35
Deepness_RTA	90	0.002	0.005	-0.01	0.02

Table B.13. Student test for the difference of average distance elasticity of new and traditional goods after the discovery.

Variable	Obs	Average	Standard Error	[95% Conf. Interval]
Dist-elasticity (new goods)	77475	-0.678	0.00035	[-0.679, -0.677]
Dist-elasticity (Trad. goods)	10990	-0.676	0.00094	[-0.678 -0.674]
Difference	88465	-0.0022	0.00099	[-0.004, -0.0003]
Ho: mean(diff) = 0	degrees of freedom = 88463			
Ha: mean(diff) < 0	Ha: mean(diff) != 0			Ha: mean(diff) > 0
Pr(T < t) = 0.0121	Pr(T > t) = 0.0241			Pr(T > t) = 0.9871

Table B.14.: Test for the difference of number of destination markets within and between HS2 industries (for goods exported at least five years successively).

Variable	Number of Observations*	Average	Standard Deviation	[95% Conf. Interval]
Standard deviation of Average Number of market of HS2 industries	123	7.796	6.602	[6.646; 8.946]
Average standard deviation of number of market within HS2	123	7.339	6.138	[6.270,8.409]
Difference	123	0.456	1.295	[0.231; 0 .682]
Ho: mean(diff) = 0	degrees of freedom = 128			
Ha: mean(diff) < 0	Ha: mean(diff) != 0			Ha: mean(diff) > 0
Pr(T < t) = 0.9999	Pr(|T| > |t|) = 0.0001			Pr(T > t) = 0.0001

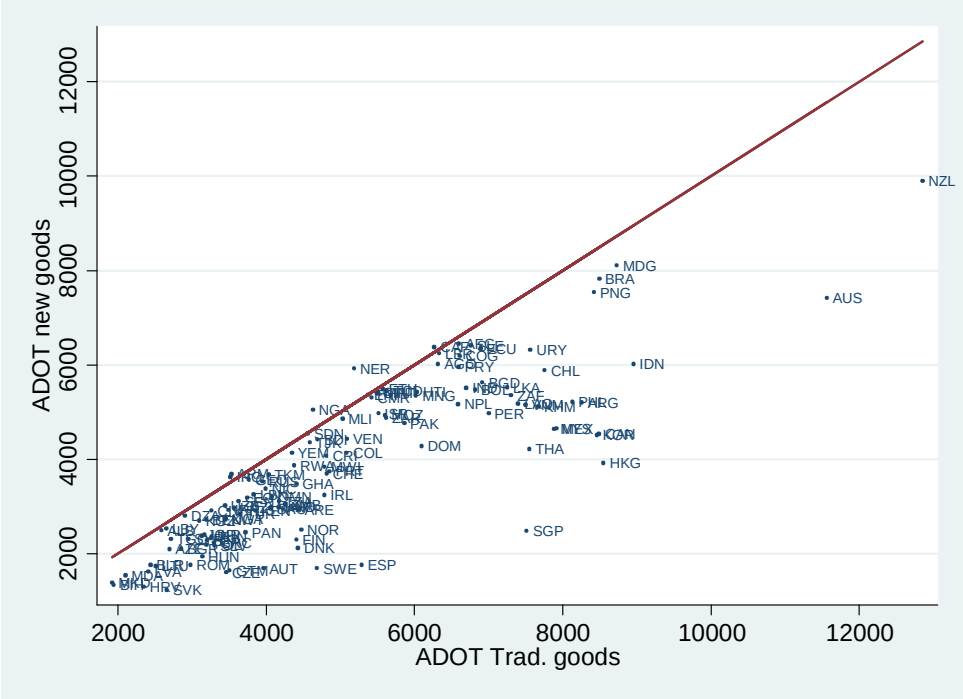
*Number of exporting country with positive number of goods exported at least five years successively.

Table B.15: Coefficients of discovery costs by HS2 industries.

HS2	"distancexdiscovery" coefficient	"discovery" coefficient	Name
9	-0.0254	-0.639***	Coffee tea matF and spices
41	-0.0142**	-0.407***	Raw hides and skins (other than fur skins) and
46	0.0275	-0.396***	Manufactures of straw of esparto or of other
67	-0.00693	-0.385***	Prepared feathers and down and articles made of
16	-0.00286	-0.380***	Preparations of meat of fish or of crustaceans
8	-0.00992	-0.362***	Edible fruit and nuts; peel of citrus fruit or melons
15	-0.0053	-0.356***	Animal or vegetable fats and oils
23	-0.00128	-0.345***	Residues and waste from the food industries
19	0.00962	-0.336***	Preparations of cereals flour starch or milk;
17	0.00432	-0.325***	Sugars and sugar confectionery
11	-0.00426	-0.318***	Products of the milling industry; malt; starches;
33	0.00359	-0.298***	Essential oils and resinoids; perfumery cosmetic
31	-0.0123	-0.286***	Fertilizers
28	-0.00508	-0.275***	Inorganic chemicals
21	0.00104	-0.275***	Miscellaneous edible preparations
68	0.000405	-0.266***	Articles of stone plaster cement asbestos mica or
2	-0.00732	-0.258***	Meat and edible meat offal
36	-0.00635	-0.258***	Explosives; pyrotechnic products; matches
97	-0.00584	-0.252***	Works of art collectors' pieces and antiques
53	-0.0124	-0.240***	Other vegetable textile fibers; paper yarn and
49	0.00849	-0.240***	Printed books newspapers pictures and other
22	-0.00263	-0.233***	Beverages spirits and vinegar
32	0.0045	-0.208***	Tanning or dyeing extracts
27	-0.000793	-0.206***	Mineral fuels mineral oils and products of their
69	-0.00507	-0.199***	Ceramic products
25	-0.00157	-0.199***	Salt; sulfur; earths and stone; plastering materials
92	-0.0131*	-0.196***	Musical instruments; parts and accessories of
44	-0.00654	-0.195***	Wood and articles of wood; wood charcoal
81	-0.0109	-0.184***	Other base metals; cermets; articles thereof
72	0.00277	-0.164***	Iron and steel
79	-4.54E-03	-0.160***	Zinc and articles thereof
62	0.00398	-0.160***	Articles of apparel and clothing accessories not
51	-0.0141*	-0.159***	Wool fine or coarse animal hair; horsehair yarn
63	-0.00107	-0.159***	Other made up textile articles; sets; worn clothing
71	-0.00738	-0.157***	Natural or cultured pearls precious or semi-
59	-0.00162	-0.155***	Impregnated coated covered or laminated textile
47	-0.00207	-0.153***	Pulp of wood or of other fibrous cellulose
96	-0.00537	-0.151***	Miscellaneous manufactured articles
74	-0.0047	-0.145***	Copper and articles thereof
4	-0.00791	-0.142***	Dairy produce; birds eggs; natural honey;
83	-0.000457	-0.138***	Miscellaneous articles of base metal
18	0.00106	-0.138**	Cocoa and cocoa preparations
35	0.00673	-0.129**	Albuminoidal substances; modified starches;
29	-0.00949***	-0.125***	Organic chemicals
56	-0.0133*	-0.118***	Wadding felt and non-wovens; special yarns
20	-0.0107	-0.118***	Preparations of vegetables fruit or nuts
24	0.0123	-0.118	Tobacco and manufactured tobacco substitutes
58	0.00493	-0.108**	Special woven fabrics; tufted textile fabrics; lace
78	-0.0190**	-0.102**	Lead and articles thereof
55	-0.00845	-0.102***	Man-made staple fibers
52	0.00603	-0.102**	Cotton
38	0.000609	-0.0957***	Miscellaneous chemical products
61	4.17E-05	-0.0950**	Articles of apparel and clothing accessories
76	-0.001	-0.0948***	Aluminum and articles thereof
70	-0.00243	-0.0943***	Glass and glassware
88	-0.0021	-0.0863	Aircraft spacecraft and parts thereof
3	0.00632	-0.0818	Fish and crustaceans molluscs and other aquatic
30	0.00198	-0.0782	Pharmaceutical products
39	0.0125**	-0.0761**	Plastics and articles thereof
91	0.00249	-0.0730**	Clocks and watches and parts thereof
7	-0.00383	-0.0647	Edible vegetables and certain roots and tubers
75	-0.0048	-0.0604	Nickel and articles thereof
80	-0.00648	-0.0534	Tin and articles thereof
57	0.000738	-0.051	Carpets and other textile floor coverings
90	0.00433	-0.0439**	Optical photographic cinematographic measuring
82	-0.000772	-0.0373	Tools implements cutlery spoons and forks of
93	0.00152	-0.0369	Arms and ammunition; parts and accessories
43	-0.00747	-0.0366	Fur skins and artificial fur; manufactures thereof
50	-0.0092	-0.0255	Silk
85	0.00334	-0.0112	Electrical machinery and equipment and parts
65	-0.0132	-0.00492	Headgear and parts thereof
48	0.0059	-0.00356	Paper and paperboard; articles of paper pulp of
42	0.00469	-0.00162	Articles of leather; saddlery and harness
95	-0.0007	-0.000534	Toys games and sports requisites; parts and
12	-0.00447	0.0049	Oil seeds and oleaginous fruits
45	-0.00516	0.00543	Cork and articles of cork
54	-0.00654	0.00914	Man-made filaments
37	-0.00667	0.0211	Photographic or cinematographic goods
64	-0.00969	0.0271	Footwear gaiters and the like; parts of such

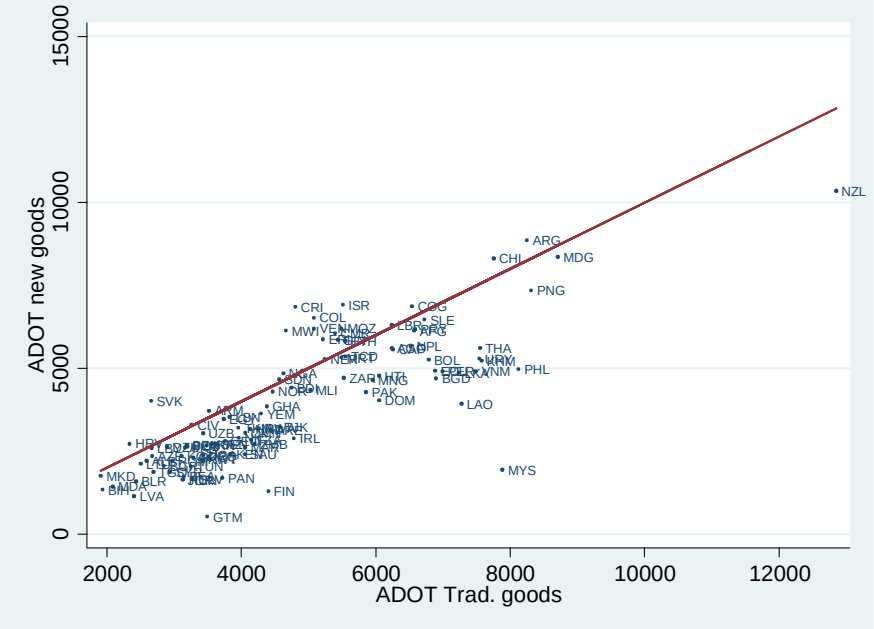
89	0.00141	0.0317	Ships boats and floating structures
66	-0.000454	0.0458	Umbrellas sun umbrellas walking sticks seat
66	-0.000454	0.0458	Umbrellas, walking-sticks, seat-sticks, whips,
40	0.00149	0.0546*	Rubber and articles thereof
86	-0.00511	0.0709*	Railw/tramw locom, rolling-stock & parts there
5	-0.0137	0.103	Products of animal origin, nes or included.
60	-0.0146	0.135	Knitted or crocheted fabrics.
10	-0.0069	0.166	Cereals
94	-0.0361***	0.237***	Furniture; bedding, mattress, matt support, cu

Figure B.1: Average distance of trade of New (large definition) and Traditional Goods (by country, average over 2000-2010).



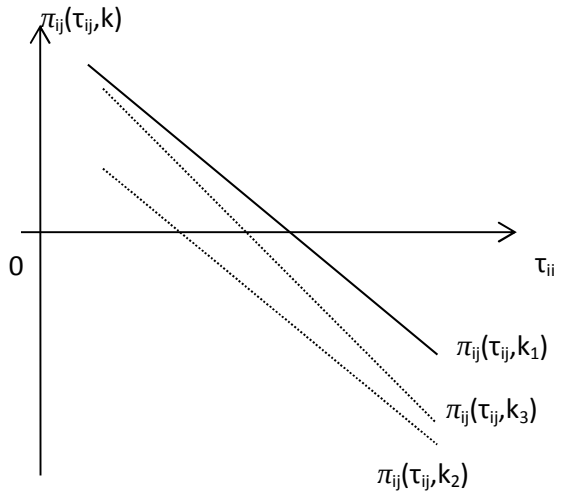
*Note: In this figure, 96% of countries are below the 45°line.

Figure B.2: Average distance of trade of New (strict definition) and Traditional Goods (by country, average over 2000-2010).



*Note: In this figure, 83% of countries are below the 45°line.

Figure B.3 : Differences of destination patterns among goods



Note: In this figure, I consider three different goods k_1, k_2 and k_3 each being respectively in industry z_1, z_2 and z_3. Industry z_2 have a higher domestic production cost and/or a higher permanent national fixed export cost than z_1, and industry z_3 is more sensitive to trade barriers than z_1. That is: $c_i(z_2)^{\pm}.F_i^{perm}(z_2) > c_i(z_1)^{\pm}.F_i^{perm}(z_1)$, and $(\pm -1)\,(z_1) + {}^{perm}(z_1) = (\pm -1)\,(z_2) + {}^{perm}(z_2)$; and $c_i(z_3)^{\pm}.F_i^{perm}(z_3) = c_i(z_1)^{\pm}.F_i^{perm}(z_1)$ and $(\pm -1)\,(z_1) + {}^{perm}(z_1) < (\pm -1)\,(z_3) + {}^{perm}(z_3)$. It follows that, for each value of τ_{ij}, $\pi_{ij}(k_2)$ and $\pi_{ij}(k_3)$ are lower than $\pi_{ij}(k_1)$. As a result, goods k_2 and k_3 are sold to a lower number of destinations than k_1 and to most accessible destinations (with a low τ_{ij}).