EXPORT STRUCTURE AT THE EXTENSIVE AND INTENSIVE MARGINS: THE CASE OF EMERGING ECONOMIES

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—Abstract —

There is a consensus that increased exports have some benefits by enabling countries to generate more revenue. But rather than exporting more, how a country achieves high export performance is a more important question. Recent empirical literature highlights that intensive and extensive margins have different contributions to the export growth. Thus, export structure across the countries and products differs according to the effects of these margins. Developed countries have lost market share in goods exports to emerging economies, especially China. In other words, the reason of this loss of market share by most advanced economies is the increase in exports from emerging economies. In this study, we will focus on the export structure of Turkey -as well as Brazil, China, India, Mexico and Russia (BCIMRT) as benchmark countries- by providing a detailed analysis of which areas of goods contribute to the intensive and/or extensive margin growth and which margin dominates. In this study, ISIC Rev.3 4-digit level trade data is used which is available at the United Nations Commodity Trade Statistics (COMTRADE) database for 2000-2010 period. By using descriptive statistics on BCIMRT's exports to the world, we decompose trade into its extensive and intensive margins and try to answer whether export has increased most through new partnerships or through expanding existing trade flows in these selected emerging economies.

Key Words: *Extensive Margin, Intensive Margin, Emerging Economies*
JEL Classification: F10, F14

1. INTRODUCTION

The export structure across the countries, years and products differs because of the different contribution of the intensive and extensive margins to the export growth. High share of the intensive margin and extensive margin indicates significant level of concentration and the pattern of diversification, respectively. In this paper we will analyze whether extensive margin (the range of goods being traded) or the intensive margin (how much that is traded of a certain good) dominates.

Every theory of international trade predicts that richer countries export more and many of the studies focus on the export structure of developed countries. But this study will decompose exports of the selected developing countries (specifically, 6 emerging countries) into intensive and extensive margins. It is unambigious that increased exports enable countries to generate more revenue and afford buying more imports. Here, it is more important to ask how a country exports more. According to Hummels and Klenow (2005), a country can increase the volume of exports in several ways: it can export more of the same goods (intensive margin) or larger set of goods (extensive margin). In other words, a country either specializes on producing the same goods or diversifies by inventing and developing new goods. This paper is organized as follows. In the next section, the extensive and intensive margins literature is briefly reviewed. Section 3 and 4 present the data used in this study and explain the methodology, respectively. Finally, Section 5 points out the main findings and concludes the study.

2. LITERATURE

There is a growing literature about the extensive and intensive margins of trade. The literature starts with the studies that use disaggregated trade data. Feenstra (1994) calculates measures of export variety while Hummels and Klenow (2005) derive measures of the extensive and intensive margins. Evenett and Venables (2002), Baldwin and Di Nino (2006), Baldwin and Harrigan (2007), Amurgo-Pacheco and Piérola (2008), and Cadot et al (2007) use other ways of disaggregated data by counting the number of categories in which a country exports; by dividing the categories into sets, depending on some criteria such as whether they are exported for the whole time period, or start to be exported at some point in time, and then look at the volumes of trade corresponding to these sets; and by constructing indicator variables for whether or not there is trade in a given product line. The other literature is that use aggregated trade data. Felbermayr and Kohler (2006, 2007) and Helpman et al. (2008) use aggregated

trade data and gravity models to draw inferences on the extensive and intensive margins of trade.

3. DATA

Various authors define trade margins in different ways and find that their importance to the trade growth is different. Also, the estimation technique of the trade flows is different. To analyze intensive and extensive margins of trade, some authors use firm level data. Since this kind of data is very difficult to obtain, in this study we will focus on disaggregated data on exports at country level. We use very detailed trade data on imports from our selected 6 emerging countries to different country groups at ISIC Rev.3 4-digit level. The data covers 2000-2010 period and only manufacturing industry where goods are differentiated. We follow Hummels and Klenow (2005) to decompose trade into its extensive and intensive margins. Hummels and Klenow (2005) argue that by using more detailed export data, we can do better job of assigning variety differences to the extensive margin. Trade data are extracted from the United Nations Commodity Trade Statistics Database (COMTRADE), accessed through WITS . We use import data since governments record these flows more accurately for tax purposes (import duties). So, for example, the export from Brazil to Least Develeoped Countries (LDC) is measured as the import reported by the LDC rather than the export reported by Brazil.

Our database includes 18 reporters and 6 partners, giving a total of 127261 observations. The export values below $1000 (526 records) are excluded. The set of reporter countries include All countries; All high-income (OECD+non-OECD); EU 25 Members; EU 27 Members; High-income OECD; Least Developed Countries; Low & Middle Income East Asian & Pasific; Low & Middle Income Europe; Low & Middle Income Economies; Low & Middle Income Latin America; Low & Middle Income Middle East and Africa; Low & Middle Income South Asia; Low & Middle Income Sub-Saharan Africa; WTO All Members; WTO Developing Members; WTO High-Income Members; WTO Least Developed Countries Members and WTO Low & Middle Income Members. The partner countries are as follows: Brazil, China, India, Mexico, Russia and Turkey.

4. METHODOLOGY

4.1. Definitions of Extensive and Intensive Margins

The exact meaning of the terms extensive margin and intensive margin varies between contexts. In general, changes in the extensive margin of trade are changes in the variety of traded goods driven by countries starting to trade goods that they had not traded before and changes in the intensive margin of trade are changes in trade volumes of goods that were previously traded. In other words, extensive margin is exporting larger set of goods and intensive margin is exporting more of the same goods. In time-series contexts, growth at the extensive margin can refer to new goods being exported, old goods being exported to new destinations or a growing number of exporting firms and growth at the intensive margin refers to growing exports of goods that were already being exported or the volume of exports from incumbent exporters. In cross-sectional contexts, extensive margin is the range of goods that is being exported, or the number of exporting firms and intensive margin is how much that is being exported of each good, or the exported volume for individual firms. At the firm level, extensive margin indicates the number of new firms entering a market and intensive margin indicates growth in the total value of exports (of any goods or services) from a firm that is already present in a given market. Lastly, at the country level, extensive margin refers to the number of country pairs trading bilaterally with each other, while intensive margin is the amount of trade taking place within an existing trade partnership. In sum, extensive and intensive margins are generally about export diversification and export concentration, respectively. In the following section, export diversification and concentration concepts are analyzed.

4.2. Diversification and Concentration

Export diversification has been measured in many ways. For instance, it has been measured using concentration indexes or counts of exported products. In the literature, the most commonly used measures of diversification are the concentration ratios. Among them the most widely used measure of commodity concentration is the Herfindahl-Hirschman Index (HHI). Even if it is an imperfect indicator HHI is still the most commonly used statistic for measuring concentration, which sums the squared shares of each commodity in total exports.

The index takes values from zero to one, the higher representing greater concentration. It may be written as follows:

$HHI = \sqrt{\sum_{i=1}^{N}\left[\frac{x_{it}}{X_t}\right]^2}$ where x_{it} is the value of exports of commodity i in year t and X_t is the total export in that year.

Table 1_HHI

	Brazil	China	India	Mexico	Russia	Turkey
2000	0,12	0,04	0,30	0,19	0,90	0,07
2001	0,13	0,04	0,22	0,17	0,96	0,07
2002	0,13	0,05	0,26	0,17	0,89	0,08
2003	0,13	0,07	0,28	0,20	0,92	0,08
2004	0,12	0,08	0,24	0,21	0,88	0,09
2005	0,12	0,08	0,28	0,26	0,97	0,09
2006	0,13	0,08	0,32	0,31	0,95	0,09
2007	0,13	0,08	0,36	0,32	0,97	0,09
2008	0,18	0,07	0,40	0,35	0,98	0,12
2009	0,22	0,09	0,32	0,26	0,93	0,09
2010	0,30	0,09	0,42	0,28	0,97	0,07

Table 2_Average HHI Values

Brazil	China	India	Mexico	Russia	Turkey
0,16	0,07	0,31	0,25	0,94	0,08

As shown in Table 1, the highest HHI values are seen in Russian trade. When we look at the average HHI values, in Table 2 it is clearly observed that exports have become more concentrated in Russia and India, respectively. After 2007, concentration of exports in Brazil has increased and at the second half of 2000s, concentration of exports in India has increased. In cases of China and Turkey there is a stable pattern in export concentration and they have smaller HHI values which means they managed to diversify their exports compared to Russia and India.

Dogruel and Tekce (2011) state that diversification of exports is expected to contribute to the output growth of developing countries through several channels, such as decreasing export instability by reducing the dependence on a limited number of commodities that are subject to fluctuations in prices and volumes, creating spillover effects and increasing productivity growth, making countries less vulnerable to sector-specific adverse shocks and making it easier to channel

positive terms-of-trade shocks into growth. They use the number of active lines of exported commodities as an indicator about export diversification of a country. In other words, diversification at the extensive margin can be measured simply by counting the number of active export lines. We use the method of Dogruel and Tekce (2011) and among commodities at the 4-digit ISIC Rev.3 classification, all exported products having a positive value are taken into consideration and only values less than $1,000 are excluded.

Table 3_Average Number of Active Lines

	Brazil	China	India	Mexico	Russia	Turkey
2000	101	112	106	92	99	102
2001	100	113	107	93	99	102
2002	101	113	107	93	99	104
2003	104	113	108	94	100	105
2004	105	113	107	94	99	106
2005	101	107	104	91	94	103
2006	101	108	105	91	95	102
2007	103	108	105	95	98	105
2008	104	108	105	96	97	105
2009	101	108	105	92	91	103
2010	103	108	106	97	96	106
Average	103	110	97	106	93	104

Table 4_Change in the Average Number of Active Lines from 2000 to 2010

2,22	-4,12	-0,89	4,83	-2,33	3,72

This study shows the descriptive statistics on the pattern of export structure in the 6 emerging countries; Brazil, China, India, Mexico, Russia and Turkey. Trade data shows how exports of the selected countries have diversified or concentrated in time and among countries.

As shown in Table 3, Mexico has the least number of commodities exported while China has the highest number of active lines. According to Dogruel and Tekce (2011) the change in the number of active lines may be an indicator of changing export patterns of countries. If the average number of active lines in 2000 and 2010 are compared, the highest rise is observed in Mexico (% 4,8) and Turkey (% 3,7). Conversely, the average number of active lines fall in China (% 4,1) and Russia (% 2,3). On the other hand, Table 5 shows the number of non-active lines which are values less than $1000.

Table 5_Number of Non-Active Lines

Country	Year	Kind of Products	Most Frequent Product Code	Country Group
Brazil	2007	17	1553	• Low and Middle Income South Asian Countries
	2008	18	3320	• Low and Middle Income South Asian Countries
	2010	20	1553 2330	• Least Developed Countries • WTO LDC Members
China	2007	3	2330	• Low and Middle Income Latin America
	2008	1	2330	• WTO LDC Members
	2010	1	2330	• Low and Middle Income Europe
India	2007	10	1553 2927	• Low and Middle Income Middle East and Africa
	2008	6	2023	• WTO LDC Members
	2010	2		• Low and Middle Income Middle East and Africa
Mexico	2007	34	2010	• WTO LDC Members • Least Developed Countries • Sub-Saharan Africa • Low and Middle Income Middle East and Africa
	2008	40	1553	• Least Developed Countries • WTO LDC Members
	2010	30	3140	• Low and Middle Income Middle East and Africa • Least Developed Countries
Russia	2007	38	1511 1912 2212 3592	• Low and Middle Income Latin America • Sub-Saharan Africa • Low and Middle Income Middle East and Africa
	2008	36	1514 2212 3693	• Low and Middle Income Latin America • WTO LDC Members • Sub-Saharan Africa
	2010	34	1723 1912 2219 2812 2927 3420 3691	• Sub-Saharan Africa • Least Developed Countries • WTO LDC Members
Turkey	2007	14	2212 3140 3520	• WTO LDC Members • Low and Middle Income South Asian Countries
	2008	16	2023 2330 3320 3330	• Low and Middle Income South Asian Countries • WTO LDC Members
	2010	10	2023 3330 3692	• WTO LDC Members • Low & Middle Income East Asian & Pasific

As shown in Table 5, the smallest export values, which are below $1000, are observed only in 2007, 2008 and 2010. In Mexican and Russian cases, various

kinds of products between the codes 1511-3699 according to ISIC 4-digit classification have export values below $1000. As seen in the fourth column the smallest export values for Brazil and China are the products 1553 (Manufacture of malt liquors and malt) and 2330 (Processing of nuclear fuel), respectively. In Russian case, 2212 (Publishing of newspapers, journals and periodicals) and 1912 (Manufacture of luggage, handbags and the like, saddlery and harness) are the non-active lines, while in Turkish case 2023 (Manufacture of wooden containers) and 3330 (Manufacture of watches and clocks) have the smallest export values. Finally, as shown in the fifth column, most of the non-active lines belong to the trade with low income countries, as expected. Also, the total share of top 3 exported products in total exports may be regarded as an indicator of concentration of exports on certain products. As seen in Table 6 , in Russia only 3 products constitute more than 90 % of total exports. The lowest concentration of exports is observed in Chinese trade (42%).

Table 6_ Total Share of Top 3 Products (%)

	Brazil	China	India	Mexico	Russia	Turkey
2000	52,14	43,58	55,60	52,23	92,79	55,68
2001	53,30	47,37	51,20	51,62	85,13	56,06
2002	59,94	48,29	51,29	56,04	87,44	52,65
2003	59,89	48,72	51,37	57,98	91,89	52,09
2004	64,41	46,97	55,40	56,05	93,00	59,34
2005	62,28	43,60	58,87	54,91	93,37	58,82
2006	61,92	43,52	68,58	54,09	98,76	55,89
2007	63,61	40,12	64,56	51,31	92,89	59,96
2008	68,02	41,70	71,84	53,17	94,55	72,72
2009	61,02	33,52	68,50	54,01	93,05	55,94
2010	61,39	31,11	80,16	59,83	97,24	53,66

Table 7_ Average Share of Top 3 Products (%)

Brazil	China	India	Mexico	Russia	Turkey
60,72	42,59	61,58	54,66	92,74	57,53

Table 8_Top 3 Products Codes

	Brazil	China	India	Mexico	Russia	Turkey
2000	2710	3000	1711	3430	2720	2710
2000	2720	1810	2411	3190	2320	1711
2000	2101	1711	1512	3000	2710	1721
2001	1514	1810	1711	3430	2720	2710
2001	2710	3000	2411	3190	2320	1711
2001	1511	1711	1721	3000	2710	1721
2002	2710	1810	1711	3430	2320	2710
2002	1514	3000	2411	3190	2720	1711
2002	1511	1711	2710	3610	2710	1721
2003	2710	3000	2411	3430	2320	2710
2003	1514	1810	2710	3190	2720	1711
2003	1511	2899	1711	3610	2710	1721
2004	2710	3000	2411	3430	2320	2710
2004	1511	1810	2710	3190	2720	1711
2004	1514	2899	2320	3120	2710	3430
2005	2710	3000	2320	3430	2320	2710
2005	1511	1810	2710	3190	2710	1711
2005	1514	3230	2411	3120	2720	3430
2006	2710	3000	2320	3430	2320	2710
2006	1511	2710	2411	3190	2720	3430
2006	2720	3230	2710	3120	2710	1711
2007	1511	2710	2320	3430	2320	2710
2007	2710	3694	2710	3190	2720	3430
2007	2720	3000	2411	3120	2710	1711
2008	2710	2710	2320	3430	2320	2710
2008	1511	3694	2710	2710	2710	3430
2008	1514	2899	2411	2720	2720	2320
2009	1511	3694	2320	3430	2320	2710
2009	2710	2899	2411	2720	2710	3430
2009	1514	2520	2423	3120	2720	1711
2010	1511	3694	2320	3430	2320	2710
2010	1542	2899	2411	2720	2720	3430
2010	2101	2411	2423	3120	2710	1711

Table 8 shows the product codes of top three exporting commodities of our six emerging countries (BCIMRT). For Brazil, the products 2710 (Manufacture of basic iron and steel), 1511 (Production, processing and preserving of meat and meat products) and 1514 (Manufacture of vegetable and animal oils and fats) have the biggest share of Brazilian export. For China, the product 3000 (Manufacture of office, accounting and computing machinery) has a big share until 2007. After 2006 it losses its importance and the product 3694 (Manufacture of games and toys) takes its share. Also, until 2005 the product 1810 (Manufacture of wearing apparel, except fur apparel) is among the important products but after 2005 it is not in the top three products. For India, 2710 (Manufacture of basic iron and steel), 2411 (Manufacture of basic chemicals, except fertilizers and nitrogen compounds) and 2320 (Manufacture of refined petroleum products) have the biggest shares. For Mexico, 3430 (Manufacture of parts and accessories for motor vehicles and their engines) is always in the first row and it is followed by 3190 (Manufacture of other electrical equipment n.e.c.) and 3120 (Manufacture of electricity distribution and control apparatus). For Russia, the top three products are always 2710 (Manufacture of basic iron and steel), 2720 (Manufacture of basic precious and non-ferrous metals) and 2320 (Manufacture of refined petroleum products) var. And finally, for Turkey, 2710 (Manufacture of basic iron and steel) is always the top product for the 2000-2010 period. The other most important product is 1711 (Preparation and spinning of textile fibres; weaving of textiles). 1721 (Manufacture of made-up textile articles, except apparel) lose its importance and 3430 (Manufacture of parts and accessories for motor vehicles and their engines) takes its place.

5. RESULT

So one should be careful in taking diversification as a policy objective *because,* in principle, diversification reduces risk. Also, diversification at the extensive margin reflects “export entrepreneurship” and, in that sense, is useful evidence on the business climate, because extensive margin creates a spillover in the economy as a result of having a more diversified production structure. The analysis shows that exports at the intensive margin account for the most important share of overall trade growth. Also, trading with richer countries are also found to have positive impacts on export diversification for developing countries. Export diversification is especially important for developing countries, because developing countries’ exports tend to be concentrated on a few products, often commodities, with very volatile demand. According to Amurgo-Pacheco and Pierola (2008) this translates into high income instability, which in turn provokes

high growth volatility. Export diversification in this setting has the advantage of creating a more stable income inflow. The growth of trade at the intensive margin is much more important than at the extensive margin for all groups of countries. The extensive margin seems to be relatively more important for poorer regions. In another words, the relative importance of product diversification increases as we move to less developed regions. For example, countries in Middle East and North Africa and Asia have similar patterns. This paper contributes to the export diversification literature by presenting and discussing some descriptive statistics on trade patterns between emerging countries and 18 different income groups. We find that export growth is mostly explained by the growth at the intensive margin. It means it is easier for a producer to expand into new markets with existing products than to start exporting new products.

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