New goods margin in international trade: empirical analysis for Visegrad countries

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This paper deals with empirical analysis of international trade between Visegrad countries and EU-15 during past two decades. The goal of the paper is to find out if the growth in export is of intensive or extensive type. I follow methodology of Kehoe and Ruhl (2002) and use detailed trade statistics on the value of trade flows by commodity according to Standard International Trade Classification (SITC) codes. I find out that the goods that were traded the least in the benchmark year account for disproportionate share in trade after liberalization and reduction of trade barriers. The most significant increase was found for Poland and the Czech Republic. The set of goods which accounted for only ten percent of trade in 1993 accounts for nearly thirty percent of trade following the liberalization. Similar patterns were identified also for Hungary and Slovakia even it the analyzed period was shorter. The countries thus began to export goods that they had not been previously trading.

Keywords: international trade, trade barriers, liberalization, export growth, intensive and extensive margin

1. Introduction

This paper analyses international trade between Visegrad countries and EU-15. The goal of the paper is to find out if the growth in export is of intensive or extensive type. We follow methodology of Kehoe and Ruhl (2002) and use detailed trade statistics on the value of trade flows by commodity according to Standard International Trade Classification (SITC). The results show that the goods that were traded the least in the benchmark year account for disproportionate share in trade after liberalization and reduction of trade barriers. In other words the countries began to export goods that they had not been previously trading. This is growth on the extensive margin and should be reflected in models of international trade and also in decisions

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of policymakers that usually focuses only on supporting of traditional export industries.

The rest of the paper is organized as follows. Section 2 briefly describes data used for analysis and section 3 focuses on measures of extensive margin growth. The results are presented and discussed in Section 4. Section 5 deals with sensitivity analysis of the measure of extensive margin and its influence on results. Final section concludes with prospects for further research.

2. Data

The data are obtained from OECD database. The measure is annual flow values of exports of particular country into EU-15. The data are disaggregated by commodities according to four-digit Standard International Trade Classification (SITC), revision 2. The data are quoted in thousands of U.S. dollars, however we are interested in relative quantities and thus the units are not important. The data sample for each country is determined by availability of data. The data sample starts in 1993 for Poland and for the Czech Republic and in 1997 for Hungary and Slovakia.[2] The last available period is 2006 for all countries. It must be mentioned that the process of trade liberalization was gradual and in some cases already started before period that we study. However, main reduction of trade barriers happened before accessions of Visegrad countries to European Union in 2004 which is covered in our analysis.

3. Measures of the extensive margin

For each country's exports into EU15, the SITC codes are ordered by their value of trade in the first three years of the sample.[3] Then the cumulative sets of the ordered codes are constructed. Every set includes one-tenth of total export. The first set starts with the smallest codes[4] and other codes are added to this set until the sum of their values reaches one-tenth of total export value. The next set is formed in similar way by summing the remaining smallest codes until the value of the set reaches one-tenth of total trade. This procedure produces ten sets of codes where each set represents one-tenth of total trade. The first set consists of the "least-traded" commodities – they have the smallest export value. Subsequent set contains less codes then the previous set as the (relative) trade value of the codes increases. Since the set comprises

[2] The data for Hungary are available from 1993 but methodological changes occured, especially between years 1996 and 1997, and therefore the analyzed period starts in 1997.
[3] Average value in three years is used for the sake of robustness of the ordering. Implications of the way of ordering (one year or three years average) are discussed in Section 5.
[4] The term 'smallest codes' means codes that account for the smallest value of total trade.

exactly one-tenth of total export, some codes are split into two sets. Therefore the number of codes in the set need not be integer number.

Given this partitioning of the SITC codes, two measures of export growth are considered. First measure corresponds to change in each set's share of trade over the sample period, second measure focuses on the time evolution of the least-traded set of codes with the aim to capture timing of the export growth of these goods.

The first measure is constructed by calculating the share of total exports for each of the ten sets of codes in the last year of the sample period. The interpretation of this measure is as follows. If the growth in trade is driven only by proportional increase in the value of goods already traded, each set of codes would retain its one-tenth share in trade. On the other hand, if the trade liberalization leads only to trade of goods that were previously untraded, the first set of codes would gain trade share, while share of other set would decline. The first case is intensive margin, the second case is extensive margin in trade growth.

The second measure uses the same partition of SITC codes but looks only on the share of least-traded goods in total export. This share is calculated for each year of the sample period. If the lowering of trade barriers leads to trade of goods not previously traded, there should be an increase in the share of trade accounted for by this set of goods. This measure should show the timing of any change it the trade of new goods. If an increase in the share of exports coincides with the implementation of trade reforms, we can think of it as an evidence of the link between trade liberalization and growth in the extensive margin.

4. Results

Overall results indicate significant export growth on the extensive margin for all Visegrad countries. Table 1 shows the end of sample export shares of the least-traded goods. The most significant increase in the extensive margin is observed in Poland and the Czech Republic. Least-traded goods comprise 28 % and 27 % of the total export share in 2006, respectively. The shares of least-traded goods in Hungary and Slovakia account for 23 and 19 percent, respectively. These lower values can be caused by shorter sample period, but even so the increase is quite considerable.

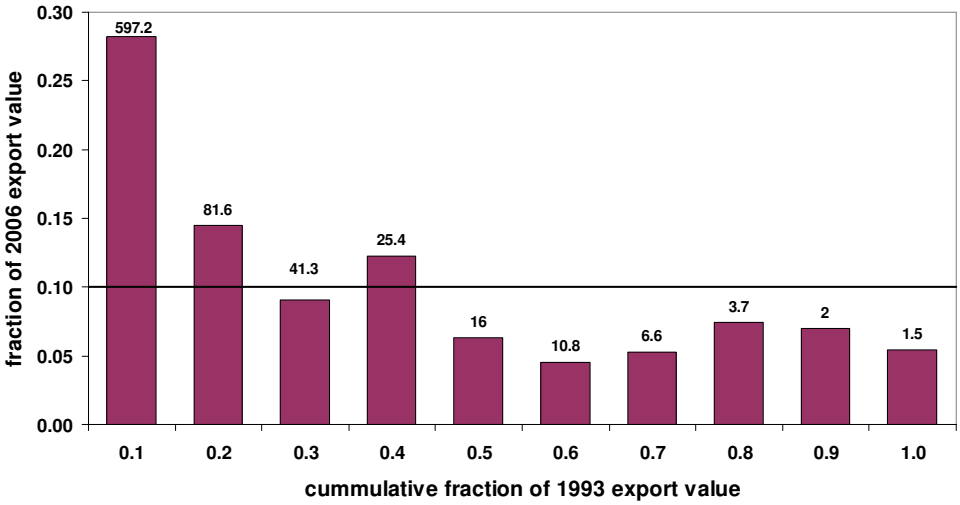
Table 1. Share of export value in 2006: least-traded goods in benchmark year

Country	Benchmark year	Share of least-traded goods
Poland	1993	0.28
Czech Republic	1993	0.27
Hungary	1997	0.23
Slovakia	1997	0.19

Source: own creation

Let us look at the trade share in individual countries one by one. The highest extensive margin growth was recorded for Poland. Graph 1 shows the decomposition of trade into individual sets of goods for this country. The set of least-traded goods that account for 28 % trade share in 2006 includes 597 SITC codes. Given the detailed structure of the measure, we can find which codes experienced the most significant changes. Two codes "7132: Internal combustion piston engines for propelling vehicles" (in the first decile) and "7611: Television receivers, colour" (in the second decile) increased their share on total export value by about 4 %. There is also more than proportional increase in the fourth decile where code "7849: Other parts & accessories of motor vehicles" increased its share by 5 percents.

Graph 1. Composition of Exports: Poland into EU 15



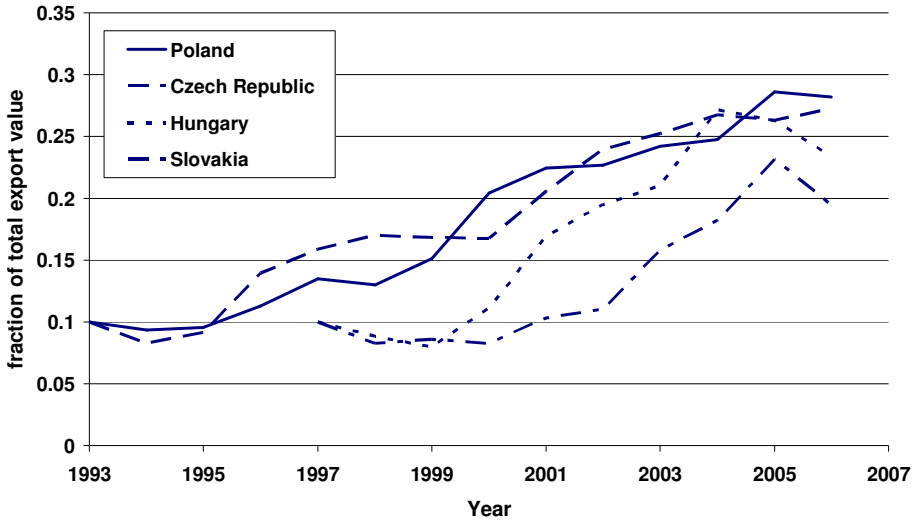
Source: own creation

On the other hand, bunch of categories related to textile products show about one percentage decrease of their share and they are quoted in the fifth, sixth and seventh decile. One category "3222: Other coal, not pulverized, not agglomerated" that can be found in the last set – the most traded goods – decreased its share by 6 percent. It is positive news that Poland turn away from exporting articles of small value added to more processed ones.

It is also interesting to look at the timing of the trade change. Graph 2 plots the trade share of the least-traded goods over the sample period for all countries. There is small decrease of the share at the beginning of every time series. This is caused by the method sorting of the codes (average of first three years) and not much of atten-

tion should be paid to this.[5] In case of Poland (solid line), the increase in the trade share is gradual, with short stagnation in 1997 followed by sharp increase between 1999 and 2000. Are there any events of trade liberalization that are connected to these changes? Lot of custom duties between EU and Poland was abolished in years 1994, 1997 and 2001, but no sharp increase is observed in the time series following these years. Even the opposite is the case – the time series is flatter after these years. Thus, the coincidence of trade barriers reduction with increase of the share of least traded goods is not completely confirmed. However, if we treat the period as a whole, we can conclude that the trade growth on extensive margin has certainly some sources in trade liberalization.

Graph 2. Time evolution of least traded goods: Visegrad countries



Source: own creation

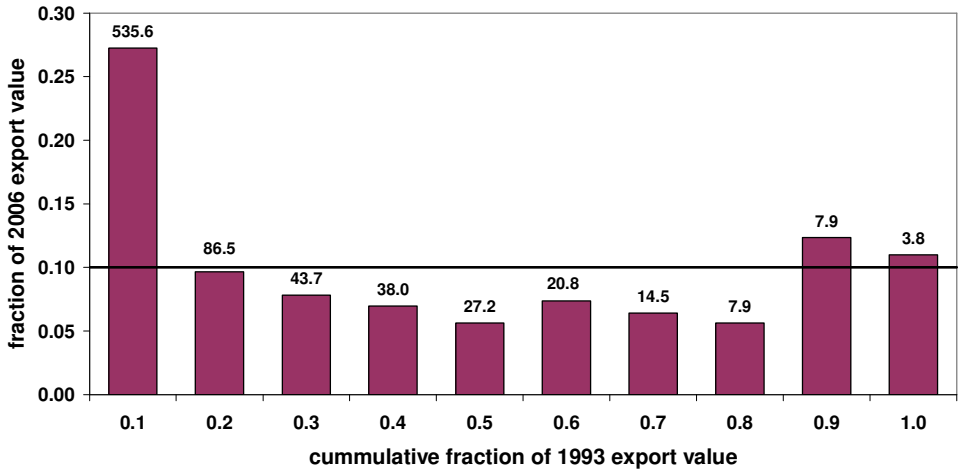
Graph 3 shows trade decomposition in the Czech Republic. The set of least-traded goods includes 535 codes and comprise 27 % of export share in 2006. There are not many single codes (among least-traded goods) that would achieve large share over the analyzed period.[6] However, it is worth to note that goods in two last deciles (most-traded goods) account for more than proportional increase in their sets. No wonder that these sets include codes "7810: Passenger motor cars for transport of

[5] Sensitivity analysis in Section 5 deals with this issue.

[6] The largest increase – by 4 % – was recorded for code „7523: Complete digital central processing units".

pass. & goods“ and „7849: Other parts & accessories of motor vehicles“ – traditional branches of Czech industry.[7]

Graph 3. Composition of Exports: Czech Republic into EU 15



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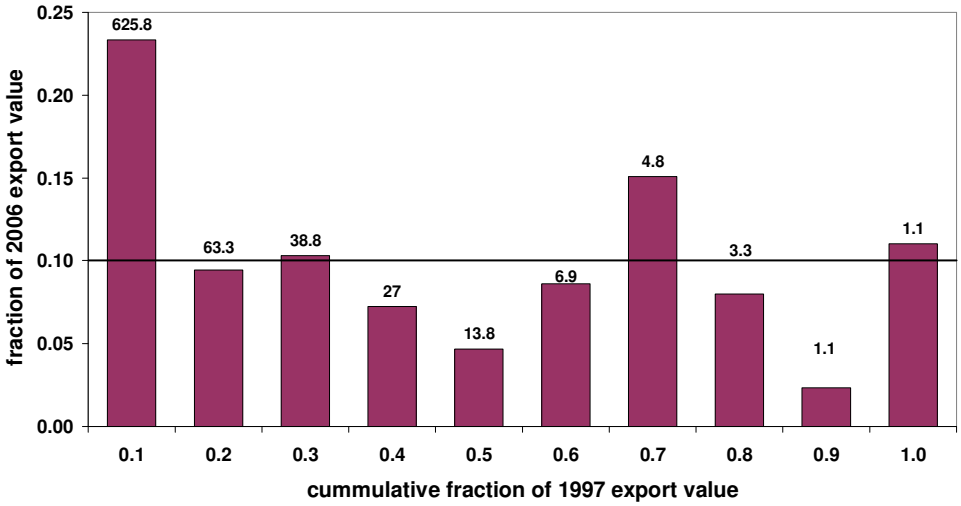
For time evolution of least-traded goods in the Czech Republic we look again on Graph 2. Compared to Poland it is only slightly different. Regarding trade liberalization, the free trade agreement between EU and Czechoslovakia was arranged in 1992.[8] EU states abolished the customs and quantity limits unilaterally as the agreement came into force. Since we have data from 1993, the effect of this liberalization is partly distorted. We can see two waves (accruals) in the share of least-traded goods: one from 1995 to 1998 and the second from 2000 to 2004. But it is hard to find some concrete causes.

[7] These two codes increased their share by 5 % and 7 %, respectively.
[8] After splitting of Czechoslovakia it was automatically related to the Czech Republic.

Graph 4. Composition of Exports: Hungary into EU 15



Source: own creation

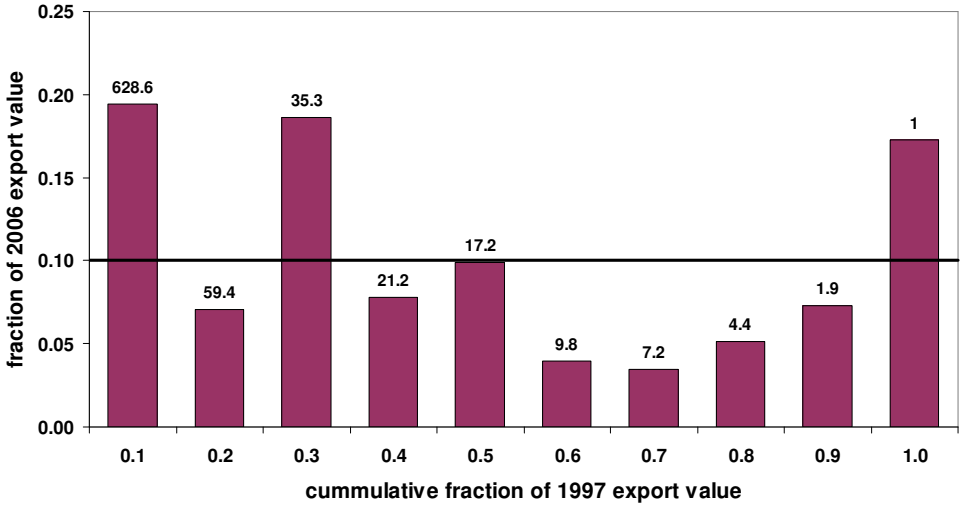
Trade in other two Visegrad countries – Hungary and Slovakia – were analyzed for shorter time period. In spite of this fact, the extensive margin is quite considerable. Trade decomposition for Hungary is shown in Graph 4. The set of least traded goods comprise 23 % of total export value. Among 564 codes from this group the only code "4236: Sunflower seed oil" achieved significant increase (by 6 %). Quite significant change happened also in the seventh decile. Its share is 15.1 % and it includes codes "8749: Parts and accessories for machines, appliances, instruments and apparatus n.e.s." and „6289: Other articles of rubber, n.e.s." that both contributed to increase of the share by 3 %. On the other hand, very significant decrease is observed in the ninth decile. The code "6931: Stranded wire, cables, cordages and the like" decreased by 8 % and is major source of this change.

For time evolution of least traded goods look again at Graph 2. As the analyzed period for these two countries is quite short, it is even more difficult to match reduction of trade barriers to changes in the share of least traded goods. Main steps to trade liberalization have been already done before 1997. Nevertheless, in case of Hungary, the group of least traded goods experienced steady increase from 1999 up to 2004 where it reached the share of 27 % comparable with Poland and the Czech Republic. Then the share little bit decreased to value 23 % as reported above.[9] The overall increase is more rapid and comes earlier than in case of Slovakia.

[9] There was another methodological change in Hungarian data in 2004; therefore the decrease can be ascribed to this fact. For further details about methodological changes, see:

The composition of trade in Slovakia is shown in Graph 5. It seems that Slovakia is country with growth in trade on both extensive and intensive margins. The set of least traded goods has 19 % share on total exports. The most important code is "7842: Bodies for the motor vehicles of 722/781/782/783" that recorded increase by 3 %. There is also significant increase in trade of goods included in the third decile. Share of this set is 18.6 % which is almost the same as of the first set. The code „7611: Television receivers, colour" with 12 % increase derived this change. And finally, the last decile (the most traded goods) has 17.3 % share on total trade. This increase (by 7 %) was caused by single code „7810: Passenger motor cars, for transport of pass. & goods". Intensive margin is therefore also significant source of export growth for Slovakia. From the detailed analysis of codes we see that car manufacturing industry had positive effect for related industry that became also well established. However, the extensive margin growth is still considerable which will be clearer in the next section that deals with sensitivity analysis. The time evolution of least traded goods exhibits flat pattern with gradual increase from 2002. It could be caused by some government export incentives than by reducing of trade barriers because the process of trade liberalization was nearly completed.

Graph 5. Composition of Exports: Slovakia into EU 15



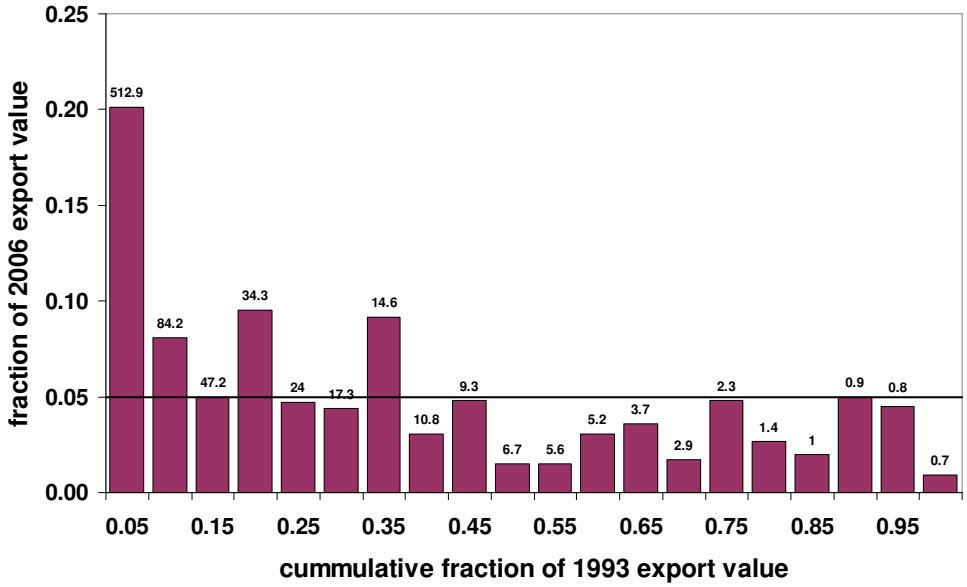
Source: own creation

http://portal.ksh.hu/pls/ksh/ksh_web.meta.objektum?p_lang=EN&p_menu_id=110&p_ot_id=100&p_obj_id=QKT&p_session_id=50231930

5. Sensitivity analysis

This section focuses on sensitivity analysis of our empirical measures. First, we check how the results depend on the choice of cutoff level. As an illustration, composition of trade for Poland using 5% cutoff is shown in Graph 6. This procedure produces twenty sets of good. Increase of least traded goods is apparent and corresponds to the previous pictures. Table 2 reports the extensive margin growth rates for 5%, 10% and 20% cutoffs for all Visegrad countries. Each column shows percentage growth rate of the least traded goods between benchmark year and year 2006. All countries exhibit the same pattern. If we consider smaller cutoff, the least-traded goods grow more. It again support the idea, that goods with very small trade shares drive the extensive margin growth and our measure that uses 10% cutoff can even underestimate size of the extensive margin growth. The measure calculated with 20% cutoff shows smaller growth and it is roughly one half of the measure using 10% cutoff. Even if larger cutoff makes the set of least-traded goods quite big, the increase is still significant.

Graph 6. Composition of Exports: Poland into EU 15 (20% cutoff)



Source: own creation

Table 2. Results under different cutoff values

		Cutoff		
Country	**Benchmark year**	**5%**	**10%**	**20%**
Poland	1993	302.1	182.1	113.4
Czech Republic	1993	267.4	172.4	84.5
Hungary	1997	256.3	133.3	63.8
Slovakia	1997	151.2	94.5	32.7

Source: own creation

Second sensitivity check deals with ordering of the goods at the beginning of the sample period. Primary analysis made in the paper used the average of export value in first three years. The goods were then ordered according to this measure and the first year was chosen to calculate the deciles. Alternative way is to order the goods according to their value in the first year. The least-traded goods thus contain little different set of codes (usually more of them). The results of this procedure are reported in Table 3.

Table 3. Share of export value in 2006: least-traded goods in benchmark year

Country	**Benchmark year**	**Share of least-traded goods**
Poland	1993	0.34
Czech Republic	1993	0.32
Hungary	1997	0.24
Slovakia	1997	0.36

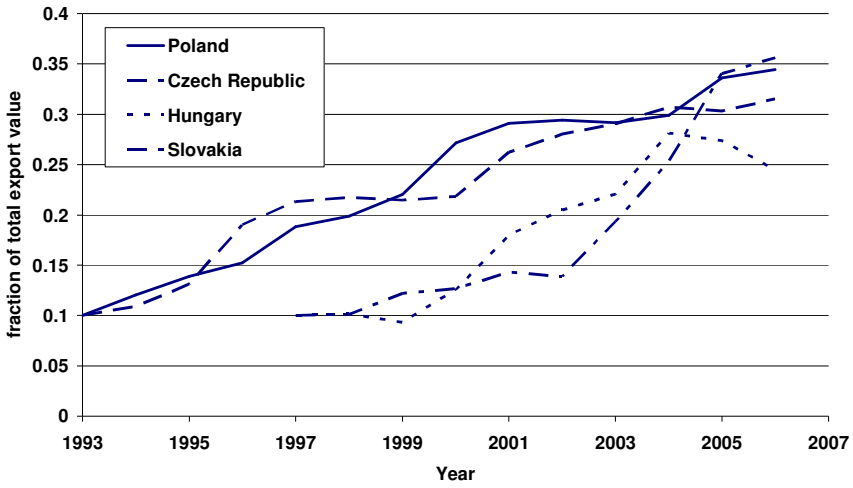
Source: own creation

The extensive margin growth is higher for all countries and thus our analysis understated the importance of this growth.[10] The largest difference is for Slovakia. Contrary to previous measure, the least-traded goods now comprise 36 % of total export value. It is even more than in Poland and the Czech Republic. Detailed analysis reveals that code „7611: Television receivers, color“ is responsible for this change.[11] Time evolution of least-traded goods for Visegrad states using alternative ordering is shown in Graph 4.

[10] Compare to Table 1.

[11] This code was included in the third decile when previous ordering was used (according to the average of first three years).

Graph 7. Time evolution of least traded goods: Visegrad countries



Source: own creation

What is different? We see that the share is growing already from the beginning – there is no initial decrease in first years that was present in Graph 2. Time series of Hungary is almost unchanged. Main trends for other countries are very similar to previous measure except of Slovakia. Here, the share of least-traded goods exhibits rapid growth from 2002 that finally overtook the share in other countries, as discussed above.

To summarize it, using smaller cutoff implies more significant extensive margin growth. Similarly, ordering of the goods according to the first year export value (instead of the average of three years) increases the importance of new goods margin in international trade.

6. Conclusion

This paper analyzed international trade between Visegrad countries and EU15. Results show that there is clear evidence of extensive margin in trade growth. Countries are exporting goods that they had not been previously trading. It is sometimes hard to find if trade liberalization was the main cause of this change because reduction of trade barriers was gradual. This issue deserves more attention. Foreign direct investment can be also important determinant of observed changes and will be subject of further study.

The implications for economic theory are clearcut. International trade models should focus on modeling of the extensive margin. The modified Ricardian model

used in Kehoe and Ruhl (2002) is one of the examples. Calibration of this model using data on intra-industry trade is also topic for further research.

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