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Price Competition in the enlarged EU 27 Export Market and the Role of Foreign Direct Investment

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The Schumpeter Discussion Papers are a publication of the Schumpeter School of Business and Economics, University of Wuppertal, Germany

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SSBEditor@wiwi.uni-wuppertal.de

SDP 2014-011
ISSN 1867-5352

Impressum
Bergische Universität Wuppertal
Gaußstraße 20
42119 Wuppertal
www.uni-wuppertal.de
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Jens K. Perret*

Wuppertal, July 2014

Preliminary

Abstract

From a microeconomic perspective competition between firms has been duely discussed. Extending microeconomic concepts to a macroeconomic level and considering competition between countries becomes more complex. The complexity issues is tackled in this study by extending a methodology developed in Borbely (2006) to account for specialization in specific sectors as well as price groups that under certain assumptions can be seen as a quality indicator. This study observes 27 EU countries - excluding Croatia - and Turkey. This allows for a view on the competition structure in the context of the EU common market.

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In a second step of the analysis it is analyzed whether FDI inflows impact the price - quality - level of a sector or the probability to switch to a higher or a lower price level in said sector. Where in other publications including Borbély (2006) for selected EU countries a positive impact of FDI inflows is found, this study finds for the EU as a whole or the EU 15 or EU 10+1 (including Turkey) sub-groups no significant impact of FDI inflows on the price level or the probability to switch to another price level.

1 Introduction

With continuously rising levels of competition on a regional as well as on a global scale, countries more often start to turn their eyes on national advantages which they try to strengthen or if none are present to artificially generate.

Although, it remains an important question whether trying to forcefully generate national advantages is a prudent choice¹ - following Ricardian as well as Heckscher-Ohlin-style trade theory² - for fostering trade and thus economic growth.

This study's intent is however not to answer said question, even though it can be referred to the results from Hausmann et al. (2005) or Hausmann and Klinger (2007), that indicate that structural change usually takes place along the connections in the product space. More generally the aim of this study is to answer in how far specialization and competition can be measured and in how far dynamics of EU 27 price competition is influenced by foreign direct investment flows. This study focusses on the European market, consisting of the 27 states of the European Union. Even though, only the EU 27 market is observed, with the modified version of the RCA a methodology is implemented that allows to include significant non-EU countries like the US, China, Russia or Turkey as well.

The following analysis accounts for price competitiveness as, which will be discussed in a succeeding section only trade volumes and the value of the traded goods are considered. This limits the analysis insofar as no information on the quality of the goods is implemented in the methodology. Additionally, only traded manufacturing goods are observed.

It can be noted however that a rise in export unit values (EUV) that are used herein to account for the price levels can have three causes:

- Market power

¹This can be traced to the arguments found in Porter (1990).

²See Ricardo (1817) and Heckscher (1949) as well as Ohlin (1933).

- Product innovations
- Other effects (exchange rate effects etc.)

As causes one and three cannot be disregarded offhandedly in this study the more specific term of *price competition* is used instead of the general term *competition*. This also leads to the omission of an integration of national innovation systems to account specifically for the second cause.

Through its focus the present can offer insights for firms as well as policy makers trying to get a grasp of the product structure and possible competitors on a macro-level in the context of the enlarged European Union. Via an extension the same methodology applied herein could furthermore be applied to country groups and offers a suitable tools for decisions makers who operate on a comparative country basis.

In section two of this study the applied research methodology is introduced and in section three it is applied to the EU 27 market and the respective countries including as well the US, China, Russia and Turkey as four additional countries of interest. The final section concludes and policy issues are deduced.

2 Methodology

2.1 Revealed Comparative Advantage

The traditional RCA (Revealed Comparative Advantage) - Indicator as given by equation (1) has been introduced by Balassa (1965) for the analysis of international trade links. By setting the export share of a sector of the observed country against the import share in the same sector of this country the comparative advantages of the observed sector can be calculated.

$$RCA_j = \frac{\frac{x_j}{\sum_{j=1}^n x_j}}{\frac{m_j}{\sum_{j=1}^n m_j}} = \frac{\frac{x_j}{m_j}}{\frac{\sum_{j=1}^n x_j}{\sum_{j=1}^n m_j}} \quad (1)$$

The variable x_j gives the export in sector j , whereas m_j gives the imports in sector j . An indicator value in the interval $[0, 1)$ indicates a comparative disadvantage and a value in the interval $(1, \infty)$ a comparative advantage. As shown by Hoen and Oosterhaven (2006) indicator (1) has some inherent statistical faults. For alleviation of the faults Hoen and Oosterhaven (2006) propose the following alternative indicator:

$$SRCA_j = \frac{x_j}{\sum_{j=1}^n x_j} - \frac{m_j}{\sum_{j=1}^n m_j} \quad (2)$$

Using indicator (2) an indicator value in the interval $[-1, 0)$ marks a comparative disadvantage and a value in the interval $(0, 1]$ a comparative advantage. Additionally, Borbély (2006) proposes another alternative indicator, that also accounts for the faults of the original indicator and furthermore allows for a comparison of sectors in different countries³.

$$MRC A_{c,j} = \arctan \left(\ln \left(\frac{\frac{x_{c,j}}{\sum_{j=1}^J x_{c,j}}}{\frac{x_{I,j}}{\sum_{j=1}^J x_{I,j}}} \right) \right) \quad (3)$$

In analogy to indicator (2) an indicator value in the interval $[-1, 0)$ accounts for a comparative disadvantage while a value in the interval $(0, 1]$ accounts for a comparative advantage. In analogy to the original indicator the variable $x_{c,j}$ gives the exports in sector j and region c , while $x_{I,j}$ gives the exports of the sector in a reference market I . While indicator (2) is a direct adaptation of the original indicator, indicator (3) does not only change the form of calculation of comparative advantages but also the way these advantages are measured. Instead of a comparison of exports and imports in a given countries, the relevance of one sector in the total exports of a country is compared to the relevance the same sector has in the reference market.

Indicator (1) as well as indicator (2) have the disadvantage that they are one-dimensional indicators. Thus in the course of any analysis a decision has to be made whether the comparison is across sectors or across countries. While it is possible to substitute the sectoral component with a country-specific one, it is not possible to take an intersectoral and international perspective at once. At this point indicator (3) comes into play. It is two-dimensional and allows the comparison of different sectors in different countries without generating problems of comparability for the results - only the reference market is a priori fixed.

2.2 Measuring Price Competition

For a given sector j the price of one metric kilogram of exports of sector j can be calculated by dividing the overall value of the exports of the sector by their volume, resulting in the so called export unit values:

$$EUV_{c,j} = \frac{x_{c,j}}{x_{c,j}^W} \quad (4)$$

³This indicator is also used for example in Perret (2012).

$x_{c,j}^W$ is the volume of all exports of sector j in country c (measured in metric tons). If the EUVs for all countries are calculated they can be sorted into high price, medium price and low price exporters. One can distinguish the top quartile (high quality) from a medium range (two medium quartiles) and the bottom quartile in which standardized low quality products will be found.

As quartile are considered it is not assured that each quartile spans a comparable price range which remains stable across time. For example for the manufacture of motor vehicle in 1999 the lower quartile spans the range from 294.27 to 691.09 and the upper quartile spans the range from 974.58 to 2,380.64 while in 2011 the lower quartile spans the range from 228.80 to 578.21 and the upper quartile spans the range from 993.38 to 1,344.08.

In the bottom quartile barriers to entry are low and given the rather modest quality competition product innovations will be rather low. By contrast, the top quartile stands for rather advanced products and high quality products, respectively; Schumpeterian rents in this product group should be rather high.

This should facilitate firms to invest further in R&D which in turn will facilitate firms to stay in the relevant price range. A very interesting group of companies is grouped in the medium price range and firms from these groups will regularly consider options to move up the product ladder - and many firms, the less innovative ones, will be afraid to move down to the bottom price range. Specific production factors will be intensively used in the high quality price range and thus relative factor endowment could play a role here.

In the course of the study trade data from the COMEXT database of Eurostat is used assuming a NACE 3-digit level which means to compare 96 different sectors for 31 countries (EU 27, US, China, Russia and Turkey). While such a descriptive analyse might lead to a lot of insightful results in the first part of this study a more disaggregated approach is taken. A classification of the OECD⁴ assigning all sectors into five product categories is implemented. Table 1 gives an overview which NACE sector is assigned to which category. Very generally speaking it can be assumed that the technology incorporated in the goods increases for sectors further down in the table - denominating especially labor and resource intensive goods as low-tech goods and science-based and differentiated goods as high-tech goods.

To fit the price levels as well into this classification it is assumed that a country can either specialize in only one kind of price level, two kinds or in none or all at once. However, only those sub-sectors are considered that report a comparative advantage in the corresponding sector.

⁴See Pavitt (1984) and OECD (1987).

OECD Category	NACE Sektors
Labor-intensive	171, 172, 173, 174, 175, 176, 177, 181, 182, 183, 191, 192, 193, 281, 282, 283, 284, 285, 286, 287, 361, 362, 363, 364, 365, 366
Resource-intensive	151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 201, 202, 203, 204, 205, 231, 232, 233, 261, 262, 263, 264, 265, 266, 267, 268, 271, 272, 273, 275
Scale-intensive	211, 212, 221, 222, 223, 241, 242, 243, 244, 245, 246, 247, 251, 252, 274, 341, 342, 343, 352, 354, 355
Science-intensive	300, 331, 332, 333, 334, 335, 353
Differentiated	291, 292, 293, 294, 295, 296, 297, 311, 312, 313, 314, 315, 316, 321, 322, 323

Figure 1: Product categories of the OECD classification

A single dominant price level is present if more than 50 percent of all sub-sectors of a category are in the same price level. A country furthermore is assumed to specialize in two different parts of the price spectrum if sub-sectors from two price levels each hold a share of more than 35 percent. Else the country does not specialize in any price level or rather has an almost equal share of all three price levels. Table 2 give a concise algorithmic decision rule for this assignment rule. The cut-off levels are motivated by results from testing with EU 27 specialization patterns. They offer the most comprehensive assignment results and generate the most stable results over time as well as the highest robustness.

Finally, two countries are considered to be competing against each other if they are specialized in the same category and are exporting goods in the same price segment.

3 Application to the EU 27 Market

3.1 Competitiveness in the EU 27 Market

The following five tables summarize the results for the five OECD categories. L reports on the low price level segment, M on the medium level price segment and H on the high level price segment. Finally, the time horizon spans the time from 1999 to 2009 and thereby a period of 11 years. The reason behind this choice, besides data availability, is that since the end of the 1990s

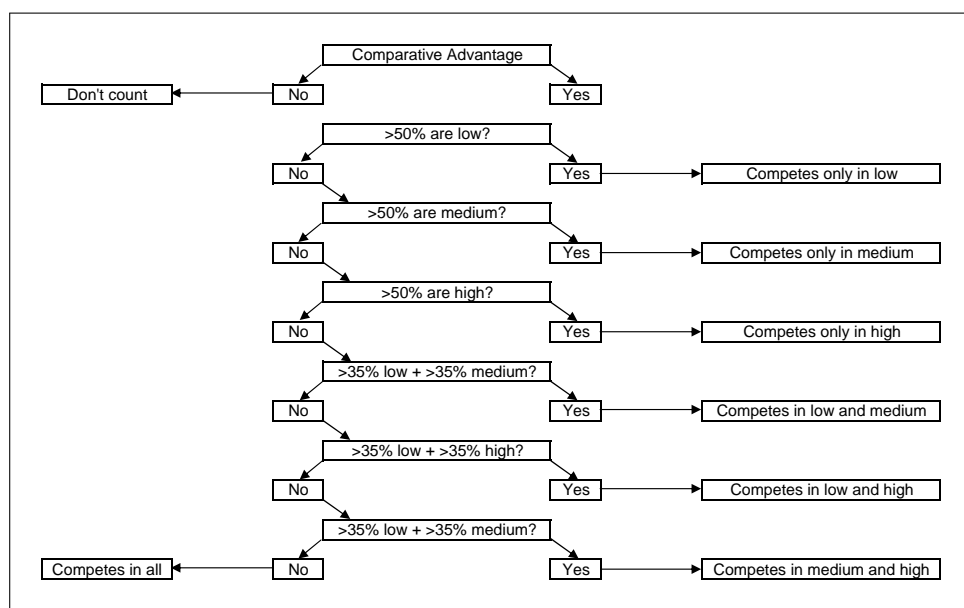


Figure 2: Decision Algorithm

the accession of the eastern European countries was more or less on its way and they integrated ever more rapidly into the EU market. Therefore, starting in 1999 and referring a EU 27 market is also from an economic point of view a prudent choice even though the last 12 Eastern and Southeastern European countries only joined the union in 2004 or 2007 respectively. Additionally, in 2009 Eurostat introduced the NACE 2.0 classification and in this context stopped reporting data based on the NACE 1.1 classification used herein. Therefore, variables imperative for the second part of this study are only available up to 2009.

While the tables - due to their aggregated nature - do not allow for detailed insights, it can be seen that for labor-intensive goods the competition is strongest for medium priced goods. In all the other segments competition is rather limited. This is especially true since even in the mixed groups those reporting competition are all containing medium priced goods, which might strengthen this argument. Additionally, in those years where especially the mixed set of medium and high priced goods reports a rise, competition in medium or high goods alone diminishes.

An interesting side-note that can be seen from the table is that China - especially in recent years - is specializing only in low priced labor-intensive goods and in this field China has almost no competitor. This also is an indicator that the European states have mostly offshored their low priced

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
L	BG,SK,CN			CN	CN	CN	CN	BG,CN	CN	CN	CN
M	CY,CZ,FR,GR,IR,LV,LX,MT,NL,PL,SP,SW,UK,RU	CY,CZ,FR,GR,IR,LV,LX,MT,NL,PL,SP,SW,UK,RU	BE,CY,CZ,FR,GR,HU,IR,LJ,LX,MT,NL,RO,SK,UK,CN,RU,US	AU,BE,BG,CY,DE,DK,EE,FR,GR,IR,LX,MT,NL,PT,SP,SW,UK,RU,TR,US	AU,BE,BG,CY,FR,GR,HU,IR,LX,MT,NL,PT,SK,UK,RU,TR,US	CY,CZ,EE,FR,GR,HU,IR,LX,MT,NL,PT,SK,UK,RU,TR,US	AU,BE,CY,CZ,DE,DK,EE,FR,HU,IR,LJ,LX,MT,NL,PT,SK,UK,RU,TR	BE,CY,CZ,DE,DK,FR,GR,IR,IT,LX,MT,NL,PT,SK,SP,SW,SV,UK,RU,US	AU,BG,CY,CZ,DK,FR,GR,IR,LX,MT,NL,PL,PT,SK,SP,SW,SV,UK,RU,TR,US	BE,CY,CZ,DK,FR,GR,HU,IR,IT,LX,MT,NL,PL,SK,SP,SW,SV,UK,RU,TR,US	BE,BG,CY,CZ,DE,FR,GR,HU,IR,LV,LX,MT,NL,PL,SK,SP,SW,UK,RU,TR
H	DE,IT	AU,DE,PT,SP	AU,DE,DK	IT	HU,IT,SV	DE,SP	FR,US				AU,SP
LM	EE,GR,IJ,RO	BG,EE,PL	BG,EE,PL	BG,SK	TR	RO	GR,LV	LV,RO,TR	TR	LV	EE,IJ,PT
LH						BG					
MH	AU,DK,PT,SV,US	BE,DK,FR,IT,MT,US	IT,PT,SP,SV	HU,IJ,SV	DE,DK,PT,US	AU,DK,IT,SV	IT	AU,FR,HU	BE,DE,FR,HU,IT,RO,UK,US	AU,DE,RO	SV,US
LHM	BE,HU,TR	TR	LV,TR	LV,PL	EE,LV,PL,RO,SP,UK	BE,IJ,LV	BG,PT,RO	EE,IJ	EE,IJ,LV,PT,SK	BG,EE,IJ,PT	DK,IT

Figure 3: Competitiveness results for labor-intensive goods

labor-intensive goods to China. This holds true in some part due to the fact that the price level enterprises are calculated based on the price levels of inner EU 27 levels and therefore do not include China.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
L	CZ		BG, RU	US	BG, SK, RU, TR	BG, TR			CN		BG
M	BE, CY, MT, CN, RU	BE, BG, CY, CZ, LV, LX, MT, NL, UK, CN, RU, TR, US	BE, CY, CZ, IR, MT, NL, UK, US	BE, CY, CZ, EE, MT, NL, PL, SV, UK, CN	CY, CZ, DE, IR, MT, NL, UK	CY, MT, PL, CN, RU, US	CY, CZ, DE, MT, NL, RO, SV, CN, RU	BG, CY, CZ, EE, LX, MT, NL, PL, RO, SV, CN, RU, TR	AU, CY, CZ, FN, MT, RO, SK, SV, RU, TR	BE, BG, CZ, DE, FN, HU, LV, LX, MT, SK, CN, RU, TR, US	BE, CY, CZ, EE, FN, HU, IR, LV, MT, RO, SK, RU, TR, US
H	AU, DK, FN, FR, GR, IT, SP, SV	AU, DK, FN, GR, IT, SP, SV	DE, DK, FN, FR, IT, PT, SP, SV	AU, DE, DK, FN, GR, IR, IT, SP, SV	DK, FN, IT, SP, SV, SV	AU, DE, DK, FN, FR, GR, IR, IT, SP, SV, UK	AU, DK, FN, FR, IR, IT, SP, SV	AU, DE, DK, FN, IT, PT, SP, SV, UK	DE, DK, FR, IR, NL, SV, UK	DK, IR, SP, SV	AU, DK, PT, SP
LM	EE, LI, SK, TR, US	EE, LI, PL, RO, SK	EE, RO, SK	BG, SK, RU, TR	EE, LV, US	CZ, LI, SK	BG, EE, SK, US	SK, US	EE, LI, LV	EE, GR, LI	LI
LH					PT	LX			GR		
MH	DE, IR, NL, PL, UK	FR, IR, SV	AU, GR, HU	FR, HU	AU, BE, FR, GR	BE, NL, SV	BE, HU, PL, UK	BE, FR, GR, HU, IR	BE, IT, LX, PL, SP, US	AU, CY, FR, IT, NL, SV, UK	GR, LX, SV, SV, UK
LHM	BG, HU, LV, LX, PT, RO	DE, HU, PT	LI, LV, LX, PL, CN, TR	LI, LV, LX, PT, RO	HU, LI, LX, PL, RO, CN	EE, HU, LV, PT, RO	GR, LI, LV, LX, PT, TR	LI, LV	BG, HU, PT	PL, PT, RO	DE, FR, IT, NL, PL, CN

Figure 4: Competitiveness results for resource-intensive goods

Similar arguments as in the case of labor-intensive goods hold as well in the case of resource-intensive goods, although here it is not the medium priced goods, but as well the high priced goods that report high levels of competition. Again in the case of mixed price groups those groups report a higher level of competition that have a distinct specialization in medium priced goods as well.

In contrast to the labor-intensive goods that, in resource-intensive goods no single country dominates one segment of the market. It can be noted that the Baltic states are pretty consistent in supplying low and medium priced goods only occasionally enriching their portfolios with high priced goods - although this supposedly is just a statistical artefact.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
L		LV			LI, CN	LI, RO		LI	LI, LV, TR	LI, TR	
M	BG, CY, CZ, EE, FR, HU, IR, LI, LV, MT, PL, RO, SK, SP, CN, RU, TR	AU, BG, CZ, IR, MT, TR	CY, CZ, GR, HU, IR, LI, LV, MT, PL, RO, TR	AU, BG, CY, CZ, EE, HU, IT, LV, MT, PT, RU	CY, CZ, EE, HU, IT, LV, MT, RO, SV, RU, TR	HU, IR, IT, MT, SP, SV, TR	CZ, EE, IT, MT, RO, SK, TR	CZ, EE, HU, IR, LX, MT, CN	AU, BG, CZ, EE, FN, IT, LX, MT, PL, RO, SK, CN, TR	BG, CZ, DK, EE, IT, LX, MT, RO, SK, SP, CN	DK, EE, GR, IR, IT, MT, PL, CN, TR
H	BE, DE, DK, IT, NL, UK, US	BE, DE, FR, HU, IT, NL, PT, SP, SW, UK, US	BE, DE, DK, NL, PT, SW, UK, US	BE, DE, DK, FN, NL, SP, SW, UK, US	AU, BE, DE, DK, NL, SW, UK, US	BE, CY, DE, DK, FR, NL, SW, UK, US	BE, CY, DE, DK, FR, NL, SP, SW, UK, US	BE, DE, IT, NL, PT, SP, SW, UK, US	BE, DE, FR, NL, SP, SW, UK, US	NL, SW, UK, US	CY, CZ, HU, UK, US
LM		LI, RO, SK	BG, SK, CN	CN	SK	LV, SK, CN	LX, CN	SK, RU	LV, SV		
LH		LX	LX		FN	RU		BG		BE	
MH	SW, SV	CY, DK, EE, SV	AU, FR, IT, SP	FR, IR, PL, SV	BG, FR, PL, SP	CZ, EE, FN, LX	BG, HU, IR	AU, DK, FN, FR, PL	DK, HU, PT, RU	AU, CY, FN, HU, PL, PT, RU	AU, BG, DE, FN, FR, LX, NL, RO, SW, SV
LHM	AU, FN, GR, LX, PT	FN, GR, PL, CN, RU	EE, FN, SV, RU	GR, LI, LX, RO, SK, TR	GR, IR, LX, PT	AU, BG, GR, PL, PT	AU, FN, GR, LV, PL, PT, SV, RU	CY, GR, RO, SV	CY, GR, IR	DE, FR, GR, IR, LV, SV	BE, LI, LV, PT, SK, SP, RU

Figure 5: Competitiveness results for scale-intensive goods

In the scale-intensive sectors it is as well the medium as the high priced segments that report the highest degree of competition. Here it is even more distinct, since there is not only a high degree of competition in the single

specialization case but as well in the cases where specializations in both or in all three segments are present.

The only country that draws attention here is Lithuania which shifted from medium priced goods to low priced goods and provided those relatively consistent and with little competitive pressure. One assumption that interprets this finding might be that Lithuanian firms did not innovate and therefore their products became outdated and could only be sold for lower prices. An alternative solution might be that due to high competitive pressure Lithuanian firms decided to serve a different clientel and started switching their production to lower priced goods.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
L	SV_CN	SV_CN	SV_CN	SV_CN	CN	CN	CN	CN	CN	CN	CN
M	AU,BE,BG,CZ,GR,LI,LV,PL,RO,SK,RU	AU,BE,CY,CZ,EE,FR,GR,HU,IT,LI,LV,LX,MT,PL,RO,SK,SV,RU,TR	AU,BE,BG,CY,CZ,EE,IR,IT,LI,LV,PL,RO,SK,RU	BE,CY,GR,IT,LI,LV,MT,PL,PT,RO,SK,RU,TR	BE,CY,EE,FR,HU,IR,IT,LI,LV,LX,PL,RO,SK,RU,TR	BG,CY,CZ,DE,GR,HU,LI,LV,PL,RO,SK,SV,RU,TR	LI,LV,PL,PT,RO,SK,RU,TR	BG,CY,EE,GR,LI,LV,LX,PL,PT,RO,SK,SV,RU,TR	AU,BG,CZ,DE,EE,FR,GR,HU,IT,LI,LV,LX,MT,PL,PT,RO,SK,SP,RU,TR	BG,CY,EE,FR,GR,HU,IT,LI,LV,LX,MT,SK,SP,SV,RU,TR	AU,BG,CZ,DE,EE,FR,GR,HU,IT,LI,LV,MT,PL,PT,RO,SP,SV,RU,TR
H	FR,IR,LX,UK,US	DE,DK,FR,IR,NL,PT,UK,US	DE,DK,LX,US	AU,DE,DK,IR,LX,SW,US	AU,DK,UK,US	DK,FR,FR,IT,LX,SW,UK,US	DK,FR,HU,IT,US	DE,DK,FR,IR,NL,UK,US	DK,FR,IR,NL,UK,US	AU,BE,IR,US	BE,IR,US
LM	HU,IT		HU	CZ,HU	CZ		MT	CZ,SP	CN	DE,UK	CN
LH											
MH	CY,DE,DK,EE,FR,MT,NL,PT,SP,SW,TR	BG,SP	FR,FR,GR,NL,PT,SP,SW,TR	BG,EE,FR,NL,SP	BG,DE,FR,GR,NL,PT,SP,SW	AU,BE,EE,PT,SP	AU,BE,BG,CZ,DE,EE,FR,GR,LX,SP,SW	AU,BE,FR,HU,MT	BE,CY,SW	CZ,DK,PL,PT,RO	CY,LX,SK,UK
LHM			MT,UK	FR,UK	MT,SV	IR,MT,NL	CY,IR,NL,SV,UK	IT,SV	SV	NL,SW	DK,NL,SW

Figure 6: Competitiveness results for science-intensive goods

A similar pattern as in the two preceding categories can also be found in the category of science-based goods. Interestingly enough, China again holds a quasi-monopolistic position in the delivery of low-priced goods. Only in more recent years are they present in the medium priced segment as well. Though, due to the high competition in this segment it can be assumed that this result might be more due to statistical artefacts than due to a change in Chinese production patterns.

Finally, in the category of differentiated goods, there is at least a medium degree of competition in all three price segments. Though, in this category due to its nature of differentiated goods, on this level of aggregation it is hard to say if competition is really present or simply an artefact of the aggregation process. In this case at least, a detailed analysis on the 3-digit level is necessary.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
L	BG,CY,CZ,GR,RO,SK,CN	BG,CY,GR,PL,RO,SK,SP,SV,TR	BG,RO,TR	BG,LI,SK,TR	BG,LI,TR	LI,SK,CN,TR	BG,LI,SK,CN,TR	BG,HU,LI,CN,TR	BG,EE,HU,LI,LV,CN	EE,CN,TR	GR,CN,TR
M	SP,SV	CZ,LI,US	CZ,IT,LI,MT,PL,SV,RU,US	CZ,GR,PL,RU	CY,CZ,IT,NL,SP,SV,RU	CY,CZ,LV,NL,SP,RU	CY,CZ,IT,MT,NL,SP,SV,RU	CY,CZ,LX,MT,RU	AU,GR,TR	BE,BG,GR,NL,PL,PT,UK	EE,FR,LI,NL,PL,RO,SV
H	AU,BE,DE,DK,EE,FR,IR,LX,MT,NL,PL,PT,SW,UK,RU,US	AU,BE,DE,EE,FR,IR,LX,MT,NL,PT,SW,UK,CN,RU	AU,DE,DK,EE,FR,IR,LX,NL,SW,UK	AU,BE,DE,DK,FR,NL,SW,UK,US	AU,BE,DE,DK,EE,FR,LX,MT,SW,UK	AU,BE,DE,DK,EE,FR,FR,LX,MT,PT,SW,UK	AU,BE,DE,DK,EE,FR,LX,SW,UK,US	AU,DE,DK,FR,FR,NL,SP,SW,UK,US	BE,CY,DE,DK,FR,FR,LX,MT,NL,PT,SP,SW,UK,US	AU,DE,DK,FR,SK,SP,US	AU,BE,FR,SK,SW,UK,US
LM	LI,TR		BE,CY,SK,SP	CY,RO,SP	LV,PL,RO,SK,CN	BG,PL	HU,PL,RO	BE,EE,PL,PT,SK	CZ,PL,RO,SK	FR,IR	BG,CY,CZ,DK,IR,LV
LH											
MH	IT	DK,HU,IT	FN,HU	LX,MT,PT	FR,US	GR,IT,US	LV,PT	IT,LV,RO		CY,CZ,RO	MT,SP
LHM			GR,PT,CN	EE,FR,HU,IT,SV,CN	GR,HU,PT	HU,RO,SV	FR,GR	GR,IR,SV	IR,IT,SV	HU,IT,MT,SW,SV	DE,HU,IT,PT

Figure 7: Competitiveness results for differentiated goods

3.2 Foreign Direct Investment as a Driver of Comparative Advantages

Following the work by Borbély (2006) Table 2 summarizes the results from using the available data to illustrate the positive relation between the size of the export unit values and FDI as well as the corresponding revealed comparative advantages⁵.

A dynamic panel model⁶ has been implemented in this context and all independent variables were used in their logarithmized version. In accordance to Borbély (2006) the term FDI signifies the amount of FDI inflows while LABOR signifies the amount of laborers employed in the respective sector and country. RCA signifies the modified version of the RCA indicator. Finally, VA signifies the amount of value added generated by the sector. The value added is included as an additional variable to control for size effects of the domestic size of the respective sector's market. Two dummy variables LOWP and HIGHP were added as control variable to account for membership in the lowest or the highest price category. The medium price category is thus the reference group. The twelve dummy variables SECT02 to SECT13 were added to control for sector specific effects. The base is here the sector of food products, beverages and tobacco products. The other sector dummies are:

The implemented data spans the time from 1999 to 2011.

⁵The RCA indicator implemented herein is the modified version applied by Borbély (2006). It can be noted that this indicator fulfills more or less the requirements discussed by Hoen and Oosterhaven (2006).

⁶Even disregarding inflation, export unit values are by far no constant thus only a panel model can assure unbiased results. However, as prices are not set arbitrarily, assuming path-dependency of the export unit values and thus applying a dynamic panel model is only prudent.

SECT02	Textiles, Wearing Apparel and Leather Products
SECT03	Wood and Paper Products, Printing
SECT04	Coke, Refined Petroleum, Fuel
SECT05	Chemicals
SECT06	Rubber and Plastic Products
SECT07	Minerals, Non-Metals, Metals and Metal Products
SECT08	Machinery and Equipment
SECT09	Office Machinery and Electrical Machinery
SECT10	Radio, Television and ICT Equipment
SECT11	Medical Precision and Optical Instruments, Watches
SECT12	Motor Vehicles
SECT13	Other Transport Equipment

Table 1: Sectoral Dissemination

	EU 27+1		EU 10+1		EU 15	
	No-Dummies	Dummies	No-Dummies	Dummies	No-Dummies	Dummies
EUV-1	0.150*** (2.94)	0.154*** (2.74)	0.210*** (3.97)	0.165*** (4.37)	0.020 (0.17)	0.025 (0.11)
FDI	0.080 (1.01)	0.088 (1.03)	2.648 (1.28)	3.465 (1.36)	0.046 (1.12)	0.001 (0.03)
LABOR	-18.927** (-1.97)	-9.150 (-1.10)	-41.270** (-1.97)	-17.027 (-0.77)	-19.156*** (-2.71)	0.240 (0.09)
VA	-0.241* (-1.85)	-0.031 (-0.71)	0.169 (0.24)	0.723 (1.00)	-0.130 (-1.52)	0.018 (0.51)
RCA	4.155*** (3.98)	3.978*** (3.67)	4.747*** (4.56)	4.819*** (4.19)	0.263 (0.23)	-0.171 (-0.22)
LOWP		8.984** (2.04)		-		1.715 (0.30)
HIGHP		9.087** (2.05)		0.203 (0.62)		2.146 (0.37)
SECT02		-0.177 (-0.33)		0.160 (0.23)		0.466 (1.51)
SECT03		-0.717* (-1.77)		-0.464 (-0.68)		0.085 (0.45)
SECT04		-0.622 (-1.43)		-1.076 (-1.63)		-140.369 (-1.07)
SECT05		-0.197 (-0.95)		-0.209 (-0.81)		-
SECT06		0.045 (0.17)		0.095 (0.27)		0.021 (0.06)
SECT07		-0.733** (-2.02)		-3.374 (-1.59)		-0.118 (-0.75)
SECT08		-0.534 (-0.99)		-0.779 (-1.38)		0.125 (0.53)
SECT09		2.101 (1.11)		0.874 (0.67)		2.563 (1.01)
SECT10		3.007*** (2.63)		4.062*** (2.71)		-0.142 (-0.11)
SECT11		-2.210*** (-2.79)		-2.013* (-1.86)		0.599 (0.36)
SECT12		-75.847 (-1.05)		-142.972 (-1.09)		-55.412 (-0.93)
SECT13		0.303 (0.44)		-0.994 (-1.49)		1.596 (1.27)
CONST	4.944*** (3.70)	-4.318 (-0.83)	4.239*** (2.80)	4.754*** (3.15)	6.155*** (4.49)	3.844 (0.55)
Wald χ^2	61.10***	238.84***	332.46***	1,278.45***	12.16*	29.38**

Table 2: Impact of FDI on the Export Unit Value

The table⁷ shows distinctly similar results as well for the whole data set⁸ as for the two sub-groups of the EU 15 and the EU 10+1 - the new member states plus Turkey. While in all cases - including controls for the quartile and the sectoral level (NACE 1 level) - the coefficients for the FDI inflow variable are insignificant, it is however interesting to note that the effects significantly diminish for the EU 15 countries as compared to the EU 10+1 countries. This shows in addition to the study by Borbély (2006) that it is the less developed countries in the EU that profit the most - concerning their level of competitiveness and their income potential - from FDI inflows. The significant impact of FDI inflows on export unit values - in contrast to Borbély (2006) - cannot be replicated. Thus broadening the results of Borbély (2006) to all of the EU countries is not possible and neither it possible to broaden them to even only the EU 10+1 countries.

As the coefficients and the significance level for the RCA indicator is also the smallest for the EU 15 countries the export price level and thus the export quality level in the more established EU countries is less dependent on foreign influence or their position in the market - as measured via the RCA indicator - and shaped more by factors that are not considered in the frame of this study - two possibilities being the level of technological knowledge or the size of the stock of highly educated human capital.

However, the aim of this study lies not only in replicating the results by Borbély (2006) in a broader context but to use this methodological framework to analyze whether the same impact factors that drive the development of export unit values can also offer insights into the dynamics driving the switch from one quality group - as defined in the previous sections - into another. In specific three cases are considered; the chance of increasing or decreasing the price category and the chance of staying in the same category.

An increase of the price category takes place if in both periods the sector reports a positive RCA and switched either from the medium to the high or from the low or medium category into the high category; with the opposite development signifying a decrease. A sector only remains in the same category if it reports a positive RCA in both periods.

To estimate the respective effects a panel logit model with random effects has been estimated.

Tables 3 and 4⁹ report the results for increasing or decreasing the price

⁷To ensure better readability the coefficients for RCAs and the constant have been divided by a factor of 1,000.

⁸In addition to the EU 10 countries Turkey has been included as well. For reasons of consistent data availability Croatia has been left out in this study.

⁹In tables 3, 4 and 5 the coefficients for FDI inflows, labor and value added have been multiplied by a factor of 1,000 to ensure better readability.

	EU 27+1		EU 10+1		EU 15	
	No-Dummies	Dummies	No-Dummies	Dummies	No-Dummies	Dummies
FDI	0.197 (0.94)	0.211 (0.85)	-1.175 (-0.88)	-0.808 (-0.41)	0.237* (1.66)	0.229 (0.97)
LABOR	2.072 (1.41)	0.141 (0.08)	0.983 (0.23)	-6.281 (-0.62)	5.387 (0.82)	1.778 (0.35)
VA	-0.046 (-1.41)	-0.000 (-0.19)	0.085 (0.23)	0.962 (1.41)	-0.115 (-0.88)	-0.047 (-0.52)
RCA	-0.214 (-0.72)	-0.254 (-0.77)	-0.530 (-1.36)	-0.520 (-0.93)	0.222 (0.47)	0.053 (0.10)
LOWP		1.101*** (3.01)		1.474 (1.61)		0.925 (1.35)
SECT02		1.568** (2.37)		3.316 (0.62)		1.298 (0.12)
SECT03		-0.064 (-0.09)		-0.478 (-0.04)		0.176 (0.01)
SECT04		1.081 (1.44)		1.881 (0.30)		0.917 (0.06)
SECT05		-0.463 (-0.07)		0.368 (0.05)		-
SECT06		0.747 (1.15)		2.034 (0.40)		-26.554** (-2.50)
SECT07		-0.157 (-0.23)		-1.462 (-0.12)		-0.035 (-0.00)
SECT08		1.148* (1.73)		2.188 (0.44)		1.531 (0.16)
SECT09		-0.706 (-0.08)		-22.562*** (-3.33)		-0.114 (-0.01)
SECT10		-0.190 (-0.31)		0.724 (0.06)		-0.185 (-0.01)
SECT11		-25.185*** (-11.65)		-22.194*** (-3.31)		-26.307** (-2.47)
SECT12		0.445 (0.05)		1.566 (0.14)		0.233 (0.01)
SECT13		0.126 (0.03)		1.085 (0.10)		0.421 (0.02)
CONST	-2.413*** (-13.65)	-3.502*** (-5.69)	-2.486*** (-9.33)	-5.106 (-1.01)	-2.339*** (-10.31)	-3.270 (-0.35)
Wald χ^2	3.58	294.27***	3.74	65.83***	3.36	116.28***

Table 3: Impact of FDI on Increasing the Product Price Level

	EU 27+1		EU 10+1		EU 15	
	No-Dummies	Dummies	No-Dummies	Dummies	No-Dummies	Dummies
FDI	0.227 (0.71)	0.209 (0.69)	1.683 (1.47)	3.155* (1.65)	0.218 (0.60)	0.177 (0.44)
LABOR	0.949 (0.72)	-0.539 (-0.34)	2.039 (0.32)	3.242 (-0.27)	3.245 (1.53)	1.630 (0.25)
VA	-0.028 (-1.15)	0.014 (0.42)	-0.316 (-0.64)	0.482 (0.62)	-0.080* (-1.75)	-0.043 (-0.28)
RCA	0.036 (0.17)	-0.121 (-0.40)	-0.382 (-1.39)	-0.682 (-1.50)	0.498 (1.32)	0.593 (1.40)
HIGHP		0.892*** (3.34)		1.349*** (3.37)		0.650 (0.91)
SECT02		0.599 (0.99)		1.349 (0.35)		-0.073 (-0.01)
SECT03		-0.434 (-0.99)		-1.069 (-0.10)		-0.369 (-0.08)
SECT04		-0.361 (-0.07)		-0.437 (-0.05)		0.190 (0.02)
SECT05		-0.218 (-0.04)		0.116 (0.02)		-
SECT06		0.103 (0.18)		0.856 (0.23)		-27.345*** (-4.59)
SECT07		-0.854 (-1.45)		-2.420 (-0.18)		-0.786 (-0.12)
SECT08		0.425 (1.10)		0.764 (0.21)		0.213 (0.04)
SECT09		-1.208 (-0.11)		-26.512*** (-5.81)		-0.633 (-0.05)
SECT10		-0.635 (-0.12)		-1.313 (-0.10)		0.266 (0.03)
SECT11		-0.673 (-0.08)		0.354 (0.04)		-27.543*** (-4.61)
SECT12		-0.645 (-0.05)		-26.558*** (-5.47)		-0.498 (-0.04)
SECT13		-0.393 (-0.56)		0.185 (0.03)		-0.372 (-0.03)
CONST	-2.286*** (-15.58)	-2.484*** (-5.66)	-2.377*** (-12.00)	-3.461 (-0.94)	-2.092*** (-8.81)	-1.995 (-0.40)
Wald χ^2	2.69	33.50***	5.56	436.71***	5.54	430.61***

Table 4: Impact of FDI on Decreasing the Product Price Level

	EU 27+1		EU 10+1		EU 15	
	No-Dummies	Dummies	No-Dummies	Dummies	No-Dummies	Dummies
FDI	-0.307 (-0.90)	-0.309 (-1.04)	-0.491 (-0.68)	-1.681 (-1.52)	-0.317 (-0.95)	-0.299 (-1.09)
LABOR	-1.634 (-0.81)	0.539 (0.24)	-0.569 (-0.09)	7.423 (0.89)	-4.244 (-0.91)	-1.846 (-0.33)
VA	0.043 (1.02)	-0.000 (-0.19)	-0.035 (-0.07)	-1.002 (-1.63)	0.099 (1.15)	0.049 (0.47)
RCA	0.143 (0.48)	0.232 (0.86)	0.546 (1.63)	0.646** (2.14)	-0.397 (-0.93)	-0.356 (-0.73)
LOWP		-14.943*** (-5.21)		0.196 (0.67)		-17.094* (-1.82)
HIGHP		-14.985*** (-5.19)		-		-17.119* (-1.84)
SECT02		-1.442*** (-2.45)		-3.083 (-0.63)		-0.743 (-0.71)
SECT03		0.136 (0.21)		0.800 (0.11)		0.110 (0.12)
SECT04		-0.479 (-0.77)		-0.857 (-0.14)		-0.603 (-0.12)
SECT05		0.299 (0.12)		-0.305 (-0.32)		-
SECT06		-0.588 (-0.85)		-1.689** (-2.20)		18.239*** (14.33)
SECT07		0.636 (0.17)		2.461 (0.23)		0.545 (0.10)
SECT08		-1.078** (-2.20)		-1.745* (-1.83)		-1.059 (-1.48)
SECT09		1.123 (0.21)		18.011*** (5.25)		0.413 (0.09)
SECT10		0.569 (1.48)		0.506 (0.07)		-0.090 (-0.10)
SECT11		1.259 (0.20)		0.265 (0.04)		18.220 (1.32)
SECT12		0.098 (0.02)		0.100 (0.01)		0.208 (0.02)
SECT13		0.155 (0.32)		-0.607 (-0.12)		0.005 (0.00)
CONST	1.770*** (9.08)	16.706*** (5.70)	1.880*** (6.86)	2.661*** (3.17)	1.570*** (4.56)	18.457* (1.92)
Wald χ^2	2.15	110.61***	3.94	88.01	3.23	958.60***

Table 5: Impact of FDI on Keeping the Product Price Level Stable

category respectively while Table 5 reports the results for remaining in the same category.

While it is obvious that all three setups, independent of the country groups considered, offer very poor results the coefficients for the FDI inflows are still interesting to note.

Following the logic of the first part of this section it seems only logical that FDI inflows report a positive impact on the chance to switch to a higher price category and a negative impact on switching in a lower category - especially for the EU 10 countries plus Turkey.

While the first part of the hypothesis holds, at least considering the coefficients' signs - if not their significance levels, for the overall and the EU 15 case; exactly the opposite results come up for the EU 10 countries plus Turkey. Considering the second part of the hypothesis - a decrease in the price category - both country groups report counter-intuitive results.

The results for the chance of keeping to the same price category mirror in many parts the results for an increase of the price category.

Assuming, that FDI inflows in the EU 10 countries are for a large part subsidiaries of firms with their headquarters and main production facilities in the EU 15 or other developed countries their FDI activities might increase the national sectoral export unit values while on an international level they might still be only suppliers to the developed countries and not well established in an international context.

If the models are extended by introducing price category and sectoral dummy variables results only marginally change in particular does the FDI variable become insignificant in the few cases where it has been significant before..

These results illustrate three things. First, the results gained by Borbély (2006) are specific for the seven selected countries and cannot be broadened to a larger context including all EU 10 (+1) or even all EU countries. Second, even when the model is reduced to a switch between price categories on a broader scale most input variables are highly insignificant and the largest impacts stem from sectoral dummies. Third the dynamics driving price competition in the European Union are more complex than can be explained by FDI and labor market dynamics alone.

4 Conclusions

In the course of this study it has been shown that considering price competitiveness a number of European and outer-European countries compete on the EU 27 market. In this context the present study has extended the analysis

conducted by Borbély (2006) to include not only the cohesion and the former accession countries Poland, Hungary and the Czech Republic but all EU 27 countries as well as significant other countries like Russia, the USA, China and Turkey.

While it has been shown that all sector groups pertain a considerable internal dynamic and countries do not remain in the same price group for the whole time of reference. Also it has been shown that in almost all product groups there is a high level of competition between European countries with each other. This only underlines the importance of EU internal intrasectoral trade.

In the second part of this study the results by Borbély (2006) considering the relation between export unit values and FDI inflows have been replicated for this larger data set and it has been shown that the results hold for the whole of the EU as well as for the EU 15 and the EU 10+1 sub-groups.

Additionally, it has been shown that the dynamics driving the export unit values are only partially comparable when analyzing the chance of a country switching from one price category into another; while for the whole EU as well as the EU 15 countries results are partially comparable - in particular when considered upwards movements -, the EU 10 plus Turkey however consistently report results opposite to economic argumentation. This conundrum motivates future research in which it will be necessary to study the effect of the structure of FDI inflows especially on the dynamics of initiating switches between price categories.

From a political perspective the first part of the study can be used on a sectoral level to deduce potential competitor countries while the second part can be seen as a warning that FDI inflows might not per se have an overall beneficial effect on the competitiveness of a country but are more dependent on factors unobserved in the context of this study.

Furthermore, countries facing a domestic recession are likely to experience increasing exports - in line with the vent for surplus theory. Countries that have successfully specialized in high price range products should suffer from small declines in sales in the case of recessions abroad since the price elasticity for high quality products is rather low.

Countries that are strongly specialized in low technology products face a different challenge: In the case of a foreign recession exports will strongly fall at given prices. Economic catching-up across countries thus requires over time a certain technology and quality upgrading; government should support innovation dynamics in an adequate way. As the industrial policy debate has suggested governments in big countries might consider R&D subsidies for goods that are both R&D-intensive and scale intensive - here adequate public procurement policy could help domestic companies to gain in international

competitiveness in fields with static or dynamic economies of scale.

A critical issue concerns leap-frogging, namely whether or not government policy could help companies to jump from the low price range to the top price range directly. Here additional research is needed that could highlight under which conditions leap-frogging is possible.

Future research to be conducted also could shed light on a splitting of a price premium fetched by firms into distinct components: home bias, quality advantage or market power. Finally, one should consider to which extent national innovation policy and EU innovation policy can contribute to improving competitiveness of firms and sectors, respectively.

Acknowledgements

The author likes to thank Mr. Paul J.J. Welfens for technical and Mr. David Hanrahan for editorial support.

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