Explaining Industrial Localization and Countries' Specialization in the European Union: An Empirical Investigation

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First version of this paper. Comments welcome.

Extended Abstract

The aim of this study is to empirically investigate the development of Industrial Localization and Countries' Specialization Patterns in the European Union, to explain the driving forces behind and to find out dynamic tendencies. We extend existing research work by using a broader data set, covering a longer period of time and by applying several econometric methods in order to explain Localization and Specialization. Explanatory variables are derived from Traditional Trade Theory, New Trade Theories and the New Economic Geography. Taking EU-KLEMS data for 14 European countries covering 20 industries over the period from 1970 to 2005 we compute both regional and locational Gini coefficients. There is a clear increase in Industrial Concentration but only a slight increase in Countries' Specialization in the EU evident over time. Especially, low technology or labor intensive industries experienced the highest increase in Industrial Concentration. New Trade Theory and New Economic Geography can explain both Industrial Concentration and Countries' Specialization in the EU best. As regards Countries' Specialization our results indicate that trade costs seem to have declined so much and European liberalization has proceeded so far that dispersion among countries occurs again. We show that it's important to consider multicollinearity problems of variables. Furthermore, we test for cointegration between our regression variables. For the EU, results of an error correction modeling framework show that imbalances in European Countries' Specialization are being set off at a rate of about 68 to 105 percent (according to the regression framework taken) within the next period. New Economic Geography is the best explanatory force within the error correction model. Adjustments rates for Sweden and Italy appear to be much lower than for the EU as a whole. These results might be valuable for understanding agglomeration processes in the EU. Also, as European Integration continues to progress, it is important to know how and how quickly countries will specialize and industries will agglomerate.

Keywords: Concentration, Specialization, European Integration, New Economic Geography, Cointegration
JEL-Code: F14, F15, C50

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1 Introduction

The aim of this study is to investigate the development of industrial localization and countries' specialization in the European Union from 1970 to 2005 and to find evidence for the driving factors of both localization and specialization. We further extend existing research work by using a new data set, covering a longer period of time and by applying several econometric methods in order to explain both localization and specialization. We focuss on three different branches of trade theories: classical trade theory, new trade theory and the new economic geography. These theories will guide us in finding the influential factors of localization and specialization. Further, we will investigate dynamic tendencies of localization and specialization by applying cointegration and error correction modeling methods. To the best of our knowledge this is the first study that explicitly considers stationarity properties of regression variables. In regard of the ongoing process of integration in the European Union this study gives valuable insight into the evolution of industrial structures in Europe.

The European Union experienced a great bunch of stages of integration over time. This process of integration meant a reduction of protectionism tapering with the Single European Market Act in 1992. Further trade liberalization occurred with the establishment of the WTO in 1995. The question arises whether ongoing integration exerts an influence on European countries' specialization and industrial agglomeration. It is important for many branches of European politics to know about agglomeration and specialization processes in the EU. If countries become more specialized, asymmetric shocks might damage single countries a lot. Because of European common monetary policy, one important tool in smoothing crises has become absent, European countries are not able to conduct a monetary policy themselves, any more.

2 Theoretical Background

Trade theories give different explanations for countries' specialization. Whereas Ricardo predicts that countries specialize according to their comparative advantage, Heckscher-Ohlin tells us that a country specializes in producing and exporting that good that is produced relative intensively with the factor the country is relatively well endowed with.

New Trade Theories emphasize that economies specialize because of making use of scale economies in production. Using scale effects firms can reduce costs of production. Either they can produce more output at a given cost or they can reduce costs producing a given output. Thinking about a homogeneous good, countries would specialize in the good they have the higher market share in, initially. Further integra-

tion, thereby seizing international trade, would make countries' industrial structures become even more unequal. If we assume goods to be heterogeneous within a sector, however, free trade would make consumers getting access to a greater variety of products. Free trade in turn, would seize intra-industrial trade, leading to equalized industrial structures across countries.
New Economic Geography, elaborated in particular by Paul Krugman, argues that further integration would make countries become more different (Krugman (1991), Krugman and Venables (1995), Krugman and Venables (1996)). One has to differentiate between different stages of transport costs, however. High transport costs between countries would make them still keep the full range of industries guaranteeing a fair level of subsistence. There is no agglomeration at place. With falling transport costs producers of final and intermediate goods would tend to move together, each industry would concentrate in one country only. Industries making use of economies of scale will locate at sites where demand is high, usually this will be in the larger market (backward linkage). They can minimize transport costs this way. Demand in turn will be high in places where firms are already located in, because their products will be less expensive (forward linkage). The interaction between transport costs and trade in intermediates might lead to agglomeration. As Krugman and Venables (1995) point out, a core-periphery pattern emerges. But if transport costs continue to fall the importance of being close to markets and suppliers might decline. Lower labor costs in the periphery could make industries remove again, core and periphery regions would converge.

There exists a vast body of literature measuring and explaining agglomeration and specialization patterns. We are not going to give an exhaustive review on all of that work being done so far. We would like to point to Brülhart (1998) who gives a good review on trade and location theory and considers various studies up to the year his study was published. Instead, we will report only on some of the relevant literature in the following, the one that gave us most of the inspiration for the research we conducted which we will talk about in detail in section 3.
Amiti (1998, 1999) investigates both industrial localization and countries' specialization in the EU for the period from 1968 and 1990. She finds evidence for increasing specialization in the EU, involving all countries especially between 1980 and 1990. She explains this through increasing trade liberalization in the European Union. Furthermore, she can show that industries agglomerated because of scale economies and high intermediate goods intensity. This supports the validity of new trade theory and new economic geography.
Brülhart (2001) finds evidence for growing industrial concentration in the EU from 1972 to 1996. Especially, labor-intensive industries showed the highest increase in concentration. The author argues that classical trade theory might exhibit some

explanatory power for industrial concentration, still.
Kim (1995) argues that both resource use and scale economies could explain specialization and localization in the USA best. The author further states that Heckscher-Ohlin type arguments should not be neglected in explaining specialization trends.
Midelfart, Overman and Venables (2003) state that there is an ongoing increase in specialization in the EU. Labor-intensive industries would have become more concentrated in Southern European countries. Further impacts on EMU are being discussed, especially the relationship between city size and the probability of asymmetric shocks is being addressed.
Paluzie, Pons and Tirado (2001) show in a country study for Spain that there is no specialization tendency for Spanish provinces from 1979 to 1992. A reduction in trade costs didn't affect industrial location. They can show that Heckscher-Ohlin and New Economic Geography do not explain industrial concentration but scale economies do.
Ezcurra, Pascual and Rapun (2006) show that regional specialization in the EU decreased from 1977 to 1999. Smaller regions displayed higher reductions. These are the regions that had a high specialization level in the beginning of the investigated time period and converged towards the European average over time.

Summarizing, there exist studies that give evidence for the validity of classical trade theory in explaining agglomeration or specialization (Brülhart (2001), Kim (1995)), some find support for New Trade Theory (Amiti (1998), Amiti (1999), Kim (1995), Paluzie, Pons, Tirado (2001)) others see New Economic Geography as a main explanatory force (Amiti (1998), Amiti (1999)). Whereas most studies agree with growing agglomeration tendencies, there is discordance about tendencies of specialization. Some studies find out that specialization in the EU increased some others find out that specialization decreased over time. In the following section we will talk about our own results on disentangling the importance of different trade theories in explaining agglomeration and specialization in the European Union.

3 Empirical Analysis

In the first part of the Empirics section we describe how to compute measures of agglomeration and specialization. Data issues will be addressed and we will have a look at localization and specialization patterns over time. The second part investigates potential driving factors of localization, the third part does so for specialization tendencies in the European Union. In the fourth part we seek after dynamic changes both in localization and specialization in the European Union and make use of cointegration and error correction modeling techniques.

3.1 Measuring Industrial Localization and Countries' Specialization

In accordance with Krugman (1991) and Amiti (1998, 1999) gini coefficients are used for measuring both localization and specialization.
One has to differentiate between measurement of countries' specialization in their manufacturing production and industries' geographical concentration. The first measure relates to changes in industrial structures in countries whereas the last measure relates to concentration of industries. In the following we will talk about countries' specialization when changes in countries' industrial structures are addressed. Further, we will employ the terms industrial localization, agglomeration and concentration as synonyms relating to industries' geographical concentration.
The gini coefficients are calculated as follows. First compute the Balassa index

$$B_{ij} = \frac{\frac{e_{ij}}{e_j}}{\frac{e_i}{E}} for countries' specialization \tag{1}$$

and

$$B_{ij} = \frac{\frac{e_{ij}}{e_i}}{\frac{e_j}{E}} for industries' geographical concentration. \tag{2}$$

Here e_{ij} denotes industry i's employment in country j, e_j is total manufacturing employment in country j, e_i denotes total industry i employment in the European Union, and E is total manufacturing employment in the European Union[1]. The Balassa index can be thought of as a kind of relative specialization. Let's think about it in the case of industries' geographical concentration. The denominator denotes the share of total manufacturing employment in country j to total manufacturing employment in the EU. This share measures the magnitude in terms of total manufacturing employment of a country. The nominator consists of the share of industry i's employment in country j to total industry i employment in the European Union. This share measures the magnitude of an industrial sector in a country. Now, if a country possesses a low magnitude in total manufacturing employment (small value of denominator) but a high magnitude in an industrial sector's employment, the Balassa index will show up a high value indicating a country's strong specialization in the given industry. The Balassa index will be equal to one if a country's industrial employment relative to the EU equals the country's total employment share relative to the EU.
For calculating the gini coefficient, the Balassa index has to be ranked in descending order. Then one constructs a Lorenz-curve by plotting the cumulative of the numerator on the vertical axis and the cumulative of the denominator on the horizontal

[1] See for example Amiti (1998, 1999).

axis. The gini coefficient is equal to twice the area within a 45 degree line and the Lorenz curve. The gini coefficient equals zero if an industrial sector or a country is totally equally distributed across countries or across industries, respectively. Agglomeration or specialization then will be low. The gini coefficient approaches one the more the Balassa indexes differ from one, agglomeration or countries' specialization will be high.
We calculated both industry and country Gini coefficients.

The data stem from the EU KLEMS Database (2008) and can be downloaded online. EU KLEMS is a data collection project funded by the European Commission. The data collection has been done and supported by the OECD, several statistical offices, national economic policy research institutes and academic institutions in the EU. For our computation of gini coefficients we extracted national employment data. The variable taken was *number of persons engaged*. We took data covering 14 European countries. We had to discard Luxembourg from our sample since data were missing for many industries. In the end we could make use of 20 industries. A further disaggregation of industries was prevented by lack of data. Employment data were available for the period from 1970 to 2005. Most of the country variables were available for this time period, however, for several industries data on value added, output and compensation (variables needed for explaining concentration and specialization) were available from 1995 to 2005 only. Furthermore, we took an openness index from Penn World Table (2006) and an index for trade costs from Dreher (2006).

The evolution of European localization and specialization will be shown in the next section.

3.1.1 Industrial Localization

We will take a look at industrial concentration tendencies over time, first. Results are shown in table 1[2].

[2] In the table industry gini coefficients are shown for the time points 1970, 1980, 1990, 2000 and 2005. Furthermore the change of gini coefficients from 1970 until 2005 is presented, as well as the results applying a linear trend test over time.

	1970	1980	1990	2000	2005	Change 1970-2005	Trend Test β
All industries	0,1762	0,1862	0,1925	0,2095	0,2207	0,2525	0.0012**
Food, beverages, tobacco	0,1294	0,1224	0,1337	0,1075	0,1132	-0,1251	-0.0005**
Textiles, textile products	0,145	0,2169	0,2902	0,3667	0,4091	1,8213	0.0077**
Leather, footwear	0,246	0,3348	0,4389	0,5236	0,5481	1,2281	0.0092**
Wood, wood products, furniture	0,1791	0,2423	0,2763	0,3431	0,3538	0,9755	0.0051**
Pulp, paper, paper products	0,2111	0,2135	0,206	0,1484	0,1461	-0,3078	-0.002**
Printing, publishing	0,15	0,1543	0,1407	0,1639	0,1694	0,1294	0.0006**
Basic Metals	0,2083	0,1853	0,1407	0,1223	0,1501	-0,2796	-0.0026**
Fabricated Metals	0,091	0,0963	0,0835	0,077	0,0756	-0,1663	-0.0009**
Non-metallic mineral products	0,1129	0,1046	0,1156	0,1308	0,1563	0,384	0.0011**
Coke, refined petroleum, nuclear fuel	0,2368	0,2189	0,2007	0,2564	0,2989	0,2622	0.0015**
Rubber, plastics, plastics products	0,1254	0,1215	0,1225	0,1071	0,1203	-0,041	-0.0003**
Machinery equipment	0,16	0,143	0,1712	0,1539	0,1491	-0,0685	-0.0001
Motor Vehicles, trailers, semitrailers	0,1442	0,1606	0,2169	0,2652	0,2825	0,9598	0.0045**
Other transport equipment	0,2593	0,2537	0,2207	0,1917	0,1928	-0,2565	-0.0025**
Manufacturing, nec recycling	0,1236	0,1154	0,1169	0,1442	0,1624	0,3137	0.0012**
Chemical industry	0,1071	0,1194	0,1336	0,136	0,1376	0,2844	0.0009**
Office accounting, computing machines	0,3565	0,3627	0,2999	0,3485	0,3358	-0,0582	-0.002
Electrical machinery apparatus	0,1725	0,1638	0,1751	0,1608	0,1823	0,057	0.0002
Radio, TV, communication equipment	0,148	0,1609	0,1338	0,2234	0,1998	0,3501	0.0019**
Medical, precision, optical instruments	0,2182	0,2335	0,2326	0,2188	0,2307	0,0571	0.0000

Table 1: Industrial concentration over time

As can be seen average industrial agglomeration in the EU increased from 1970 to 2005 by about 25 percent. Some industries show a sharp increase in industrial concentration over time, among these are the textile industry (182 percent), leather and footwear (about 123 percent), wood and furniture industry (about 98 percent) and motor vehicles (about 96 percent). Agglomeration declined in the branches of food, beverages, tobacco, pulp and paper, basic metals, fabricated metals, rubber and plastics and other transport equipment.

The OECD classifies industries into four main sectors: low technology industries (comprising food, beverages, tobacco, textiles, leather, footwear, wood, furniture, pulp, paper, printing and publishing), medium-low technology industries (comprising basic metals, fabricated metals and non-metallic mineral products), medium-high technology industries (comprising coke, petroleum, rubber, plastics, machinery equipment, motor vehicles, other transport equipment and recycling) and high technology industries (comprising chemical industry, office, accounting, computing machines, electrical machinery, radio, tv, communication, medical, precision and optical instruments). Table 2 lists the results:

	1970	*1980*	*1990*	*2000*	*2005*	**Change 1970-2005**	**Trend Test β**
All industries	0.1762	0.1862	0.1925	0.2095	0.2207	0.2525	0.0012**
Low technology industries	0.1768	0.214	0.2476	0.2755	0.29	0.6403	0.0033**
Medium low technology industries	0.1373	0.1287	0.1133	0.11	0.1273	-0.0727	-0.0008**
Medium high technology industries	0.1749	0.1689	0.1748	0.1864	0.201	0.1493	0.0007**
High technology industries	0.2005	0.2081	0.195	0.2175	0.2172	0.0836	0.0002

Table 2: Changing agglomeration in industrial sectors–New OECD classification

Low-technology industries have agglomerated the most over time. In 1970 low technology industries had about the same gini coefficient as the average of industries in the EU, 0.176. In 2005 low-technology industry's gini coefficient is about 0.29 compared to 0.22 for the European industries' average. Agglomeration of low-technology industries therewith increased by about 64 percent. Medium-low technology industries deagglomerated over time by 7 percent, whereas medium-high technology industries showed a significant increase in agglomeration of about 15 percent.

Using the old OECD classification[3] for grouping industrial sectors, one might gain a better insight into agglomeration forces. Sectors are grouped into labor- (comprising textiles, leather, footwear and fabricated metals), research- (comprising coke, petroleum, rubber, plastics, machinery equipment, motor vehicles, other transport equipment, recycling, chemical industry, office, accounting, computing machines, electrical machinery, radio, tv, communication, medical, precision and optical instru-

[3]We reconstructed the old OECD classification to as best as we could. Unfortunately, with only 20 industries at hand, this might be less precise than a higher disaggregation of industries would allow for.

ments), scale- (comprising printing, publishing, rubber, plastics, chemical industry, motor vehicles and other transport equipment) and resource-intensive (comprising basic metals, non-metallic mineral products, wood, furniture, paper, pulp, coke and petroleum) industries:

	1970	1980	1990	2000	2005	Change 1970-2005	Trend Test β
All industries	0.1762	0.1862	0.1925	0.2095	0.2207	0.2525	0.0012**
Labor intensive industries	0.1606	0.216	0.2709	0.3281	0.3443	1.1442	0.0054**
Research intensive industries	0.1865	0.1867	0.184	0.2005	0.2084	0.1172	0.0005**
Scale intensive industries	0.1572	0.1619	0.1669	0.1728	0.1805	0.1484	0.0007**
Resource intensive industries	0.1896	0.1929	0.1879	0.2002	0.221	0.1655	0.0006**

Table 3: Changing agglomeration in industrial sectors–Old OECD classification

Labor-intensive industries show a sharp increase in agglomeration over time, about 114 percent. This is much more than the increase of average European industries' concentration from 1970 to 2005 by about 25 percent. Thinking about reasons for this kind of development one should take a closer look at the countries that record a big increase in industrial concentration. The Balassa index for industries such as textiles, leather and footwear is especially high for Italy, Greece, Portugal and Spain. The argumentation behind could be that labor-intensive industries have concentrated in these countries because of lower labor costs. This argumentation would support classical trade theory. However, this deserves further investigation. We will explicitly test for the influence of traditional trade theory in one of the later sections. The other industries show only moderate increases in industrial concentration over time. Resource-intensive industries showed an increase of about 17 percent, scale-intensive industries of about 15 percent and research-intensive industries of about 12 percent, respectively.

The reasoning for developments in resource-intensive industries might be that agglomeration in this sector has occurred in the years before the investigation period of 1970-2005. Availability of resources plays an important role in this sector. Transport costs for this sector are high because of the need to produce in the vicinity of resources. Interestingly, after a slight decline in concentration until 1990, agglomeration of these industries increased to a remarkable amount (about 18 percent) until 2005.

Scale-intensive industries show a slow but steady increase in industrial concentration

over time.
Research-intensive industries display only a slight increase in industrial agglomeration over time. Obviously, this industry needs highly skilled labor. Traditional trade theory would argue that this kind of industry will agglomerate in countries that are highly endowed with high-skilled labor. We will devote ourselves in clarifying theses issues when we come to conduct regressions about explanatory variables for industrial concentration in one of the later sections.

3.1.2 Countries' specialization

Specialization and agglomeration are closely related to each other as has been shown by Kim (1995) for example. A growing specialization of European countries would indicate that industrial structures of European countries have become more unequal to each other.
Taking a look at country gini coefficients given in table 4 one can see that it's Germany, France, Greece, Portugal, Italy and Ireland that show a significant increase in specialization during the time period from 1970 to 2005. However, specialization shows only slight changes compared to agglomeration tendencies. It becomes evident that those countries exhibiting middle-high specialization states in the 70s tended to despecialize a little until 2005. Highly specialized countries in 1970 like Greece, Ireland and Portugal show a sharp increase in specialization until 2005 as well as those countries being only little specialized in 1970 (Germany, France and Italy, also). Besides, countries lying in the periphery of Europe like Ireland, Greece and Portugal and two important European core countries, namely Germany and France, exhibit high increases in specialization from 1970 to 2005.

	1970	1980	1990	2000	2005	Change 1970-2005	Trend Test β
Europe	0,2269	0,2304	0,2286	0,2349	0,2384	0,0507	0.0003**
Austria	0,194	0,1873	0,1746	0,176	0,1671	-0,1385	-0.0004**
Belgium	0,2161	0,2096	0,2098	0,202	0,2024	-0,0633	-0.0004**
Denmark	0,2519	0,2545	0,2322	0,2159	0,2166	-0,14	-0.0014**
Finland	0,3147	0,2828	0,2545	0,2982	0,2983	-0,0519	0.0000
France	0,0944	0,083	0,0913	0,102	0,1183	0,2537	0.0004**
Germany	0,1282	0,1414	0,1723	0,1763	0,1852	0,444	0.0016**
Greece	0,3398	0,3647	0,3888	0,4	0,3874	0,1402	0.0017**
Ireland	0,322	0,3135	0,2933	0,3503	0,368	0,1427	0.001**
Italy	0,1666	0,1675	0,1755	0,1849	0,1917	0,1511	0.001**
Netherlands	0,2532	0,2903	0,2717	0,241	0,2468	-0,0255	-0.001**
Portugal	0,3386	0,367	0,4167	0,4097	0,4132	0,2202	0.0024**
Spain	0,188	0,1803	0,1739	0,1556	0,1448	-0,2298	-0.001**
Sweden	0,2498	0,2633	0,253	0,2537	0,247	-0,0114	-0.0005**
United Kingdom	0,119	0,1198	0,0928	0,1226	0,1506	0,2651	0.0003

Table 4: Specialization of countries

3.2 Explaining Industrial Localization

In the following we will focuss on the investigation of driving factors of industrial concentration in the European Union. To address this issue we will set up an estimation equation containing variables that are supposed to excess an influence on industrial localization. Explaining variables are taken from the three trade theories discussed in more detail above. Amiti (1999) has specified and estimated an regression function explaining industrial agglomeration, as well. We will draw on the variables for classical trade theory and new economic geography taken and operationalized by her in this section. Our measure for scale intensity differs from hers. For explaining specialization tendencies, which is being done in the next section, we will add further variables to our estimation function.

First, we consider classical trade theory. According to Heckscher-Ohlin, countries will specialize in producing and exporting a good that they produce relative intensively with the factor they are relatively abundant with. This is being captured by the following measure:

$$fact_{it} = |\frac{w_{it}L_{it}}{VA_{it}} - \overline{\frac{w_t L_t}{VA_t}}|. \quad (3)$$

Here $w_{it}L_{it}$ denotes compensation of employees in industry i at time point t and VA_{it} is gross value added at current basic prices. The measure consists of the deviation of the share of labor compensation in value added to industries' average share of labor compensation in average value added. The absolute value of this measure is taken. The idea behind is that industries exhibiting either a high labor or a high capital intensity (represented by either high or low labor compensation compared to the European average) will show up a high level of industrial concentration. Thus we expect a positive influence of *fact* on industrial concentration.
New trade theories postulate the relevance of scale economies. We try to capture this by the following measure:

$$scale_{it} = \frac{e_{it}}{Q_{it}}. \tag{4}$$

e_{it} denotes number of persons engaged and Q_{it} is gross output as a volume index (1995=100). We expect a negative relationship between concentration and scale intensity. This is because the more output can be produced at a given employment, the lower will be the measure *scale*.
New Economic Geography's influence is going to be modeled in the following way:

$$intermediate_{it} = \frac{P_{it}Q_{it} - VA_{it}}{P_{it}Q_{it}}. \tag{5}$$

Here $P_{it}Q_{it}$ denotes gross output at current basic prices and VA_{it} is gross value added at current basic prices. Industries that use a lot of intermediate inputs are expected show a higher concentration than other industries. Therefore we expect a positive relationship between concentration and intermediate goods intensity.

We estimated a regression function using pooled OLS including time and industry fixed effects. Time dummies are taken relative to 1995, industry dummies are taken relative to fabricated metals. Further, the logs of variables are taken such as to better interpret (percentage) changes in variables. The results are given in table 5. $**$ denotes significance at a 5 percent p-value level, $*$ denotes significance at a 10 percent p-value level.

Dependent variable ln(gini_industries)	**Pooled OLS**		**Pooled OLS**		**Pooled OLS**
constant	-2.1921**	Coke, refined petroleum, nuclear fuel	1.0625**	1996	0.0137
ln(fact)	-0.0099	Rubber, plastics, plastics products	0.3437**	1997	0.0201
ln(scale)	0.046	Machinery equipment	0.6196**	1998	0.021
ln(intermediate)	0.8103**	Motor Vehicles, trailers, semitrailers	1.011**	1999	0.0209
Food, beverages, tobacco	0.1401**	Other transport equipment	0.8388**	2000	0.0147
Textiles, textile products	1.4526**	Manufacturing, nec recycling	0.5761**	2001	0.0305
Leather, footwear	1.8488**	Chemical industry	0.5211**	2002	0.0424*
Wood, wood products, furniture	1.3591**	Office accounting, computing machines	1.3342**	2003	0.0619**
Pulp, paper, paper products	0.6662**	Electrical machinery apparatus	0.7368**	2004	0.0667**
Printing, publishing	0.7508**	Radio, TV, communication equipment	0.8373**	2005	0.06**
Basic Metals	0.3739**	Medical, precision, optical instruments	1.1434**	N	220
Non-metallic mineral products	0.5374**			R^2	0.988
				F-Stat	470.362

Table 5: Regression Results Industrial Concentration

The results show that only New Economic Geography can explain agglomeration tendencies in the EU. A one percent increase in intermediate goods intensity increases industrial concentration by about 0.81 percent. All of the industry fixed effects are significant pointing towards the importance of further unobservable industry characteristics. Time fixed effects are significant from 2002 on, which indicates the influence of growing integration and liberalization in the EU. However, we considered a check for multicollinearity of variables being adequate. Important results occurred: scale intensity tends to be highly correlated with industry fixed effects. Therefore, putting both fixed effects and scale into a regression function appears to bias estimators. This is why we estimated another regression function discarding industry fixed effects. The results are given in the following table:

Dependent variable ln(gini_industries)	**Pooled OLS**		**Pooled OLS**		**Pooled OLS**
constant	-1.7375**	1998	-0.0558	2004	-0.0524
ln(fact)	-0.1224**	1999	-0.0698	2005	-0.1108
ln(scale)	-0.2414**	2000	-0.0825	N	220
ln(intermediate)	0.9382**	2001	-0.0777	R^2	0.383
1996	-0.006	2002	-0.0687	F-Stat	9.83
1997	-0.044	2003	-0.0765		

Table 6: Regression Results Industrial Concentration controlling for multicollinearity

As can be seen, both New Trade Theory and New Economic Geography show strong explanatory power. Thus, we can confirm the results obtained by Amiti (1999). A one percent increase in intermediate goods intensity increases industrial concentration by about 0.94 percent and a one percent increase in scale intensity increases industrial concentration by about 0.24 percent. Surprisingly, factor intensity appears to be significant but doesn't show the expected sign. The negative sign would mean that industries get more concentrated the more factor abundance in a country equals the European average. This is in sharp contrast to classical trade theory assumptions. Classical trade theory therefore doesn't seem to be able to explain industrial concentration very well.

Before making a final conclusion, however, we took into account the four different industrial sectors classified by the OECD and checked for influential factors of agglomeration in all of these sectors separately (we considered sectors obtained by both the old and new OECD classification). The results are shown in table 7.

	Labor intensive	*Scale intensive*	*Resource intensive*	*Research intensive*	*Low technology*	*Medium-low technology*	*Medium-high technology*	*High technolog*
constant	3.2029**	-1.0282**	-1.9123**	-1.5348**	-1.7659**	-2.766**	-0.2922**	-2.2788**
Ln(fact)	-0.04	-0.1279**	-0.0615	-0.0484**	-0.2504**	-0.0219	0.045**	0.0061
Ln(scale)	-0.1059*	-0.019	-0.2591	-0.1571**	-0.3848**	-0.686**	0.1925**	-0.3984**
Ln(intermediate)	10.5099**	2.3861**	0.4204	0.9337**	1.1213	-0.9847**	3.3043**	-0.9169**
1996	0.0253	-0.0113	-0.0086	0.0209	-0.0916	-0.0066	-0.0076	0.0016
1997	0.0084	-0.0192	-0.0281	0.0101	-0.1793	-0.0439	0.0419	-0.0091
1998	0.0473	-0.0329	-0.0609	0.0023	-0.1512	-0.0583	0.0536	-0.0492
1999	0.1296	-0.0625	-0.0865	-0.0212	-0.2161	-0.069	-0.002	-0.0691
2000	-0.0525	-0.0963*	-0.092	-0.0379	-0.1966	-0.0985	-0.0583	-0.088
2001	-0.1437	-0.0874	-0.0294	-0.0483	-0.1934	-0.0405	-0.0236	-0.0949
2002	0.0146	-0.1051*	-0.0185	-0.0402	-0.2131	-0.0138	-0.0003	-0.1608**
2003	0.0673	-0.0608	-0.0394	-0.0349	-0.2265	-0.0141	0.0346	-0.2191**
2004	-0.1378	-0.0838	0.0017	-0.0158	-0.1762	-0.0201	-0.0195	-0.2164**
2005	-0.2288*	-0.1059*	-0.0425	-0.0464	-0.3545	-0.0189	-0.0652	-0.1939**
N	33	55	55	121	66	33	66	55
R^2	0.986	0.901	0.286	0.569	0.543	0.956	0.926	0.927
F-Stat	106.52	28.551	1.262	10.87	4.752	31.963	50.059	39.8

Table 7: Regression Results Agglomeration of industrial sectors

New Economic Geography appears to be the main explanatory power in most of the sectors considered so far. The most surprising result perhaps is that intermediate goods intensity is the main driving force for agglomeration in labor-intensive industries. The results indicate that a one percent increase in intermediate goods intensity increases industrial concentration in this sector by about 10.51 percent. The New Economic Geography is also the best explaining device for scale-intensive, research-intensive and medium-high technology industries. Economies of scale are important for labor-intensive, research-intensive, low technology, medium-low technology and high technology industries. Factor intensity appears to be significant for medium-high technology industry only. Further, economies of scale exert a positive influence on agglomeration in the medium-high technology sector. This would mean that the higher are scale economies the lower is this sector's concentration. This seems to support intra-industrial trade to exist in this sector. As we look back on this sector's division, coke, petroleum, rubber, plastics, machinery equipment, motor vehicles, transport equipment and recycling would be affected by intra-industry trade. Interestingly, for high-technology industries time fixed effects are important from 2002 on. The negative signs of time effects, however, suggest that for high technology industries concentration declined over time.

Another way of looking at agglomeration would be to consider single time series of countries or for the aggregated EU. Problematically, we do have eleven data points only, a far too small sample to conduct plausible estimation. It would be worthwhile to reestimate a regression equation for explaining industrial concentration using more observations in the future.

3.3 Explaining Specialization

Finding out the driving factors of countries' specialization in the EU we take up the same explanatory variables as we did for explaining industrial concentration. On the one hand this undertaking is justified by our incentive to disentangle the influence of different trade theories on countries' specialization. Furthermore, a strong correlation between specialization and agglomeration has been found out in previous literature (see for example Kim (1995)). On the other hand we might still miss a bunch of other important driving factors of specialization. We leave this out for further research. In addition, we added two more variables to our regression framework: country's openness and trade costs, aiming to cover further aspects of New Economic Geography .

The openness index is taken from the Penn World Table (2006) and defined as follows:

$$openness_{jt} = \frac{IM_{jt} + EX_{jt}}{GDP_{jt}}. \tag{6}$$

This measure is made up of imports plus exports devided by real gdp (base year 2000). It gives us country j's total trade as a percentage of gdp at time point t. We expect a positive relationship between openness and countries' specialization, more trade should go hand in hand with more specialization.

Trade costs are taken from Dreher (2006). They are operationalized by the component *restrictions* out of his index of economic globalization. The measure is composed of mean tariff rate, hidden import barriers, taxes on international trade and capital account restrictions. Dreher used principal component analysis in order to derive the indexes for globalization, the procedure can be reread in his paper. We would like to point to some drawbacks of this measure. Severe bias is to be expected since most of the time at the margins of a data series missing observations are substituted by the last available data value. Further, missing values within a time series are gained by linear interpolation, thus again, not the real world values are taken. Though there are several disadvantages in taking Dreher's index, we nevertheless took this measure within our regressions since we couldn't find better data for addressing trade costs so far. A higher value of *trade costs* indicates fewer trade costs. We expect a positive relationship between trade costs and countries' specialization to appear. The measure trade costs could be formalized as follows:

$$tradecosts_{jt} = f(MT_{jt}, HIB_{jt}, TIT_{jt}, CAR_{jt}), \tag{7}$$

where MT denotes mean tariff rate, HIB hidden import barriers, TIT taxes on international trade, CAR capital account restrictions and f denotes a linear combination using a principal component, respectively.

Applying pooled OLS using country and time fixed effects we get the following results:

Dependent variable ln(ginicountries)	Pooled OLS (1)	(2)	(3)	(4)	(5)
constant	-1.2755**	-1.2808**	-1.4327**	-2.6891**	-2.5048**
ln(fact)	0.0027	0.0039	0.0042	0.0012	0.0009
ln(scale)	-0.039*	-0.0304	-0.0273	-0.0483**	-0.0517**
ln(intermediate)	0.7316**	0.8095**	0.799**	1.0447**	1.0551**
ln(openness)			0.0399	0.0462	
ln(trade costs)				0.3364**	0.3341**
Austria	0.0042	0.03	0.0204	0.0036	0.0147
Belgium	0.0794	0.0947*	0.0594	-0.0276	0.0137
Denmark	0.2395**	0.2675**	0.2624**	0.1997**	0.206**
Finland	0.3971**	0.4167**	0.4196**	0.3765**	0.3735**
France	-0.6564**	-0.6628**	-0.6546**	-0.6589**	-0.6684**
Greece	0.7193**	0.7406**	0.7581**	0.7557**	0.7355**
Ireland	0.5243**	0.5459**	0.5239**	0.453**	0.4789**
Italy	0.0217	0.0193	0.025	0.0524**	0.0456**
Netherlands	0.338**	0.351**	0.3264**	0.251**	0.28**
Portugal	0.6872**	0.6917**	0.694**	0.6763**	0.6739**
Spain	-0.0526	-0.0437	-0.0273	-0.0527	-0.0715**
Sweden	0.3379**	0.3571**	0.3531**	0.3053**	0.3103**
UK	-0.3992**	-0.402**	-0.3985**	-0.4013**	-0.4053**
time fixed effects	yes	yes	yes	yes	yes
N	504	490	490	490	490
R^2	0.973	0.975	0.975	0.977	0.977
F-Stat	313.688	340.813	334.301	352.396	358.691

Table 8: Regression Results countries' specialization

$**$ denotes significance at a 5 percent p-value level, $*$ denotes significance at a 10 percent p-value level. Time dummies are taken relative to 1970, country dummies are taken relative to Germany. Further, logs of variables are taken. The results suggest that New Economic Geography explains countries' specialization in the EU best. Intermediate goods intensity and trade costs are the main driving factors of specialization. Furthermore, in some of our regressions also New Trade Theories proved to be important to a slight extent. Heckscher-Ohlin theory, however, has no relevance in explaining specialization in the EU anymore. Interestingly, the openness variable remained insignificant. Country fixed effects point to the relevance of some unexplained country variation, time fixed effects show that the periods of 1984/85 and 1994/95 are important and show greater significance over time. This indicates that ongoing integration and liberalization in the EU exerts an influence on countries' specialization.

However, we supposed multicollinearity to be a severe problem in our regressions. Checking for mulitcollinearity, we found out that openness is highly correlated with time fixed effects and scale intensity is highly correlated with country fixed effects.

Since *scale* is one of our main explaining variables we decided to exclude country fixed effects from our regressions. Redoing regressions, we got the following results:

Dependent variable ln(ginicountries)	**Pooled OLS** *(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*
constant	-0.1283	-0.4943**	0.3829*	0.4806**	1.2367*	2.301**	1.6056**	2.5699**
ln(fact)	0.064**	0.067**	0.0579**	0.0547**	0.0591**	0.0582**	0.0631**	0.0617**
ln(scale)	-0.2763**	-0.2494**	-0.3006**	-0.3016**	-0.294**	-0.286**	-0.2765**	-0.2709**
ln(intermediate)	0.6732**	0.4559*	0.828**	0.7863**	0.7205**	0.5448**	0.5604**	0.4116*
ln(openness)			-0.1092**	-0.1853**	-0.079*	-0.0696*		
ln(trade costs)					-0.2412	-0.5475**	-0.4203**	-0.6905**
country fixed effects	no	no	no	no	no	no	no	no
time fixed effects	yes	no	yes	no	yes	no	yes	no
N	490	490	490	490	490	490	490	490
R^2	0.558	0.51	0.567	0.545	0.568	0.56	0.565	0.558
F-Stat	15.43	170.95	15.51	145.01	15.18	123.41	15.41	153.03

Table 9: Regression Results countries' specialization controlling for multicollinearity

Controlling for multicollinearity we see that all of the explanatory variables become significant. This way New Economic Geography, New Trade Theories and Classical Trade Theory are able to explain countries' specialization. Heckscher-Ohlin theory, however, exerts a small influence on countries' specialization only. Further, we can see that scale intensity explains specialization to a much greater extent than regression results not controlling for multicollinearity would have suggested. Openness and trade costs appear to be important, as well, however both variables do not show the expected sign. The negative sign would mean that the more trade costs decline or the more liberalization proceeds the lower will be countries' specialization. This, however, can be explained neatly by Krugman's model. Liberalization in the European Union has proceeded so far and trade costs have declined so much that specialization in the EU became less. Suppliers settle down in both core and peripheral regions again, dispersion among countries occurs again.

Averaging variables over all European countries and looking for time series properties we get the following results:

Dependent variable ln(ginicountries)	OLS aggregated EU			
const	-1.2049**	-2.0247**	-0.1846	-1.1057**
ln(fact)	0.0298*	0.0376**	0.0254*	0.0334**
ln(scale)	-0.027**	0.0801**	-0.0909**	0.0205
ln(intermediate)	0.2766**	0.3205**	0.134	0.1947**
ln(openness)		0.1227**		0.1184**
ln(trade costs)			-0.1983**	-0.1729**
N	35	35	35	35
R^2	0.759	0.884	0.797	0.9131
F-Stat	32.491	57.151	29.473	60.926
DW	0.657	1.616	0.886	2.21

Table 10: Regression Results aggregated EU

Results indicate that all of the variables are significant in most regression frameworks. However, now openness enters the regression equation with a positive sign. In some of our regressions scale intensity and intermediate goods intensity doesn't seem to be important. We found out that including openness and/or trade costs into our regressions leads to severe multicollinearity problems. Therefore, at best only the first column of values in table 10 might give valid information on the explanatory power of parameters. Still, this means Classical Trade Theory, New Trade Theory and New Economic Geography, as well, can explain specialization. Another trouble becomes evident looking at Durbin Watson statistics. Autocorrelation of error terms might be an important point in explaining the results here, too. Therefore one has to think about further remedies, which is what we will do in the following section.

3.4 Considering Dynamics

As we have seen above regressions of time series point towards a problem: the Durbin-Watson statistics indicate autocorrelation of error terms. This problem might occur because non-stationarity properties of variables have not been adequately considered. In this section we will consider stationarity properties of our regression variables. The idea behind is that if non-stationary variables are regressed on each other one might obtain significant results that are not meaningful, however. It's a spurious regression only. In order to handle this problem it is worthwhile to check for non-stationarity of the variables first. If we can establish a cointegration relationship between non-stationary variables, that is if a linear combination of non-stationary variables appears to be stationary, we will be able to estimate an error correction model. This will enable us to differentiate between short run and long run influences of variables and to estimate the error correction term which can show by how much deviations from the long-run state equilibrium will be adjusted within the next period.

Due to data constraints we were able to consider dynamics for countries' specialization only. It would be worthwhile to redo this kind of analysis for industrial concentration once data will be available. We will show results for the aggregated EU first, results for European countries themselves can be found in the appendix.

In a first step we tested our variables for being non-stationary. This was done by using an Augmented Dickey Fuller test applying trend and intercept estimation. The results are given in table 11:

Cointegration Test and error correction model for the EU	**Unit root test trend and intercept**	**Error correction model**	**Unit root test trend and intercept**	**Error correction model**
ln(gini)	I(1)**		I(1)**	
ln(fact)	I(1)**		I(1)**	
ln(scale)	I(1)**		I(1)**	
ln(intermediate)	I(1)**		I(1)**	
ln(openness)	I(1)**		I(1)**	
ln(trade costs)			I(1)**	
cointegrated	yes		yes	
D(ln(fact))		0.0116		0.0153
D(ln(scale))		0.043		0.0395
D(ln(intermediate))		0.2148*		0.2024**
D(ln(openness))		0.0067		0.0431
D(ln(trade costs))				0.0192
D(ln(gini(-1)))		-0.0509		0.0935
Resid(-1)		-0.6773**		-1.0481**
const		0.0021		0.0007
N		35 (33)		35 (33)
R^2		0.413		0.62
DW		1.682		1.681

Table 11: Cointegration Test and Error Correction Modeling for the aggregated EU

$**$ denotes significance at a 5 percent p-value level, $*$ denotes significance at a 10 percent p-value level. All of the tested variables are I(1)[4]. This enabled us to check for a cointegration relationship in a second step. The regression functions using openness and both openness and trade costs in addition to the three trade theory variables appeared to be cointegrated. So in a third step we conducted an error correction model estimation for both regression frameworks. As can be seen, only New Economic Geography serves as an explanatory power, none of the other explaining variables appear to be significant. In the short-run intermediate goods intensity exerts an influence of about 0.2 to 0.21 per cent on countries' specialization. These values are lower than those we estimated before for the long-run using a simple OLS procedure, only. The error correction term is highly significant and ranges from -68 to -105 percent, respectively. This means that deviations from the long-run equilibrium state of specialization in the EU as a whole are being set off by about 68 to

[4] I(1) means that a variable is non-stationary and integrated of the rank 1, that is differencing the variable one time makes it become stationary.

105 percent within the next period (1 year).

Investigations for the European countries themselves delivered distinct results. In order to test for a cointegration relationship, variables have to be integrated of the same order. This is something we could establish for Italy and Sweden only: all of the tested variables appeared to be I(1). The results are shown in the appendix[5]. For Italy's specialization trade costs are a significant influential factor and the error correction term ranges from -0.39 to -0.4, for Sweden it's factor intensity and trade costs that are important, the error correction term ranges from -0.25 to -0.33. A decline in trade costs over time made Sweden specialize more but Italy specialize less. All in all, investigations show that adjustments for these two European countries are slower than for the EU as a whole. It would be nice to have further research going on in the future on econometrical dynamics of several European countries for more disaggregated industries or a larger amount of time such that clearer evidence might be gained about European countries' short-run and long-run driving forces of specialization.

4 Conclusion

Our aim was to disentangle the various factors influencing industrial concentration and countries' specialization in the European Union. We found out that industrial agglomeration in the European Union grew by about 25 percent from 1970 to 2005. Especially textiles, leather, footwear, wood, furniture and motor vehicles showed a large increase in agglomeration. We have seen that it's basically labor-intensive or low-technology industries that displayed a huge increase in concentration. Instead, countries' specialization remained rather low. However, we found out that peripheral European countries like Ireland, Greece, Portugal and two core European countries, namely Germany and France exhibited high increases in specialization.
Our regression results indicate on the one hand that one has to consider multicollinearity problems. If this is not being done results become biased and are hardly interpretable. New Trade Theory and New Economic Geography can explain agglomeration best. Classical Trade Theory didn't appear to be significant. It might play a small role for medium-high technology industries, though. Further, intra-industry trade seems to exist with industries belonging to the medium-high technol-

[5]We checked for cointegration for all of the regression frameworks for all European countries and conducted error correction estimation whenever a cointegration relationship was significant up to about a 0.25 p-value. This is something we did in order to gain some first insight into the values of cointegration, error correction terms and the main explaining variables of specialization. We decided to report all of these results. Nevertheless, it has to be stated that checking for cointegration is valid only for variables that are integrated of the same order and error correction modeling is valid only for cointegrated variables, so for all of the other countries than Sweden and Italy cointegration and error correction modeling results can not be interpreted.

ogy sector. Regarding countries' specialization we found evidence for the validity of all of the three trade theories, although Classical Trade Theory exerts a small influence on countries' specialization, only. Since growing openness and declining trade costs influence specialization negatively, one could argue that this gives evidence for what Krugman and Venables (1995) described for the case of ongoing reduction of trade costs. Liberalization in the European Union seems to have proceeded so far and trade costs have declined so much that specialization in the EU became less. Suppliers settle down in both core and peripheral regions again, dispersion among countries occurs.

Our study appears to be the first one that considers stationarity properties of variables explaining agglomeration and specialization in the European Union. Our regression results indicate that New Economic Geography is best in explaining specialization. Furthermore, for the EU as a whole we can disentangle the effect of adjusting to the long-run equilibrium state of specialization which amounts to about 68 to 105 percent (depending on which regression framework is being taken) within the next period. We could establish further valid cointegration relationships and error correction modeling frameworks for Sweden and Italy only. The results indicate that adjustments rates to long-run equilibrium for these two countries are much lower than for the EU as a whole. Declining trade costs led to make Sweden specialize more and Italy to specialize less.

It would be worthwhile to intensify research in the future for these two countries' specialization and agglomeration patterns making use of more disaggregated industry data employing econometric methods as being shown in this paper. Since agglomeration of European industries increased considerably over time and seems to increase even further, the probability for asymmetric shocks to occur is and remains quite high. One further extension of research could thus be to model asymmetric shocks in a framework of growing industrial concentration in the European Union.

Acknowledgements:

We would like to thank Sebastian Vollmer for valuable comments on this paper and Andy Sischka for his help on making the computation of gini coefficients less tedious.

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Appendix

$**$ denotes significance at a 5 percent p-value level, $*$ denotes significance at a 10 percent p-value level.

		OLS	*Unit root (at 5 % value)*	*Cointegrated*	*Error correction model*	*Other*
Belgium	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: 0.03** DW: 0.64 R^2: 0.69	Ln(scale)=I(0) Ln(openness)=I(2) Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(trade costs)=I(1)	yes*	Error correction term: -0.44**	DW: 2.00 R^2: 0.31
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)			yes*	Error correction term: -0.48**	DW: 2.03 R^2: 0.35
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)			no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)			no		
Austria	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: 0.05** DW: 0.73 R^2: 0.54	Ln(fact)=I(0) Ln(scale)=I(1) Ln(intermediate)=I(1) Ln(gini)=I(1) Ln(openness)=I(1) Ln(trade costs)=I(1)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)			no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Scale: 0.38** Intermediate: 1.36** Trade costs: 0.66** DW: 1.08 R^2: 0.73		yes*	Fact: 0.01** Intermediate: 0.98** Error correction term: -0.56**	DW: 1.71 R^2: 0.52
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: 0.3** Intermediate: 1.42** Trade costs: 0.63** DW: 0.99 R^2: 0.72		yes*	Fact: 0.01** Intermediate: 1.00** Error correction term: -0.54**	DW: 1.7 R^2: 0.50
Germany	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Fact: -0.03** Scale: -0.42** Intermediate: -1.46** DW: 0.95 R^2: 0.94	Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(2)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Fact: -0.03** Scale: -0.36** Intermediate: -1.43** DW: 0.92 R^2: 0.94		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Fact: -0.03** Scale: -0.3** Intermediate: -1.29** DW: 0.89 R^2: 0.94		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Fact: -0.03** Scale: -0.35** Intermediate: -1.31** DW: 0.92 R^2: 0.94		no	Error correction term: -0.38**	DW: 1.73 R^2: 0.38

Portugal	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Fact: 0.02** Scale: -0.15** DW: 0.44 R^2: 0.86	Ln(fact)=I(0) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(0) Ln(trade costs)=I(2)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Fact: 0.02** DW: 0.45 R^2: 0.86		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Fact: 0.01** Trade costs: 0.50** Openness: -0.09* DW: 1.26 R^2: 0.97		yes**	Trade costs: 0.39** Error correction term: -0.66**	DW: 2.09 R^2: 0.31
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Fact: 0.02** Scale: 0.10** Trade costs: 0.48** DW: 1.37 R^2: 0.97		yes**	Scale: 0.1* Trade costs: 0.37** Error correction term: -0.65**	DW: 2.07 R^2: 0.32
Spain	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Fact: 0.10** Scale: 0.13** DW: 0.66 R^2: 0.81	Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(0) Ln(trade costs)=I(1)	yes*	Error correction term: -0.23*	DW: 2.00 R^2: 0.15
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Scale: -0.23** Openness: -0.25** DW: 0.60 R^2: 0.88		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Fact: -0.04* Openness: -0.35** Trade costs: 0.71** DW: 1.11 R^2: 0.93		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Fact: 0.11** Scale: 0.22** DW: 0.72 R^2: 0.82		yes*	Error correction term: -0.23	DW: 2.05 R^2: 0.15
France	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Intermediate: 1.94** DW: 0.18 R^2: 0.40	Ln(fact)=I(0) Ln(gini)=I(2) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(0) Ln(trade costs)=I(1)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Scale: 0.43** Openness: 0.71** DW: 0.22 R^2: 0.56		yes**	Openness: 0.46** Error correction term: -0.15*	DW: 2.28 R^2: 0.42
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Scale: 0.60** Intermediate: 1.72* Openness: 0.49** Trade costs: 1.01** DW: 0.31 R^2: 0.63		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: 0.42** Intermediate: 3.01** Trade costs: 1.43** DW: 0.39 R^2: 0.57		yes*	Intermediate: 0.87* Trade costs: 0.59** Error correction term: -0.14*	DW: 2.44 R^2: 0.44

Ireland	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Fact: 0.51** Scale: 0.07** DW: 0.40 R^2: 0.71	Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(1)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Fact: 0.53** DW: 0.41 R^2: 0.71		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Fact: 0.49** DW: 0.45 R^2: 0.72		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Fact: 0.49** Scale: 0.08** DW: 0.41 R^2: 0.71		no		
Denmark	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: 0.18** Intermediate: 0.74** DW: 0.87 R^2: 0.86	Ln(fact)=I(0) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(2)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Scale: 0.18** Intermediate: 0.75** DW: 0.88 R^2: 0.86		no	Error correction term: -0.35*	DW: 1.74 R^2: 0.17
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Scale: 0.18** DW: 0.83 R^2: 0.87		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: 0.13** DW: 0.79 R^2: 0.86		no		
Finland	Ln(gini), ln(fact), ln(scale), ln(intermediate)		Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(2)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Fact: -0.06** Scale: 0.53** Openness: 1.04** DW: 0.65 R^2: 0.75		no	Scale: 0.33** Openness: 0.61** Error correction term: -0.26*	DW: 1.94 R^2: 0.47
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Fact: -0.04** Scale: 0.68** Intermediate: -1.07** Openness: 0.92** Trade costs: 0.76** DW: 0.74 R^2: 0.80		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: 0.41** Trade costs: 1.57** DW: 0.32 R^2: 0.38		no		

Greece	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: -0.18** Intermediate: 1.02** DW: 0.72 R^2: 0.82	Ln(fact)=I(0) Ln(gini)=I(2) Ln(intermediate)=I(1) Ln(openness)=I(0) Ln(scale)=I(1) Ln(trade costs)=I(1)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Openness: 0.14** DW: 1.03 R^2: 0.91		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Intermediate: 0.42* Openness: 0.15** Trade costs: -0.14** DW: 1.41 R^2: 0.93		yes**	Error correction term: -0.72**	DW: 1.69 R^2: 0.51
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: -0.21** Intermediate: 1.2** DW: 0.87 R^2: 0.82		no		
Italy	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: -0.13** DW: 0.46 R^2: 0.8	Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(1)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Scale: -0.24** Openness: -0.17* DW: 0.52 R^2: 0.81		yes*	Error correction term: -0.39**	DW: 2.06 R^2: 0.30
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Scale: -0.24** DW: 0.53 R^2: 0.81		yes*	Trade costs: -0.25* Error correction term: -0.4**	DW: 2.13 R^2: 0.39
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: -0.16** DW: 0.47 R^2: 0.80		no		
Netherlands	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: 0.21** Intermediate: 1.73** DW: 0.45 R^2: 0.65	Ln(fact)=I(1) Ln(gini)=I(2) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(2) Ln(trade costs)=I(2)	yes**	Error correction term: -0.10*	DW: 2.45 R^2: 0.52
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Scale: -0.35** Intermediate: 0.75** Openness: -0.6** DW: 0.78 R^2: 0.86		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Intermediate: 0.68** Openness: -0.55** DW: 0.81 R^2: 0.88		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Scale: 0.42** Intermediate: 1.46** Trade costs: 0.86** DW: 0.54 R^2: 0.71		no		

Sweden	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: 0.03** Intermediate: -0.93** DW: 0.53 R²: 0.62	Ln(fact)=I(1) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(1)	yes**	Intermediate: -0.54** Error correction term: -0.25**	DW: 2.07 R²: 0.47
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Scale: 0.22** Intermediate: -1.20** Openness: 0.3** DW: 0.7 R²: 0.68		yes**	Intermediate: -0.69** Error correction term: -0.30**	DW: 2.1 R²: 0.51
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Scale: 0.28** Intermediate: -0.85* Openness: 0.34** DW: 0.70 R²: 0.70		yes**	Fact: 0.003* Intermediate: -0.50* Error correction term: -0.33**	DW: 2.34 R²: 0.53
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)			yes**	Trade costs: 0.16* Error correction term: -0.28**	DW: 2.33 R²: 0.51
UK	Ln(gini), ln(fact), ln(scale), ln(intermediate)	Scale: -0.28** Intermediate: 1.58** DW: 0.41 R²: 0.39	Ln(fact)=I(0) Ln(gini)=I(1) Ln(intermediate)=I(1) Ln(openness)=I(1) Ln(scale)=I(1) Ln(trade costs)=I(1)	no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness)	Intermediate: 2.11** Openness: 0.88** DW: 0.43 R²: 0.51		no		
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(openness), ln(trade costs)	Scale: 0.64** Intermediate: 1.48** Openness: 1.43** Trade costs: -0.78** DW: 0.93 R²: 0.72		no	Error correction term: -0.5**	DW: 2.42 R²: 0.41
	Ln(gini), ln(fact), ln(scale), ln(intermediate), ln(trade costs)	Fact: -0.04** Scale: -0.44** Intermediate: 1.06** Trade costs: -0.42** DW: 0.57 R²: 0.47		no		