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**Services sectors' agglomeration and its
interdependence with industrial
agglomeration in the European Union**

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Services sectors' agglomeration and its interdependence with industrial agglomeration in the European Union

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Abstract

Services sectors' agglomeration in the European Union, its development over time, its driving factors and dynamic tendencies will be empirically investigated in this study. Locational gini coefficients are computed taking EU-KLEMS data for 14 European countries covering 22 services sectors over the period from 1970 to 2005. Services sectors' agglomeration in the European Union decreased over the years between 1970 and 2005. Analysis shows that for most of the services sectors considered agglomeration decreased over time, leading to further dispersion of economic activities. Only the branches of retail trade, other water transport and financial intermediation record a significant increase in agglomeration.

Agglomeration tendencies of services sectors can be best explained by Traditional and New Trade Theories, New Economic Geography appears to be not relevant. Theoretical work, incorporating services sectors' activities in New Economic Geography models, is scarce and as Empirics show there is a justified reason for lack of research in that area. In a further step the interaction between industrial and services sectors' agglomeration is investigated. Non-stationarity of variables is being checked for and error correction methods or regression in differences is employed. There exist several interactions between services and industrial sectors' agglomeration in the European Union. In particular, agglomeration in retail trade is positively influenced by an increase in agglomeration in textiles industries over the years between 1970 and 2005. The existence of interaction effects justifies further enhancement of theoretical models. Further, the results are important for understanding agglomeration processes in the EU; interactions between services and industrial sectors are indicative for a highly dynamic region which might attract other activities, as well.

Keywords: Services, Agglomeration, New Economic Geography, European Integration

JEL-Code: C50, F12, F14, F15, L80

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1 Introduction

This study will investigate whether the ideas of New Economic Geography can be applied to explain developments in services sectors. Here, agglomeration of services sectors in the European Union will be investigated covering the years from 1970 to 2005. New research on developments in services sectors' agglomeration is scarce. A thorough investigation of statistical properties of variables and regression frameworks related to services sectors' agglomeration is even harder to find. This study wants to identify explanatory factors and dynamic tendencies of services sectors' agglomeration in the European Union. Further, the interaction effects between industrial and services sectors' agglomeration in the European Union will be investigated. Explanatory factors for services sectors' agglomeration will be taken from three different branches of trade theories: Traditional Trade Theory, New Trade Theory and the New Economic Geography. Dynamic tendencies of localization will be discovered by applying cointegration and error correction modeling techniques. Interdependencies between services and industries sectors' agglomeration can thus be disentangled. To the best of my knowledge, both theoretical and empirical research on the interaction effects between industrial and services sectors' agglomeration does not exist, so far. Thus, this study might deliver some new and interesting results on interdependencies between services and industries sectors' agglomeration in the European Union.

2 Literature Review and Theory

Current literature on investigating developments of services sectors' agglomeration is scarce. Most of the literature has focussed on doing research on industrial localization, so far. Krenz and Rübel (2009) for example found out an increasing trend of industrial agglomeration in the European Union. New Trade Theories and New Economic Geography explain industrial agglomeration in the EU best. As regards countries' specialization results indicate that trade costs seem to have declined so much and European liberalization has proceeded so far that dispersion among countries occurs again. The authors show that non-stationarity properties of variables have to be considered in order to get valid regression results.

Looking on services sectors' activities Jennequin (2008) finds out that services sectors got concentrated in the European Union, although concentration is only moderate from 1986 on. Business and financial services appear to be the most agglomerated sectors.

Midelfart-Knarvik et al. (2000) investigated concentration in the EU considering only five services sectors. They find out that services sectors are highly agglomerated compared to industrial sectors which might be due to the high level of sectoral

aggregation they chose. Financial services, insurance, business, communication and real estate activities are the sectors that are the most concentrated over time and also those that deagglomerated most between 1982 and 1995. Transport services are the most dispersed services over time; in turn this sector shows the highest increase in agglomeration over time.

In order to explain services sectors' agglomeration, explanatory variables will be taken from three different branches of trade theories. These theories point to different reasons for countries to specialize in producing one good instead of another one. As one of the main economic theories in Traditional Trade Theory, Heckscher-Ohlin states 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 focuss on scale economies in production. Using scale effects firms can either produce more output at a given cost or a given output at lower costs. In case of a homogeneous good, countries will specialize in the good they have the higher market share in, initially. Further integration, thereby seizing international trade, will make countries' industrial structures become even more unequal. In case of a heterogenous good, free trade will increase consumers' opportunity to access a greater variety of products. Intra-industrial trade will seize, leading to equalized industrial structures across countries. New Economic Geography has been elaborated in particular by Paul Krugman. Further integration would make countries become more different (see Krugman (1991), Krugman and Venables (1995), Krugman and Venables (1996)), one has to differentiate between different stages of transport costs, however. Countries will still keep themselves capable of producing all the goods their citizens need in case of high level transport costs. There is no agglomeration at place. In case of falling transport costs producers of final and intermediate goods will tend to move together, each industry will concentrate in one country only. On the one hand intermediate goods production will locate close to a large market for reasons of better opportunities to sell products (backward linkage). On the other hand final goods production in this region might be cheaper due to better access to intermediate goods and will thus make location in this region more attractive (forward linkage). The interaction between transport costs and trade in intermediates might lead to agglomeration. According to Krugman and Venables (1995) a core-periphery pattern will emerge. 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 will converge.

3 Empirical Analysis

The Empirical Analysis will comprise the following parts: In the first part measuring agglomeration of services sectors will be explained and data issues will be addressed. Localization patterns of services sectors over time will be investigated in part two. The third part focusses on the driving factors of services sectors' agglomeration. In the fourth part interactions between industrial and services sectors' agglomeration will be investigated. Variables are checked for being non-stationary, cointegration and error correction modeling techniques will be applied.

3.1 Measuring services sectors' agglomeration

As in Krugman (1991) and Amiti (1998, 1999) gini coefficients are used for measuring localization. Localization addresses concentration of services sectors, agglomeration is just a synonym for concentration or localization. Gini coefficients are calculated as follows. First the Balassa index will be computed by using the formula:

$$B_{ij} = \frac{\frac{e_{ij}}{e_j}}{\frac{e_i}{E}} \quad (1)$$

Here, e_{ij} denotes services sector i 's employment in country j , e_j is total services sectors' employment in country j , e_i denotes total services sector i 's employment in the European Union, and E is total services sectors' employment in the European Union¹. 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 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 a services sector is totally equally distributed across countries, then agglomeration will be low. The gini coefficient approaches one the more the Balassa indexes differ from one, agglomeration will be high.

The data are stemming 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 computation of gini coefficients national employment data were extracted. The variable taken was *number of persons engaged*. Data covering 14 European countries and 22 services sectors could be employed, Luxembourg

¹See for example Amiti (1998, 1999) or Krenz and Rübel (2009) for the method of calculation. Krenz and Rübel (2009) also give further explanations on the Balassa index.

had to be discarded from the sample since data were missing for many services sectors. A further disaggregation of services sectors was prevented by lack of data. Data were available for the period from 1970 to 2005.

3.2 Services sectors' agglomeration

The development of services sectors' agglomeration in the European Union is shown in the following table. Only data points for 1970, 1980, 1990, 1995, 2000 and 2005, respectively, are shown in the table for reason of lucidity. Further, changes in agglomeration over time were calculated and a linear trend test was applied to check for significance of changes.

| Agglomeration | 1970 | 1980 | 1990 | 1995 | 2000 | 2005 | Per cent change 1970-2005 (1995-2005) | Trend Test β |
|---|--------|--------|--------|--------|--------|--------|---------------------------------------|--------------------|
| All services sectors (18 sectors) | 0.186 | 0.1804 | 0.1653 | 0.1575 | 0.1513 | 0.1458 | -0.2161 | -0.0012** |
| (22 sectors) | | | | 0.1702 | 0.1643 | 0.159 | -0.0658 | -0.001** |
| (13 sectors) | 0.1182 | 0.1159 | 0.1089 | 0.1 | 0.0982 | 0.0997 | -0.1565 | -0.001** |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | 0.0723 | 0.0897 | 0.095 | 0.0764 | 0.078 | 0.0844 | 0.1674 | 0.0001 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | 0.1123 | 0.0922 | 0.0832 | 0.0902 | 0.0862 | 0.0845 | -0.2476 | -0.0006** |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | 0.0445 | 0.0778 | 0.0635 | 0.0783 | 0.0821 | 0.0784 | 0.7618 | 0.0007** |
| HOTELS AND RESTAURANTS | 0.1347 | 0.155 | 0.1441 | 0.1407 | 0.1437 | 0.1495 | 0.1099 | -0.00004 |
| Other Inland transport | 0.0838 | 0.0971 | 0.0895 | 0.0749 | 0.0785 | 0.0755 | -0.099 | -0.0003** |
| Other Water transport | 0.3521 | 0.3351 | 0.3275 | 0.3873 | 0.3817 | 0.3849 | 0.0932 | 0.002** |
| Other Air transport | 0.2042 | 0.2166 | 0.1806 | 0.1984 | 0.1901 | 0.1784 | -0.1263 | -0.0004** |
| Other Supporting and auxiliary transport activities; activities of travel agencies | 0.1663 | 0.1367 | 0.1368 | 0.1084 | 0.0949 | 0.0813 | -0.5111 | -0.0022** |
| POST AND TELECOMMUNICATIONS | 0.0857 | 0.0789 | 0.0805 | 0.0768 | 0.0806 | 0.0923 | 0.077 | 0.00001 |
| Financial intermediation, except insurance and pension funding | | | | 0.0545 | 0.0635 | 0.0795 | 0.4587 | 0.0022** |
| Insurance and pension funding, except compulsory social security | | | | 0.1852 | 0.1813 | 0.1733 | -0.0643 | -0.0018** |
| Activities related to financial intermediation | | | | 0.1686 | 0.1527 | 0.1344 | -0.2028 | -0.0023** |
| Real estate activities | 0.2371 | 0.2614 | 0.2257 | 0.1879 | 0.1782 | 0.1831 | -0.2278 | -0.0027** |
| Renting of machinery and equipment | 0.4578 | 0.42 | 0.333 | 0.2749 | 0.2446 | 0.1891 | -0.5869 | -0.0082** |
| Computer and related activities | 0.3068 | 0.2746 | 0.2709 | 0.2524 | 0.2241 | 0.2008 | -0.3455 | -0.0025** |

Table 1: Services sectors' concentration over time

| | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|---------|-----------|
| Research and development | 0.4126 | 0.4106 | 0.3746 | 0.3559 | 0.3556 | 0.346 | -0.1614 | -0.0023** |
| Other business activities | 0.1898 | 0.1772 | 0.1434 | 0.1285 | 0.108 | 0.0925 | -0.5126 | -0.003** |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | 0.1176 | 0.1003 | 0.1134 | 0.1101 | 0.1224 | 0.1143 | -0.0281 | 0.0002 |
| EDUCATION | 0.1047 | 0.0968 | 0.0961 | 0.0901 | 0.0802 | 0.0822 | -0.2149 | -0.0006** |
| HEALTH AND SOCIAL WORK | 0.1508 | 0.1472 | 0.142 | 0.1294 | 0.1226 | 0.1287 | -0.1466 | -0.0009** |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | 0.1147 | 0.0807 | 0.0761 | 0.074 | 0.0719 | 0.078 | -0.32 | -0.0007** |
| PRIVATE HOUSEHOLDS WITH EMPLOYED PERSONS | | | | 0.5017 | 0.493 | 0.4875 | -0.0283 | -0.0014** |
| Transport and Storage | 0.0566 | 0.0758 | 0.0775 | 0.0614 | 0.0552 | 0.0502 | -0.1131 | -0.0005** |
| Financial intermediation | 0.1135 | 0.0645 | 0.08 | 0.0676 | 0.076 | 0.0869 | -0.2344 | -0.0008** |
| Renting of machinery and equipment and other business activities | 0.1922 | 0.1865 | 0.1385 | 0.1171 | 0.0995 | 0.0835 | -0.5656 | -0.0036** |

Table 2: Services sectors' concentration over time (continued)

As can be seen total services sectors' agglomeration in the European Union decreased by about 22 percent from 1970 to 2005. Most of the services sectors show a significant decrease in agglomeration as is the case for wholesale trade, other inland transport, other air transport, other supporting and auxiliary transport activities, insurance and pension funding, activities related to financial intermediation, real estate activities, renting of machinery and equipment, computer and related activities, research and development, other business activities, education, health and social work, other community and social services and private households with employed persons. Only retail trade, other water transport and financial intermediation except of insurance and pension funding showed a significant increase in agglomeration. Agglomeration of financial intermediation and retail trade, however, still remains at a low level, only its change over time is huge compared to all other sectors. Concentration in financial intermediation records a 46 percent change, concentration in retail trade a 76 percent change, respectively. Agglomeration in water transport was pretty high in 1970 exhibiting a gini coefficient of 0.35 which increased to 0.38 in 2005. Agglomeration in water transport is not surprising since water transport is highly determined to be localized, at best in places next to the river, lake or sea. Agglomeration in retail trade and financial intermediation, however, deserves further attention. This development points to changing economic structures, financial services and retail trade get more and more clustered, presumably in economically very active regions.

3.3 Explaining services sectors' agglomeration

How can we explain agglomeration? This issue has been addressed in a bunch of research studies mainly focussing on agglomeration in industrial sectors, only. Explaining services sectors' agglomeration, however, is a task that has not been given much attention to, yet. In the following the driving factors of services sectors' concentration in the European Union will be investigated. To address this issue an estimation equation containing variables that are supposed to excess an influence on services sectors' localization is being set up. Explanatory variables are taken from the three trade theories discussed in more detail above. This way of investigation can only be seen as a first step to figure out influential factors for concentration. There might be many other factors that should be checked for, this is something that is left out for further research. Amiti (1999) has specified and estimated a regression function explaining industrial agglomeration. The variables for traditional trade theory and new economic geography I want to test for in my regressions are taken and operationalized in the way that Amiti has done in her study. My measure for scale intensity, however, differs from hers.

Traditional Trade theory shall be operationalized as:

$$fact_{it} = \left| \frac{w_{it}L_{it}}{VA_{it}} - \frac{\overline{w_t L_t}}{\overline{VA_t}} \right|. \quad (2)$$

Here $w_{it}L_{it}$ denotes compensation of employees in services sector 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 services sectors' average share of labor compensation in average value added. Taking the absolute value of this measure captures a basic element of Heckscher-Ohlin's theory: services sectors 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 services sectors' concentration. A positive influence of $fact$ on services sectors' concentration can be expected.

New trade theories postulate the relevance of scale economies. I try to capture this by the following measure²:

$$scale_{it} = \frac{e_{it}}{Q_{it}}. \quad (3)$$

e_{it} denotes number of persons engaged and Q_{it} is gross output as a volume index (1995=100). A negative relationship between concentration and scale intensity can

²Another way to get a measure for scale economies is to estimate a Cobb Douglas production function. This shall be done for further robustness checks. However, lack of data and quality of data caused some problems. Results can be obtained from the author upon request and will appear in an updated version of this paper.

be expected. 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:

$$intermediate_{it} = \frac{P_{it}Q_{it} - VA_{it}}{P_{it}Q_{it}}. \quad (4)$$

$P_{it}Q_{it}$ denotes gross output at current basic prices and VA_{it} is gross value added at current basic prices. Services sectors that use a lot of intermediate inputs are expected to show a higher concentration than other services sectors. Therefore a positive relationship between concentration and intermediate goods intensity is assumed. However, as lies in the nature of services activities, relevance of intermediate inputs for conducting services activities is expected to be rather low. This is because services are considered to be non-tradable to a great amount, thus acquiring intermediate inputs should be less necessary and feasible.

A regression function using pooled OLS including time and services sectors' fixed effects has been estimated. Time dummies are taken relative to 1970, services dummies are taken relative to the sector sale, maintenance and repair of motor vehicles. Further, the logs of variables are taken such as to better interpret (percentage) changes in variables. The results are given in the following table. ** here and henceforth denotes significance at a 5 percent p-value level, * denotes significance at a 10 percent p-value level.

The results demonstrate that Traditional Trade Theory and New Trade Theories can explain services sectors' agglomeration tendencies in the EU best. Some services' dummies are significant and point to unobserved services sectors' characteristics. Time fixed effects are significant from 1989 on. Since these effects are negative, indicating that concentration declined over time, one might think that this lends support to Krugman's theory about the importance of trade costs. Sectors will deagglomerate again when a stage of low level transport costs is reached. However, since intermediate goods intensity is insignificant, New Economic Geography does not seem to have any explanatory power.

A one percent increase in scale intensity increases services sectors concentration by about 0.20 percent. A one percent increase in factor intensity leads to an increase in agglomeration by about 0.02 percent.

| Dependent variable <i>ln(gini_services)</i> | Pooled OLS | | Pooled OLS | | Pooled OLS | | Pooled OLS |
|---|------------|--|------------|------|------------|----------------|------------|
| constant | -2.2491** | HEALTH AND SOCIAL WORK | 0.7125** | 1983 | -0.0476 | 1997 | -0.2091** |
| ln(fact) | 0.0187** | OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | 0.1126* | 1984 | -0.0466 | 1998 | -0.2122** |
| ln(scale) | -0.2045** | 1971 | -0.0063 | 1985 | -0.0417 | 1999 | -0.2155** |
| ln(intermediate) | -0.1486 | 1972 | -0.0039 | 1986 | -0.0382 | 2000 | -0.2123** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | 0.2699** | 1973 | -0.0072 | 1987 | -0.0377 | 2001 | -0.2077** |
| Retail trade, except of motor vehicles and motorcycles, repair of household goods | 0.1276* | 1974 | -0.0047 | 1988 | -0.064 | 2002 | -0.2195** |
| HOTELS AND RESTAURANTS | 0.7223** | 1975 | 0.0007 | 1989 | -0.0872* | 2003 | -0.2199** |
| Transport and Storage | -0.0147 | 1976 | -0.0212 | 1990 | -0.0917* | 2004 | -0.2104** |
| POST AND TELECOMMUNICATIONS | -0.0864 | 1977 | -0.0296 | 1991 | -0.1046** | 2005 | -0.2185** |
| Financial intermediation | 0.0026 | 1978 | -0.0378 | 1992 | -0.1224** | N | 468 |
| Real estate activities | 0.648** | 1979 | -0.0457 | 1993 | -0.1464** | R ² | 0.892 |
| Renting of machinery and equipment and other business activities | 0.7906** | 1980 | -0.0441 | 1994 | -0.1648** | F-Stat | 68.843 |
| PUBLIC ADMIN AND DEFENCE, COMPULSORY SOCIAL SECURITY | 0.469** | 1981 | -0.0428 | 1995 | -0.1798** | | |
| EDUCATION | 0.1757** | 1982 | -0.0518 | 1996 | -0.2041** | | |

Table 3: Regression Results Services sectors' concentration

Running a regression on a time series aggregated over all services sectors delivers the following results: As we can see variables neither have explanatory power nor

| Dependent variable ln (gini_services) | const | ln(fact) | ln(scale) | ln(intermed) | N | R ² | F-Stat | DW |
|--|-----------|----------|-----------|--------------|----|----------------|--------|-------|
| | -3.4353** | -0.1926 | 0.7341** | 0.5431 | 36 | 0.902 | 98.398 | 0.311 |

Table 4: Regression Results aggregated services sectors

show up the expected sign. The Durbin Watson statistic points to the potential underlying problem that biases the results: variables might be non-stationary. This problem will be adequately addressed in the following subchapter.

3.4 Taking a look at the interaction between industrial and services sectors' agglomeration

This section will investigate interdependencies between services and industries sectors' agglomeration in the EU. The idea behind is that agglomeration of certain

industries might have an influence on agglomeration or clustering of services activities, as well. To address this issue services sectors' agglomeration will be regressed on a set of variables comprising agglomeration of various industries sectors. One has to be careful in choosing adequate regression methods. Regression results for aggregated services sectors pointed towards a serious problem: non-stationarity of variables will deliver spurious regression results. Therefore, in a first step variables were checked for non-stationarity using an Augmented Dickey Fuller test with trend and intercept estimation. In a next step cointegration of variables was being tested for. If applicable an error correction model was being set up, otherwise variables (that are integrated of the same order) were differenced and regressed on each other. The results are given in the following two tables. Dependent variable is services sectors' agglomeration, independent variables are industrial sectors' agglomeration and the variables *fact*, *scale* and *intermediate*. Coefficients in white boxes emerged from error correction modeling. Coefficients in grey boxes resulted from difference regression. In that case variables integrated of the same order were not cointegrated. Empty boxes signal that variables were not integrated of the same order.

| Agglomeration (log gini) | Fabricated Metals | Basic Metals | Non-metallic mineral products | Food, beverage s, tobacco | Textiles, textiles products | Leather and footwear | Wood, wood product ,furniture | Pulp, paper, paper products | Printing and publishing | Coke, refined petroleum, nuclear fuel | Rubber, plastics, plastics products |
|---|-------------------|--------------|-------------------------------|---------------------------|-----------------------------|----------------------|-------------------------------|-----------------------------|-------------------------|---------------------------------------|-------------------------------------|
| Agglomeration (log gini) | | | | | | | | | | | |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | 0.0524 | 0.21 | -0.2718 | -0.0703 | -0.2784 | -0.1906 | | 0.0576 | -0.1575 | 0.0199 | 0.1585 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | | | | | | | | | | | |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | 0.0056 | -0.132 | -0.123 | -0.4303 | 0.8262* | 0.4441 | | 0.0866 | -0.074 | -0.2073 | -0.1011 |
| HOTELS AND RESTAURANTS | -0.0016 | 0.1108 | 0.11 | 0.0428 | 0.2191 | 0.2961 | | 0.1931* | -0.3796** | -0.0982 | -0.0881 |
| TRANSPORT AND STORAGE | 0.7374** | 0.1603 | -0.1339 | 0.6659* | 0.673 | 0.7 | | 0.9115** | -0.3551 | -0.2613 | -0.5315** |
| POST AND TELECOMMUNICATIONS | | | | | | | | | | | |
| FINANCIAL INTERMEDIATION* | | | | | | | | | | | |
| Real estate activities | -0.1172 | 0.1292 | -0.0349 | 0.328* | -0.2648 | -0.21 | | 0.1459 | -0.3897** | -0.2034* | 0.1706 |
| Renting of m&eq and other business activities | | | | | | | | | | | |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | | | | | | | | | | | |
| EDUCATION | -0.2331** | 0.0793 | 0.1191 | -0.2022 | -0.0276 | 0.2929 | | 0.0841 | -0.0743 | 0.1093 | -0.0005 |
| HEALTH AND SOCIAL WORK | | | | | | | | | | | |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | -0.338* | -0.0711 | -0.0962 | 0.5129 | -0.3763 | -0.828* | | -0.2645 | 0.014 | -0.0022 | 0.3142 |

Table 5: Interaction effects between services and industries sectors' agglomeration

| | Machinery equipment | Manufacturing, nec recycling | Chemical Industry | Electrical Machinery apparatus | Radio, TV, communication equipment | Medical precision and optical instruments | Office, accounting, computing machines | Motor vehicles, trailers, semitrailers | Other transport equipment |
|---|------------------------|---------------------------------|----------------------|--------------------------------------|--|--|---|---|---------------------------------|
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | -0.0584 | -0.1395 | -0.0318 | 0.0588 | | 0.0179 | 0.2996 | -0.0715 | 0.1679 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | | | | | | | | | |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | -0.4834 | -0.1726 | 0.2353 | 0.032 | | -0.0646 | 0.1641 | -0.1289 | 0.2429 |
| HOTELS AND RESTAURANTS | 0.35* | 0.034 | 0.0644 | 0.3272* | | 0.2473 | 0.008 | -0.3529** | 0.028 |
| TRANSPORT AND STORAGE | 0.9248** | -0.1895 | 0.6398** | 0.0176 | | -0.0987 | 0.1932 | 0.2338 | 0.4575** |
| POST AND TELECOMMUNICATIONS | | | | | | | | | |
| FINANCIAL INTERMEDIATION* | | | | | | | | | |
| Real estate activities | 0.3202 | 0.1014 | -0.1149 | 0.169 | | 0.0599 | 0.0079 | 0.1864 | 0.1837 |
| Renting of m&eq and other business activities | | | | | | | | | |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | | | | | | | | | |
| EDUCATION | -0.0848 | -0.0536 | -0.0528 | 0.3698** | | 0.0666 | -0.1026 | -0.4242** | -0.0201 |
| HEALTH AND SOCIAL WORK | | | | | | | | | |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | -0.0511 | 0.4505** | -0.1786 | 0.4181 | | 0.2567 | 0.0062 | 1.1141** | -0.1209 |

Table 6: Interaction effects between services and industries sectors' agglomeration (continued)

As we can see there are several linkages between services and industries sectors' agglomeration in the EU. The results differ enormously from using a simple OLS procedure, only (OLS results can be found in tables 7 and 8 in the appendix). One of the most important and interesting results perhaps is that agglomeration in textiles industries led to an increase in agglomeration in retail trade over the years between 1970 and 2005 in the EU. Thus, a one percent increase in agglomeration in textiles industries led to a 0.83 percent increase in agglomeration in retail trade. Obviously, the tendency for retail trade to cluster in special regions depends in part on textiles industries' clustering.

Agglomeration in transport and storage activities was positively influenced by agglomeration in the industries of fabricated metals, food, beverages and tobacco, pulp and paper products, machinery equipment, chemical industry and other transport equipment. This kind of dependency is not very surprising. Storage (transport) services do good in clustering in regions where storage (transport) activities are highly needed for and this is especially the case for industries producing material goods such as food, metals, paper, chemicals or transport equipment. Agglomeration in rubber and plastics, however, led to deagglomeration tendencies in transport and

storage activities. The negative influence of plastics industries is surprising and one question for further research.

Regression results further indicate that agglomeration in hotels and restaurants is positively influenced by agglomeration in machinery equipment, electrical machinery apparatus and pulp and paper. It is negatively influenced by agglomeration in printing and publishing and motor vehicles. These tendencies are quite surprising and deserve further research.

Concentration in real estate activities is positively influenced by concentration in food industries and negatively by concentrated printing and publishing and coke, refined petroleum and nuclear fuel. Since the food industry is highly dependent on having land and further facilities for growing crops, vegetables, etc., clustering of real estate activities in regions where food industries agglomerate might be quite understandable. The negative influences should be further investigated in future research.

Valid results on agglomeration in services in education and community, social and personal services might only be hard to establish. This is because European countries' governments still have influential power in these sectors in their own hand. The results I get here for education and social services can thus not be interpreted adequately.

4 Conclusion

Services sectors' agglomeration in the European Union decreased continuously over time. New Economic Geography does not show any explanatory power for agglomeration of services sectors. It is rather Traditional and New Trade Theories that are able to explain this process. Several interesting interdependencies between services and industries sectors' agglomeration exist. Agglomeration in textiles industries positively influenced agglomeration in retail trade over the years between 1970 and 2005 in the EU. Agglomeration in transport and storage activities was positively influenced by agglomeration in the industries of fabricated metals, food, beverages and tobacco, pulp and paper products, machinery equipment, chemical industry and other transport equipment. Concentration in real estate activities on the other hand is positively influenced by concentration in food industries. Non-stationarity of variables has to be considered and adequate remedies have to be found in order to get valid regression results.

Further research following up this study will concentrate on investigating the effects of countries' specialization in services sectors in the European Union. In addition, services and industries sectors' location should be investigated on a more disaggregated level of regions for the EU.

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Appendix

Table 7

| Agglomeration (log gini) | Fabricated Metals | Basic Metals | Non-metallic mineral products | Food, beverages, tobacco | Textiles, textiles products | Leather and footwear | Wood, wood products, furniture | Pulp, paper, paper products | Printing and publishing | Coke, refined petroleum, nuclear fuel | Rubber, plastics, plastics products |
|---|-------------------|--------------|-------------------------------|--------------------------|-----------------------------|----------------------|--------------------------------|-----------------------------|-------------------------|---------------------------------------|-------------------------------------|
| Agglomeration (log gini) | | | | | | | | | | | |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | 0.72** | 0.767** | -0.358 | 0.984** | 0.57* | 0.022 | 0.609** | 1.072** | -0.361 | -0.4** | 0.557 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | 0.457** | 0.296** | 0.402** | -0.995** | -0.296** | -0.345** | -0.388** | -0.725** | 0.741** | 0.528** | -0.425 |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | 0.916** | 0.047 | -0.654** | 0.084 | 1.277** | 1.25** | 1.305** | 0.248 | 0.506 | -0.091 | 0.057 |
| HOTELS AND RESTAURANTS | 0.236** | 0.149** | -0.091* | 0.292** | -0.071 | -0.09 | -0.008 | 0.239** | -0.28** | -0.118** | 0.104 |
| TRANSPORT AND STORAGE | 1.275** | -0.243 | -0.758** | 1.255** | 1.102** | 1.637** | 1.053** | 1.517** | -1.168** | -0.682** | 0.257 |
| POST AND TELECOMMUNICATIONS | -0.038 | 0.471** | 0.754** | 0.193 | -0.445** | -0.579** | -0.473** | 0.291 | -0.099 | 0.039 | -0.37 |
| FINANCIAL INTERMEDIATION* | 0.019 | 1.07** | 1.97** | -1.516** | -1.501** | -1.683** | -1.89** | -1.385** | -0.54 | 0.791** | -3.15** |
| Real estate activities | 0.238 | 0.337** | -0.33** | 0.987** | -0.243** | -0.308** | -0.278** | 0.62** | -0.631** | -0.476** | 0.908** |
| Renting of m&eq and other business activities | 1.683** | 0.972** | -1.482** | 1.846** | -0.84** | -0.977** | -1.267** | 1.886** | -2.149** | -0.755** | 1.687 |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | 0.465** | 0.186** | 0.324** | -0.293 | -0.301** | -0.326** | -0.18 | -0.393* | -0.572** | 0.103 | -0.861** |
| EDUCATION | -0.073 | 0.256** | -0.05 | -0.068 | -0.139** | -0.181** | -0.209** | 0.212* | 0.121 | 0.168* | 0.338** |
| HEALTH AND SOCIAL WORK | 0.429** | 0.195** | -0.235** | 0.689** | -0.075 | -0.14** | -0.077 | 0.566** | -0.317* | -0.227** | 0.598** |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | 0.213 | 0.312** | -0.068 | 0.779* | -0.263** | -0.323** | -0.392** | 0.263 | -0.062 | 0.323 | 0.532 |

This table shows OLS estimates resulting from a regression of services sectors' agglomeration on industrial sectors' agglomeration and further explanatory variables. Only coefficients of industrial agglomeration are shown here. ** here and henceforth denotes significance at a 5 percent p-value level, * denotes significance at a 10 percent p-value level.

Table 7 (continued)

| | Machinery equipment | Manufacturing, nec recycling | Chemical Industry | Electrical Machinery apparatus | Radio, TV, communication equipment | Medical precision and optical instruments | Office, accounting, computing machines | Motor vehicles, trailers, semitrailers | Other transport equipment |
|--|------------------------|---------------------------------|----------------------|--------------------------------------|--|--|---|---|---------------------------------|
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | -0.196 | 0.038 | 1.075** | -0.067 | -0.056 | 1.367** | 0.32 | 0.086 | 0.545** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | -0.727** | 0.279 | -0.636** | -0.263 | -0.016 | -0.753** | 0.301** | -0.4** | -0.039 |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | -1.699** | -0.317 | 1.716** | -1.355** | 0.504** | 1.457* | 0.627** | 0.309 | 0.726** |
| HOTELS AND RESTAURANTS | 0.185 | -0.114 | 0.153 | 0.243 | -0.052 | 0.237 | 0.092 | -0.2** | 0.164** |
| TRANSPORT AND STORAGE | 0.08 | -1.029** | 1.361** | -0.706 | -0.071 | 1.707** | 0.315 | 0.178 | 1.12** |
| POST AND TELECOMMUNICATIONS | 0.582* | 1.003** | -0.679** | 1.312** | -0.673** | -0.545 | -0.168 | -0.35* | 0.071 |
| FINANCIAL INTERMEDIATION* | 1.226* | 1.79** | -2.414** | 2.449** | -0.322 | -4.245** | 0.799* | -1.483** | -0.649 |
| Real estate activities | 0.855** | -0.241* | -0.277 | 0.58* | -0.253** | 0.16 | -0.173 | -0.312** | 0.469** |
| Renting of m&eq and other business activities | -0.856 | -1.8** | -2.146** | -1.883* | -0.821** | -1.003 | 1.776** | -1.009** | 1.601** |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | 0.218 | 0.424** | -0.4** | 0.131 | 0.329** | -1.1** | 0.514** | -0.264* | 0.742** |
| EDUCATION | -0.128 | -0.227** | -0.212* | 0.267 | -0.198** | 0.297 | -0.19* | -0.216** | -0.167 |
| HEALTH AND SOCIAL WORK | -0.144 | -0.052 | 0.049 | -0.011 | -0.047 | 0.396* | 0.117 | -0.09 | 0.438** |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | -0.554 | 0.282 | -0.973** | 0.211 | 0.151 | -0.741 | 0.364** | -0.188* | 0.471** |

Table 8

| Agglomeration (log gini) | | Fabricated Metals | Basic Metals | Non-metallic mineral products | Food, beverages, tobacco | Textiles, textiles products | Leather and footwear |
|---|---|---|---|--|---|--|--|
| Agglomeration (log gini) | | | | | | | |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | Scale:1.705** Interm:4.006** | Scale:1.581** Interm:4.702** | Scale:2.084** Interm:6.564** | Scale:1.169** Interm:3.224** | Scale:1.14** Interm:3.329** Fact:0.039** | Scale:1.904** Interm:2.15* | Scale:1.711** Interm:3.947** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | Interm:2.465** | Scale:-0.283** Interm:-2.778** Fact:0.024** | Scale:-0.183* Interm:-1.924** | Interm:-1.907** | Scale:0.349** Interm:-1.65** | Scale:-0.32** Interm:-1.438** | Scale:-0.327** Interm:-1.719** |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | Fact:0.042** Scale:-1.073** Interm:-2.213** | Fact:0.049** Scale:-1.739** Interm:-2.644** | Fact:0.044** Scale:-1.148** Interm:-2.331** | Scale:-1.226** | Fact:0.041** Scale:-1.079** Interm:-2.119** | Scale:1.672** | |
| HOTELS AND RESTAURANTS | Scale:-0.851** Interm:-0.353** | Scale:-0.445** Interm:-0.659** | Scale:-0.629** Interm:-0.956** | Interm:-0.486** | Scale:-1.075** Interm:-0.723** | Scale:-0.821** Interm:-0.86** | Scale:-0.796** Interm:-0.862** |
| TRANSPORT AND STORAGE | | Scale:-0.822** Interm:-5.535** | | | Fact:0.051* | Scale:1.341** | Scale:1.761** |
| POST AND TELECOMMUNICATIONS | Fact:-0.06** | Fact:-0.06** | Fact:-0.048** Scale:-0.424** Interm:-0.689* | | Fact:-0.067** | Fact:-0.047* Scale:-0.579** Interm:-0.864* | Fact:-0.054** Scale:-0.673** Interm:-1.084** |
| FINANCIAL INTERMEDIATION* | | | | Scale:0.701** | | Fact:-0.072** Scale:-1.877** Interm:-1.931** | Fact:-0.098** Scale:-1.771** Interm:-2.236** |
| Real estate activities | Fact:3.338** Interm:1.344** | Fact:2.784** Interm:1.43** | Fact:2.751** Interm:1.283** | Fact:2.407** Interm:1.06** | Fact:1.955** Scale:-0.158** | Fact:2.651** Scale:0.298** Interm:1.096** | Fact:2.511** Scale:0.274** Interm:1.133** |
| Renting of m&eq and other business activities | Fact:-0.085** Interm:-12.372** | Interm:-6.128** | Fact:-0.086** Interm:-8.023** | | Interm:-5.919* | Fact:-0.032** Scale:-1.547** Interm:-4.406** | Fact:-0.035** Scale:-1.184** Interm:-4.821** |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | Fact:0.561** | Fact:0.909** Interm:1.43** | Fact:0.663** | Fact:0.45** Scale:0.484** | Fact:0.494** | Fact:0.587** Scale:-0.492* | Fact:0.656** |
| EDUCATION | Fact:-0.571** Scale:1.019** Interm:-0.533** | Fact:-0.647** Scale:1.034** Interm:-0.475* | Fact:-0.55** Interm:-1.198** | Fact:-0.502** Scale:0.979** Interm:-0.447* | Fact:-0.618** Scale:1.075** Interm:-0.596** | Fact:-0.391** Interm:-0.682** | Fact:-0.406** Interm:-0.754** |
| HEALTH AND SOCIAL WORK | Fact:-0.459** Scale:1.307** | Scale:0.906** | Scale:0.919** | Fact:-0.406** Scale:0.717** | Fact:-0.271** Scale:0.468** Interm:0.836* | Scale:0.924** | Scale:0.763** |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | Scale:1.339** Interm:-1.763* | Scale:0.906** | Scale:1.348** | Scale:1.379** | Fact:0.026** Scale:1.457** | | Scale:0.963* |

This table shows further explanatory variables' estimates gained by OLS regressing services sectors' agglomeration on industrial sectors' agglomeration and other explanatory variables.

Table 8 (continued)

| | Wood, wood product, furniture | Pulp, paper, paper products | Printing and publishing | Coke, refined petroleum, nuclear fuel | Rubber, plastics, plastics products | Machinery equipment | Manufacturing, nec recycling |
|---|-------------------------------|--|--|---|---|---|---|
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | | Scale:0.871** Interm:3.736** Fact:0.055** | Scale:1.652** Interm:4.062** | Scale:1.259** Interm:3.29** Fact:0.036* | Scale:1.48** Interm:3.703** | Scale:1.715** Interm:4.023** | Scale:1.735** Interm:4.027** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | | Scale:0.492** Interm:-1.793** | Interm:-2.155** | Scale:0.357** Interm:-1.141** Fact:0.014* | Interm:-2.302** | Interm:-2.934** | Interm:-2.22** |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | | Fact:0.037* Scale:-1.2** Interm:-1.914* | Fact:0.045** Scale:-1.081** Interm:-2.7** | Fact:0.038* Scale:-1.049** | Fact:0.042** Scale:-1.078** Interm:-2.183** | Fact:0.041** Scale:-1.487** Interm:-3.602** | Fact:0.036* Scale:-1.096** |
| HOTELS AND RESTAURANTS | | Fact:-0.008** Scale:-0.928** Interm:-0.922** | Scale:-0.902** Interm:-0.658** | Fact:-0.007* Scale:-0.955** Interm:-0.496** | Scale:-0.902** Interm:-0.437** | Scale:-1.035** Interm:-0.478** | Fact:-0.009* Scale:-0.829** Interm:-0.507** |
| TRANSPORT AND STORAGE | | Scale:-0.261** | Fact:0.072** | | | | |
| POST AND TELECOMMUNICATIONS | | Fact:-0.068** | Fact:-0.06** | Fact:-0.058* | Fact:-0.053* | Fact:-0.049* | Fact:-0.067** |
| FINANCIAL INTERMEDIATION* | | | | | Interm:-3.391* | | |
| Real estate activities | | Fact:1.609** | Fact:2.855** Interm:0.793** | Fact:2.035** Scale:-0.249** | Fact:2.753** Interm:0.59* | Fact:3.759** Interm:0.698** | Fact:2.797** Interm:1.121** |
| Renting of m&eq and other business activities | | Scale:0.982* | Fact:-0.061* Interm:-9.222** | Interm:-8.474** | Fact:-0.072* Interm:-7.408* | Fact:-0.086** Interm:-12.345** | |
| PUBLIC ADMIN AND DEFENCE, COMPULSORY SOCIAL SECURITY | | Fact:0.369** Scale:0.556** | Fact:0.643** | Fact:0.508** | Fact:0.539** Scale:0.525** Interm:1.185* | Fact:0.501** | Fact:0.465** Scale:0.405** |
| EDUCATION | | Scale:0.807** | Fact:-0.681** Scale:1.04** Interm:-0.626** | Fact:-0.945** Scale:1.028** Interm:-1.014** | Fact:-0.488** Scale:0.843** Interm:-0.391* | Fact:-0.605** Scale:1.062** Interm:-0.637** | Scale:1.123** |
| HEALTH AND SOCIAL WORK | | | Scale:1.112** Interm:1.202* | Fact:-0.344** Scale:0.875** | Fact:-0.569** Scale:0.72** | Fact:-0.497** Scale:1.329** | Fact:-0.421** Scale:1.2** |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | | Scale:1.469** | Scale:1.328** | Scale:1.174* Interm:-3.41* | Scale:1.544** | Scale:1.751** Interm:-1.741* | Fact:0.023* Scale:1.247** Interm:-3.093** |

Table 8 (continued)

| | Chemical Industry | Electrical Machinery apparatus | Radio, TV, communication equipment | Medical precision and optical instruments | Office, accounting, computing machines | Motor vehicles, trailers, semitrailers | Other transport equipment |
|---|---|---|------------------------------------|--|---|---|---|
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | Scale:1.407** Interm:2.268** | Scale:1.69** Interm:3.983** | | Scale:1.353** Interm:3.223** | Scale:1.787** Interm:4.454** | Scale:1.716** Interm:3.759** | Scale:1.356** Interm:4.027** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | Interm:-1.237* | Interm:-2.576** | | Interm:-1.975** | Interm:-2.551** | Scale:-0.364** Interm:-1.653** | Interm:-2.403** |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | | Fact:0.038** Scale:-1.131** Interm:-1.992** | | Scale:-0.909** | Fact:0.053** Scale:-1.494** Interm:-3.035** | Fact:0.035* Interm:-1.887* | Scale:-1.724** Interm:-2.328** |
| HOTELS AND RESTAURANTS | Scale:-0.857** | Scale:-1.017** Interm:-0.462** | | Scale:-0.863** Interm:-0.362** | Scale:-0.665** Interm:-0.426** | Scale:-0.581** Interm:-1.336** | Scale:-0.729** Interm:-0.693** |
| TRANSPORT AND STORAGE | Scale:0.458** | | | | | | Fact:0.051* Scale:-0.617** Interm:-3.265** |
| POST AND TELECOMMUNICATIONS | | | | Fact:-0.058** | Fact:-0.059** | | Fact:-0.064* |
| FINANCIAL INTERMEDIATION* | Scale:-0.662** | | | Scale:-0.817* Interm:-2.91** | | Scale:-1.424** | |
| Real estate activities | Fact:3.379** Interm:1.342** | Fact:3.707** Interm:1.132** | | Fact:3.27** Interm:1.237** | Fact:3.528** Interm:1.16** | Fact:2.468** Scale:0.273* Interm:1.191** | Fact:1.932** Interm:1.086** |
| Renting of m&eq and other business activities | Fact:-0.079** Scale:-2.255** Interm:-9.53** | Interm:-10.858** | | Fact:-0.085** Interm:-13.9** | Interm:-12.568** | Fact:-0.054** Scale:-0.869** Interm:-4.31** | Interm:-4.294** |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | Fact:0.447** | Fact:0.534** | | Fact:0.408** | Fact:0.84** Scale:0.269** Interm:1.373** | Fact:0.652** | Fact:1.15** Scale:-0.346* |
| EDUCATION | Fact:-0.605** Scale:0.679** Interm:-0.683** | Fact:-0.67** Scale:0.92** Interm:-0.578** | | Fact:-0.454** Scale:1.132** Interm:-0.409* | Fact:-0.584** Scale:1.081** | Scale:0.572** Interm:-0.73** | Fact:-0.746** Scale:1.243** Interm:-0.541** |
| HEALTH AND SOCIAL WORK | Fact:-0.476** Scale:1.362** | Fact:-0.458** Scale:1.306** | | Fact:-0.48** Scale:1.227** | Fact:-0.369* Scale:1.287** | Scale:0.984** | Scale:0.534** |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | | Scale:1.286** Interm:-1.87* | | Interm:-2.634** | Scale:1.373** | Scale:1.252** | Scale:1.535** |

Table 9

| Agglomeration (log gini) | | Fabricated Metals | Basic Metals | Non-metallic mineral products | Food, beverages, tobacco | Textiles, textiles products | Leather and footwear |
|---|----------------------------------|--|-----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| Agglomeration (log gini) | | | | | | | |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | Fact:0.021* Scale:1.498** | Interm:1.354* Scale:1.418** Resid:-0.352** | Fact:0.021* Scale:1.585** | Scale:1.409** | Fact:0.021* Scale:1.513** | Scale:1.532** | Fact:0.02* Scale:1.547** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | | | | | | | |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | Scale:0.808* | | Scale:0.827* | Scale:0.816* | Scale:0.78* | | Scale:0.775* |
| HOTELS AND RESTAURANTS | Resid:-0.66** | Resid:-0.803** | Resid:-0.642** | Resid:-0.721** | Resid:-1.081** Laggini:0.484** | Resid:-0.677** | Resid:-0.665** |
| TRANSPORT AND STORAGE | Resid:-0.203* Laggini:0.346** | | Laggini:0.367** | Resid:-0.391** Laggini:0.389** | Resid:-0.428** Laggini:0.445** | Resid:-0.334* Laggini:0.398** | Resid:-0.309* Laggini:0.418** |
| POST AND TELECOMMUNICATIONS | | | | | | | |
| FINANCIAL INTERMEDIATION* | | | | | | | |
| Real estate activities | | | | | Resid:-0.74** Laggini:0.417** | | |
| Renting of m&eq and other business activities | | | | | | | |
| PUBLIC ADMIN AND DEFENCE, COMPULSORY SOCIAL SECURITY | | | | | | | |
| EDUCATION | | | | | | | |
| HEALTH AND SOCIAL WORK | | | | | | | |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | | | Resid:-0.291** Laggini:0.481** | | | | |

This table shows further explanatory variables' results emerging from error correction modeling (dark colored boxes) and first difference regressions. Dependent variables are services sectors' agglomeration, independent variables are industrial sectors' agglomeration and further explanatory variables.

Table 9 (continued)

| | Wood, wood product, furniture | Pulp, paper, paper products | Printing and publishing | Coke, refined petroleum, nuclear fuel | Rubber, plastics, plastics products | Machinery equipment | Manufacturing, nec recycling |
|---|-------------------------------|---|-----------------------------------|---------------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | | Fact:0.022* Scale:1.491** | Fact:0.021* Scale:1.547** | Fact:0.021* Scale:1.497** | Fact:0.021* Scale:1.459** | Fact:0.021* Scale:1.496** | Fact:0.022* Scale:1.507** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | | | | | | | |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | | Scale:0.812* | Scale:0.848* | Scale:0.924* | Scale:0.845* | | Scale:0.871* |
| HOTELS AND RESTAURANTS | | Resid:-1.221** Interm:-0.937* Laggini:0.433** | Resid:-0.849** | Laggini:0.329* Resid:-0.847** | Resid:-0.656** | Resid:-0.746** | Resid:-0.704** |
| TRANSPORT AND STORAGE | | Resid:-0.626** | Resid:-0.259* | Resid:-0.481** Laggini:0.474* | Resid:-0.229** | Resid:-0.249** Laggini:0.266* | Resid:-0.397** Laggini:0.387** |
| POST AND TELECOMMUNICATIONS | | | | | | | |
| FINANCIAL INTERMEDIATION* | | | | | | | |
| Real estate activities | | Resid:-0.45** Laggini:0.504** | Resid:-0.385** Laggini:0.352** | Resid:-0.412** Laggini:0.317* | | Resid:-0.345** Laggini:0.353** | |
| Renting of m&eq and other business activities | | | | | | | |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | | | | | | | |
| EDUCATION | | | | | | | |
| HEALTH AND SOCIAL WORK | | | | | | | |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | | | | | | | |

Table 9 (continued)

| | Chemical Industry | Electrical Machinery apparatus | Radio, TV, communication equipment | Medical precision and optical instruments | Office, accounting, computing machines | Motor vehicles, trailers, semitrailers | Other transport equipment |
|---|----------------------------------|--------------------------------------|--|--|---|--|---------------------------------|
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel | Fact:0.021* Scale:1.509** | Fact:0.021* Scale:1.519** | | Fact:0.021* Scale:1.491** | Fact:0.02* Scale:1.662** | Fact:0.021* Scale:1.509** | Fact:0.022* Scale:1.531** |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles | | | | | | | |
| Retail trade, except of motor vehicles and motorcycles; repair of household goods | | Scale:0.814* | | Scale:0.826* | Scale:0.92* | Scale:0.804* | Scale:0.826* |
| HOTELS AND RESTAURANTS | Resid:-0.742** | Resid:-0.632** | | Resid:-0.76** Laggini:0.341* | Resid:-0.669** | Resid:-0.575** | Resid:-0.831** |
| TRANSPORT AND STORAGE | Resid:-0.486** Laggini:0.456* | Resid:-0.229** Laggini:0.354* | | Resid:-0.279** Laggini:0.43** | | Resid:-0.236* Laggini:0.373** | Resid:-0.294* |
| POST AND TELECOMMUNICATIONS | | | | | | | |
| FINANCIAL INTERMEDIATION* | | | | | | | |
| Real estate activities | | | | | | | Resid:-0.3** Laggini:0.345** |
| Renting of m&eq and other business activities | | | | | | | |
| PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY | | | | | | | |
| EDUCATION | | | | | | Scale:1.001** | |
| HEALTH AND SOCIAL WORK | | | | | | | |
| OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES | | | | | | Scale:-1.037** | |

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