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Regional Concentration of Financial Services in Finland during 1995–2000[1]

ABSTRACT

In this paper we analyzed the process of regional concentration of financial service production. For indicators of concentration we used specialization index and financial service production per capita in the region. Theoretical base of the study lies on new economic geography. Derived from the theory, we tested whether the intra-region trade effect measured by geographic area and the share of the potentially immobile labor force in the region affect on the concentration. Also the concentration towards existing centers was tested. We found that the region's area has negative effect both on the specialization and production. Increase in share of immobile labor affected positively on specialization and negatively on per capita production.

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1. INTRODUCTION

During the latter half of the 1990s Finnish banking experienced a substantial reduction in terms of the branch network. The number of branches decreased from more than 3000 in 1995 to approximately 1500 in 2001. This development is likely to have regional consequences that may vary significantly from one region to another.

In this paper, we analyze specialization and absolute concentration of regional financial service output in Finland.[2] Financial services include here banking, insurance and other financial services. We attempt to quantify regional effects by using the ideas developed recently in the new economic geography literature. For that purpose we estimate two simple sets of models where different agglomeration forces are used and their impact is analyzed. The hallmark of the theoretical models is that concentration of economic activity is encouraged via circular causality. Spatial concentration of activities, thus, itself creates an environment for further regional concentration (see Krugman 1991, Fujita, Krugman & Venables 1999).

Economic geography models are usually used to explain concentration and agglomeration of industrial production (e.g. Amiti 1998, Br¸lhart 1998, Forslid et al. 1999, Braunerhjelm et al. 2000). An often-heard argument is that deeper integration will cause industrial delocation to big centers leaving other regions empty. The driving forces behind this development are lower trade costs and scale economies. In financial services and banking, the recent development in information technology decreases costs of exporting these services from one region to another, which makes financial services markets more integrated. At the same time it may well lead to concentration of output in these services to certain regions.

If we assume that the production is apt to concentration there must be unexploited opportunities of economics of scale. There exists extensive literature on scale economies in banking and few studies in insurance markets. Typically in bank market studies the maximum size of the banks facing scale economies has been moderate or even surprisingly low, and after this size banks have been found to face either constant or increasing marginal costs. The possible U-shape of average cost curve has been flat, i.e. both economies and diseconomies of scale have not been modest (see e.g. Berger & Humphrey 1994, Altunbaş et al. 2001, Cavallo & Rossi 2001, Hughes et al. 2001). Also the insurance market studies have revealed economies of scale either for smaller firms (see e.g. Suret 1991) or universally (Segal 2002).

Since the economies of scale are according to most of the empirical studies present only for rather small firms, does this make the expectation of concentration of service production irrelevant? The answer is no. Even though the financial service providers can face diseconomies of scale at the corporate level, there is a strong possibility that same firms face econo-

2 For recent development in banking in Europe, see Danthine et al. (1999).

mies of scale at the branch level (see e.g. Benston 1965, Berger et al. 1987, Zardkoohi & Kolari 1994, Toivanen 1995, Berger et al. 1997). As previously noted, the U-shape of the cost curve is rather flat. Therefore costs of the diseconomies of scale are not so high that these cannot be covered with better service prices customers are willing to pay for better accessibility of the service. Therefore, as long as the location matters and customers are willing to pay for convenience of physical proximity, firms can sustain diseconomies of scale at the corporate level. Since the new methods to serve customers from distance reduce the importance of location, i.e. the convenience of branch proximity felt by customers, it could be assumed that financial institutions will shut down small branches and concentrate the activity on bigger ones. The scale economies at branch level can be then exploited more effectively and theoretically this drives regional concentration of production.

An important aspect in location of financial services output is the importance of distance. In recent studies the usual empirical finding is that the importance of distance has declined in banking but that it still a significant determinant behind location decisions in banking (see Vesala 2000, Hyytinen & Toivanen 2002). In this paper, we take this development as given and concentrate on other determinants behind concentration.

The paper is organized as follows. In section 2 we present recent development of Finnish financial services markets. In section 3 we describe theoretical background of our study and the dataset that is used. Section 4 gives the results of the empirical analysis and, finally, section 5 concludes.

2. RECENT DEVELOPMENTS IN FINANCIAL SERVICES

Remote access services (Internet-services, WAP-services, Phone-banking) have reduced the importance of location. However, the development has not been able to exclude the fact that financial services are basically regional. That is, even if moving, a customer does not necessarily e.g. switch to a new bank. It is highly unlikely that a customer in Helsinki with no customer relationship history moves his/her financial business to a bank in Turku. Among financial services banking is perhaps most connected to region.

The development of bank service accessibility in Finland looks adverse. However, the overall picture is not so dismal, since part of the trend in number of the branch availability trend can be explained with technological progress. Drastic development of remote access technology has decreased the need for physically visit the bank and therefore some of the branches has become redundant. In table 1, we present the development of ”total financial service network”. By total financial service network we mean the customers possibilities to execute financial transactions.

TABLE 1. Total financial service network

Year	Online Connections	Giro ATMs	Cash dispensing ATMs	Branches
1995	732000	2153	2421	2880
1996	855000	2363	2298	2427
1997	1249000	2482	2285	2159
1998	1493000	2458	2208	2096
1999	1872000	2434	2181	2015
2000	2431000	2418	2134	1550

Source: Finnish Bankers' Association.

In the development of branch office and ATM networks the impact of online connection development can be seen. The number of branches has decreased throughout the period of analysis. First, the ATM network expanded until 1993 (cash dispensing ATMs) and 1997 (giro ATMs). Especially in the case of giro ATMs the most important factor of the development is the increase of online connections, since for the private consumers online connection at home is a strong substitute for the giro ATMs. Decrease in number of the cash dispensing ATMs is most likely to be compensated by the payment and credit cards. Number of payment and credit cards increased during the period 32% being approximately 2,8 millions in 2000.

Table 2 shows substantial change in payment behavior during the last decade. In 1995, some 48% of the payments were made in branch office. This ratio was as low as 11,8% in 2000. The number of payments made via online connections increased 184% (12,3% p.a.) from 1991 to 2000. The number of payments made with giro ATMs increased 119% respectively with average yearly growth rate of 9%. It is important to remember that the number of online connections increased strongly during the period whilst the number of giro ATMs has moderately decreased from 1997. Hence, the bank charges have been an effective method in the payment behavior change – the bank charges have given the incentive for self-service in banking.

Table 2. Payment transmission (millions of payments)

Year	Online Payments	Giro ATM Payments	Payments in Branch Office	Total	Share of payments via data connection (%)
1995	304	144	163	611	73
1996	316	151	161	628	74
1997	350	158	143	651	78
1998	391	174	124	689	82
1999	423	202	113	738	85
2000	462	241	94	797	88

Source: Finnish Bankers' Association.

3. FINANCIAL SERVICE PRODUCTION CONCENTRATION

3.1 Theoretical background

The key result in theoretical literature of economic geography is that self-enforcing backward and forward linkages drive concentration. Trade costs and scale economies and the fact that firms and economic activities in general are linked via input-output matrices are the main ingredients of circular causality (see Krugman & Venables 1995). In our application, downstream (industrial) firms use the supply of upstream (financial) services like an intermediate output but more importantly the linkage works from downstream to upstream as well since the downstream firms form the base for the supply of financial services. This emphasizes the role of financial services as producer services (producer services and integration, see Ethier & Horn 1991).

Another element is labor mobility, which is partially linked with general concentration. When the regional distribution of output changes it boosts migration and this migration leads to expenditure shifting, which in turn may further increase relocation of firms (and financial services) towards centers. When labor mobility contributes to location of financial services it partially gives financial services a consumer services emphasis (for consumer services and integration, see Haaparanta & Heikkinen 1995).

When trade costs or costs of exporting financial services from one region to another are sufficiently low the agglomeration forces become weaker and at the same time there exist dispersion forces. In particular, the dispersion forces that are independent of integration may become dominant. Comparative advantage is an often-mentioned example. In this paper, we evaluate two such variables. We check whether there is concentration towards existing centers at regional level and whether these regional centers are able to appeal financial services or is concentration mainly taking place inter-regionally. Another factor that may work against concentration is a high percentage of agriculture and public services in a region, which may work as a brake for circular causality tendency as there exists an upper limit for labor mobility.

In the empirical model below, we proxy trade costs with the area of a region. In big regions it is, other things being given, more costly to serve all parts of the region whereas is small and compact regions it is less costly. Our region units are NUTS4[3] regions. As mentioned above, we assume a general decline in costs of exporting financial services from one

3 In Finland NUTS4 regions consist of some 5,3 municipalities. The NUTS4 regions are used in the geographical unit since this is the most accurate level in which the regional production data was available for us. NUTS4 is also the best regional unit available to reflect the area where labor force travels daily, i.e. reflecting in most accurately the economic region. For this use municipality would be far too small unit and respectively NUTS3 region (county) too big.

region to another. The area variable attempts to capture the intra-region trade cost. Low intra-region trade cost supports, ceteris paribus, concentration.

Our measure for linkages between upstream and downstream firms is region's share of production in other market industries. The higher the share the more potential demand there is for financial services. The intensity of labor mobility, on the other hand, is proxied by potential share of immobile labor. We count the percentage of workforce in agriculture and public services for this.

3.2 Data description

The data used in our analysis is a panel consisting of both economic and geographic variables and covering years 1995–2000. The observations units are NUTS4 regions (85 regions) and data is supplied by Statistics Finland. The variables used here are an index for specialization in financial services (FINSPE, region's share of financial service production divided by regions share of total market production), financial service production per capita (FINGRPPC, in thousands euros), region's geographic area (AREA, in square-km's), share of immobile labor (IMMOBLS, share of labor working in agrarian industry and for non-market industries), and region's share of production in other market industries (MGFIN). A dummy-variable indicating the existing center of the NUTS3 area is also included (CENTER). Descriptive statistics for the pooled sample are presented in table 4 and yearly descriptive statistics can be found in appendix 1.

During the period of analysis there has been no clear trend in either specialization of financial service production or in per capita production.[4] Instead, the share of labor in immobile industries has decreased due to job creation in market industries.

Appendix 2 presents scatter plots of specialization and per capita production. It gives regional observations on the main explaining variables in theoretical model presented above.

TABLE 3. Descriptive statistics of pooled sample, N=510.

	Mean	Std.Dev.	Minimum	Maximum
FINSPE	0.856036	0.333528	0.25851	2.28592
FINGRPPC	628.697	309.266	271.481	3158.61
MGFIN	0.0117647	0.0337323	0.000232853	0.323587
AREA	3978.17	5136.58	517.87	35108.6
IMMOBLS	0.462756	0.105873	0.262934	0.696533
CENTER	0.235294	0.424599	0	1

4 However, in year 2000 per capita production of financial services is significantly higher than the average.

The figures in appendix 2 show that specialization is increasing with immobile labour. Area and MGFIN do not show as clear effects. There are two distinct regions in the data, namely Helsinki and Maarianhamina. Generally, it seems that there is weak decrease of per capita output in financial services as area or share of immobile labor increases. Regions share of other market production has positive effect on per capita production of financial services even when the distinct regions are excluded.

4. EMPIRICAL ANALYSIS AND RESULTS

In this section, we analyze econometrically agglomeration and regional specialization of financial service production. The basis of analysis lies on theory presented above. According to this the financial service production should locate where 1) the demand is, i.e. the regions with either high percentage of private market industry excluding financial services 2) where transportation costs are lower, i.e. the area of the region is small and 3) where the population is immobile, i.e. regions with high percentage of public services and agriculture.

4.1 On estimations

First, we estimate for both the financial specialization and per capita financial services output three model specifications. These models contain only the mobility and transportation cost indicators. In the second set of models, we add our demand indicator, MGFIN, into the first set of models and, finally, the fourth specification contains also a dummy variable CENTER (for the definition see above). Functions are linear and independent variables in the models are

(1) CONSTANT, AREA, IMMOBLS
(2) CONSTANT, AREA, IMMOBLS, MGFIN
(3) CONSTANT, AREA, IMMOBLS, MGFIN, CENTER

Functions are estimated with one way random effects model (RE) and random coefficients model (RCM). Also OLS-estimations are reported. We use random effects model instead of fixed effects model since we have two time-invariant variables, AREA and CENTER, in our models. However, a well-known problem with random effects model is the possible correlation of independent variables with observation unit specific error term. One solution for this problem is the model presented by Hausman and Taylor (1981)[5] where variables that are correlated with error term can be defined. However, it is difficult to define *a priori* which varia-

5 For text-book presentation of this model, see e.g. Baltagi (2001).

bles are possibly correlated with the error term. Also, the estimation of Hausman-Taylor model has identification constraints, i.e. number of possibly correlated time-invariant variables cannot exceed the number of uncorrelated time-variant variables.

The possible correlation between the independent variables and the observation unit specific error terms can easily create a situation where the error terms contain the concentration effects that we are trying to find. This unpleasant feature is difficult to avoid. In addition to the causes of concentration we are interested whether the dynamics of concentration changes over the time. For this purpose, we estimate a random coefficient model (RCM) (see e.g. Hsiao 1986 or Greene 2001) where we use time periods as a grouping variable. The models can be written in RCM context as

$$y_t = X_t\beta_t + \varepsilon_t,$$

where $\beta_t = \beta + v_t$. Then β_t is a random coefficient applied to the certain yearly cross-section and n_t is the outcome of the random process and b the mean coefficient vector. For specialization a random process can be generated using the decline in importance of the location and, for per capita production, simply using economic growth. Basically we estimate group of functions and test whether the parameter estimates are same for all of them. In general RCM-estimates are closer to OLS-estimates than RE-estimates since average estimates presented in following tables are variance weighted OLS-coefficients.

4.2. Results and discussion

The results here are presented such that at first we report the estimation results of RE-model. After that we shortly compare RE estimation results to OLS and RCM ones and shortly discuss possible econometric problems.

The estimates in tables I and II demonstrate that the variable indicating intra-region transportation costs (AREA) is insignificant both for specialization and for production per capita. Immobility is significant factor and increases specialization, but decreases per capita production (market production is lower in those areas). Economic importance of the region, measured by regions share of market production, increases concentration but has no affect of specialization. The "center" status of region is insignificant factor for both dependent variables.

The coefficients in tables I and II have all expected signs. The insignificance of distance variable suggests that both relative specialization in financial services and output per head in financial services are not negatively affected in regions with long distances. Relatively high share of immobile labor and region's high share in market production are opposite forces in the sense that they are partially exclusive. The former works like a brake and a dispersion force and the latter as an agglomeration force. Together these imply that it is likely that finan-

TABLE I. Specialization estimations with whole sample (Nobs. = 510).

	Model 1			Model 2			Model 3		
	OLS	RE	RCM	OLS	RE	RCM	OLS	RE	RCM
CONSTANT	0.180959**	0.628473**	0.166162**	–0.05345	0.555122**	–0.0803**	–0.12507	0.55799**	–0.15696**
	(0.059564)	(0.089595)	(0.041813)	(0.060632)	(0.091585)	(0.018242)	(0.065466)	(0.095317)	(0.036754)
AREA	–8.94E-06**	–2.12E-06	–9.02E-06**	–1.04E-05**	–2.69E-06	–1.06E-05**	–1.07E-05**	–2.47E-06	–1.09E-05**
	(2.70E-06)	(6.13E-06)	(2.68E-06)	(2.51E-06)	(5.63E-06)	(2.68E-06)	(2.49E-06)	(5.61E-06)	(2.64E-06)
IMMOBLS	1.53571**	0.510008**	1.5697**	1.96337**	0.649827**	2.02118**	2.08206**	0.633284**	2.14955**
	(0.131107)	(0.184859)	(0.177942)	(0.129781)	(0.186678)	(0.140311)	(0.135747)	(0.186306)	(0.159421)
MGFIN				3.58385**	0.925506	3.67855**	3.29874**	0.73474	3.38452**
				(0.386254)	(0.806076)	(0.451158)	(0.397045)	(0.839033)	(0.456692)
CENTER							0.090039**	0.026253	0.094152**
							(0.032252)	(0.072219)	(0.030663)
Model test F-value (prob.)	68.73 (.000)			82.20 (.000)			64.43 (.000)		
LM-statistics (prob value)	967.48 (.000)			893.20 (.000)			883.22 (.000)		
Homogeneity test (prob. value)		10.92 (.758)			18.32 (.563)			20.34 (.729)	

Notes. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Model test F-value is the joint significance test of the regressors. Lagrange Multiplier test (LM-statistics) tests random effects model against OLS (High values favors RE over OLS). Homogeneity test tests whether there are random coefficients or is same model applicable for all groups (low values favors homogeneity assumption).

TABLE II. Per capita production estimations with whole sample (Nobs. = 510).

	Model 1			Model 2			Model 3		
	OLS	RE	RCM	OLS	RE	RCM	OLS	RE	RCM
CONSTANT	1075.36**	1197.65**	1051.08**	716.557**	947.68**	689.247**	651.694**	935.445**	620.907**
	(58.3283)	(92.591)	(141.639)	(51.5717)	(86.5238)	(98.7421)	(55.6257)	(91.2758)	(70.7516)
AREA	–0.00477486	–0.00291072	–0.00484**	–0.00695227**	–0.003636	–0.00708**	–0.0072089**	–0.0035722	–0.00737**
	(0.00264626)	(0.00595744)	(0.001195)	(0.00213094)	(0.0046449)	(0.001272)	(0.00211635)	(0.00461703)	(0.001325)
IMMOBLS	–924.166**	–1204.47**	–878.986**	–269.558*	–788.758**	–215.78**	–162.08	–774.839**	–101.13*
	(128.387)	(193.764)	(180.411)	(110.388)	(180.253)	(82.7342)	(115.343)	(183.364)	(40.4814)
MGFIN				5485.69**	5141.19**	5506.65**	5227.5**	5037.27**	5244.84**
				(328.535)	(685.32)	(669.263)	(337.366)	(712.718)	(576.221)
CENTER							81.5381**	28.7405	84.8693*
							(27.4038)	(59.6447)	(37.7625)
Model test F-value (prob.)	35.41 (.000)			121.48 (.000)			100.83 (.000)		
LM-statistics (prob. value)		913.81 (.000)			734.14 (.000)			722.22 (.000)	
Homogeneity test (prob. value)			16.08 (.377)			32.61 (.037)			35.45 (.080)

Notes. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Model test F-value is the joint significance test of the regressors. Lagrange Multiplier test (LM-statistics) tests random effects model against OLS (High values favors RE over OLS). Homogeneity test tests whether there are random coefficients or is same model applicable for all groups (low values favors homogeneity assumption).

cial services concentrate less than market production. This is confirmed by the fact that the coefficient of IMMOBLS gets negative sign when output per head is the dependent variable and positive sign when specialization in financial services is dependent variable.

As mentioned above, Helsinki and Maarianhamina are distinct observations in our data. In tables III and IV, we present the estimation results when these observations are excluded.

Tables III and IV show that when Helsinki and Maarianhamina are omitted, MGFIN is negative and significant and CENTER is positive and significant in explaining specialization in financial services. The coefficient of CENTER is insignificant in the model explaining output per head in financial services. Like previously, high share of potentially immobile labor has positive effect on specialization and negative of per head financial service production. Negative sign of MGFIN in financial service specialization estimations and insignificance in production per capita estimations suggest that the market size effect is highly dominated by Helsinki region's importance in providing financial services. It is also interesting that NUT3 center status has positive impact on the specialization but no impact on the per capita production.

If we exclude Helsinki and Maarianhamina the high percentage of private market industries have a negative and significant impact on relative concentration of financial services, i.e. specialization, while it does not have on absolute concentration, per capita output. If we exclude the dominant role of the national center and an island center we can draw the conclusion that financial services concentrate on a slower pace than private industries' output in general. This seems to be due to potential immobility in rural regions with high shares of public services.

In the third set of estimations, we use all observations, but for Helsinki and Maarianhamina we include a dummy variable, CENTERHM. Then we have the following explanatory variables

(4) CONSTANT, AREA, IMMOBLS, CENTERHM

(5) CONSTANT, AREA, IMMOBLS, MGFIN, CENTERHM

Estimation results are for these models are presented in tables V and VI.

The tables show that CENTERHM is highly significant. It seems that there are two centers in financial service production. In Helsinki, the levels of specialization and production per capita have been rather stable, but in year 1996 the specialization index decreased strongly from previous year and in 2000 when production increased by 30% from previous year. Specialization and production in Maarianhamina have especially increased over time; due to decrease in transportation costs many financial services for the clients of ≈landsbanken in continental Finland are actually operated in Maarianhamina.

Like in table IV above the inclusion of CENTERHM dummy variable makes MGFIN to lose its significance in per capita production estimations. Similarly the specialization is de-

TABLE III. Specialization estimations without assumed main centers (Nobs. = 498).

	Model 1			Model 2			Model 3		
	OLS	RE	RCM	OLS	RE	RCM	OLS	RE	RCM
CONSTANT	–0.03098	0.413471**	–0.05462	–0.09469	0.683411**	–0.14576**	–0.08753	0.683603**	–0.13842**
	(0.04882)	(0.081905)	(0.044792)	(0.070126)	(0.096321)	(0.032131)	(0.070046)	(0.094522)	(0.032193)
AREA	–9.48E-06**	–2.99E-06	–9.57E-06**	–9.68E-06**	–4.09E-06	–9.88E-06**	–9.74E-06**	–4.19E-06	–9.94E-06**
	(2.14E-06)	(4.74E-06)	(2.50E-06)	(2.15E-06)	(4.75E-06)	(2.48E-06)	(2.14E-06)	(4.76E-06)	(2.45E-06)
IMMOBLS	1.93596**	0.92711**	1.9907**	2.04384**	0.56617**	2.1447**	2.03046**	0.555321**	2.13096**
	(0.106605)	(0.172781)	(0.17854)	(0.136487)	(0.184353)	(0.112895)	(0.136316)	(0.1801299	(0.118282)
MGFIN				1.70709	–11.7101**	2.37207	–0.00227	–15.5991**	0.703403
				(1.34984)	(2.296789)	(1.22372)	(1.62174)	(2.65552)	(1.61784)
CENTER							0.06241	0.173103*	0.06095
							(0.03301)	(0.070613)	(0.036567)
Model test F-value (prob.)	165.73 (.000)			111.31 (.000)			84.81 (.000)		
LM-statistics (prob. value)		793.57 (.000)			781.91 (.000)			783.78 (.000)	
Homogeneity test (prob. value)			21.26 (.129)			23.94 (.245)			24.49 (.491)

Notes. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Model test F-value is the joint significance test of the regressors. Lagrange Multiplier test (LM-statistics) tests random effects model against OLS (High values favors RE over OLS). Homogeneity test tests whether there are random coefficients or is same model applicable for all groups (low values favors homogeneity assumption).

TABLE IV. Per capita production estimations without assumed main centers (Nobs. = 498).

	Model 1 OLS	Model 2 RE	Model 3 RCM	OLS	RE	RCM	OLS	RE	RCM
CONSTANT	790.007**	915.329**	770.491**	636.595**	913.21**	592.732**	639.395**	917.934**	595.011**
	(31.3524)	(56.0577)	(92.9985)	(44.0727)	(70.698)	(99.094)	(44.1202)	(70.5565)	(98.9961)
AREA	–0.00573472**	–0.00390409	–0.00587**	–0.00620542**	–0.00405612	–0.00643**	–0.00623093**	–0.00409934	–0.00646**
	(0.00137685)	(0.00280431)	(0.000898)	(0.0013501)	(0.00270175)	(0.000844)	(0.00134976)	(0.00271538)	(0.000864)
IMMOBLS	–381.793**	–666.255**	–340.345**	–121.967	–655.4**	–37.4704	–127.207	–665.654**	–42.0561
	(68.4629)	(120.751)	(79.9533)	(85.7793)	(136.913)	(101.528)	(85.8621)	(136.594)	(101.829)
MGFIN				4111.23**	–281.199	4658.88**	3442.03**	–1744.1	4016.67**
				(848.352)	(1499.15)	(1057.87)	(1021.49)	(1792.16)	(1122.44)
CENTER							24.4327	57.0453	24.0616
							(20.792)	(41.3274)	(28.5819)
Model test F-value (prob.)	35.27(.000)			32.41 (.000)			24.67 (.000)		
LM-statistics (prob. value)		490.21 (.000)			437.25 (.000)			437.59 (.000)	
Homogeneity test (prob. value)			74.67 (.000)			89.63 (.000)			91.88 (.000)

Notes. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Model test F-value is the joint significance test of the regressors. Lagrange Multiplier test (LM-statistics) tests random effects model against OLS (High values favors RE over OLS). Homogeneity test tests whether there are random coefficients or is same model applicable for all groups (low values favors homogeneity assumption).

TABLE V. Specialization estimations with dummies for assumed main centers (Nobs. = 510).

	Model 4			Model 5		
	OLS	RE	RCM	OLS	RE	RCM
CONSTANT	–0.03319 (0.048653)	0.392723** (0.081983)	–0.05734 (0.0479241)	–0.02554 (0.051876)	0.469497** (0.083939)	–0.05486* (0.024915)
AREA	–9.57E-06** (2.14E-06)	–3.38E-06 (4.71E-06)	–9.68E-06** (2.54E-06)	–9.51E-06** (2.14E-06)	–2.94E-06 (4.74E-06)	–9.65E-06** (2.48E-06)
IMMOBLS	1.94147** (0.106207)	0.97496** (0.173077)	1.99775** (0.187887)	1.92783** (0.110985)	0.849521** (0.173605)	1.99147** (0.117081)
MGFIN				–0.18372 (0.429926)	–2.41647** (0.883117)	–0.07248 (1.01965)
CENTERHM	1.22781** (0.07026)	1.08803** (0.157109)	1.23675** (0.131489)	1.25286** (0.091548)	1.42534** (0.201733)	1.25291** (0.262132)
Model test F-value (prob.)	175.12 (.000)			131.17 (.000)		
LM-statistics (prob. value)		781.89 (.000)			782.99 (.000)	
Homogeneity test (prob. value)			25.12(.197)			30.29(.214)

Notes. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Model test F-value is the joint significance test of the regressors. Lagrange Multiplier test (LM-statistics) tests random effects model against OLS (High values favors RE over OLS). Homogeneity test tests whether there are random coefficients or is same model applicable for all groups (low values favors homogeneity assumption).

creasing in MGFIN. As an overall result we can see that both for specialization and per capita production region's area has no effect. The share of labor in immobile industries positive effect has positive effect on specialization and negative on per capita production. This indicates that financial services do not concentrate on regions with high shares of agriculture and public services absolutely but rather relatively.

In general the pooled sample estimation works fine with specialization, i.e. homogeneity over groups is not rejected based on chi-squared test in models 1–3 for FINGRPPC with whole sample and without CENTERHM dummy cross-sectional homogeneity is rejected in model 2 with FINGRPPC as a dependent. With sample excluding Helsinki and Maarianhamina all models reject the hypothesis of yearly estimation homogeneity. However, in these models rejection is due to year 2000: by leaving it out homogeneity in coefficients levels of the yearly predictions is high. Even though the homogeneity is rejected with inclusion of all years, in all models the yearly predictions have qualitatively (sign of the coefficient) same coefficients. For models 4 and 5 for FINGRPPC this does not apply. For IMMOBLS and MGFIN there are change both in levels and significance of coefficients. In the case of IMMOBLS, coefficient levels increase in

TABLE VI. Per capita production estimations with dummies for assumed main centers (Nobs. = 510).

	Model 4			Model 5		
	OLS	RE	RCM	OLS	RE	RCM
CONSTANT	792.467**	874.934**	769.409**	749.55**	836.213**	725.5**
	(33.8663)	58.9777	91.5285	35.6899	61.3903	113.846
AREA	–0.00560722**	–0.00440824	–0.00577**	–0.00594432**	–0.00467768	–0.0061**
	(0.00148713)	(0.00281542)	(0.001001)	(0.00147418)	(0.00277892)	(0.000848)
IMMOBLS	–388.165**	–575.306**	–339.854**	–311.59**	–508.735**	–263.34*
	(73.9284)	(127.681)	(76.0652)	(76.3552)	(130.347)	(117.844)
MGFIN				1031.06**	1055.04	1062.07
				(295.78)	(548.046)	(867.741)
CENTERHM	1621.93**	1594.86**	1632.87**	1481.34**	1449.3**	1492.16**
	(48.9069)	(93.0525)	(380.227)	(62.9833)	(119.028)	(466.687)
Model test F-value (prob.)	441.38 (.000)			341.37 (.000)		
LM-statistics (prob. value)		320.72 (.000)			305.57 (.000)	
Homogeneity test (prob. value)			165.15 (.000)			178.63(.000)

Notes. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Model test F-value is the joint significance test of the regressors. Lagrange Multiplier test (LM-statistics) tests random effects model against OLS (High values favors RE over OLS). Homogeneity test tests whether there are random coefficients or is same model applicable for all groups (low values favors homogeneity assumption).

time and it is significant in last three years and, in the case of MGFIN, coefficient levels decrease in time and are insignificant in last four year. Altogether it seems that the factors driving concentration and specialization has been stable over the period of analysis.

The RE estimation results deviated from the OLS and RCM estimations. Many of the variables that were significant in OLS and RCM estimations lost their significance in RE estimation. That was the case especially with the regions area: in all OLS and RCM estimations the area was negative and highly significant, but in significant in all RE estimations. Also the constant was typically substantially higher in RE estimations. However there were no cases where the significant coefficient had an opposite sign in RE compared to OLS or RCM. In the analysis, we used reduced form models on purpose since we wanted to concentrate on the impact of the main determinants of location analyzed in the theoretical new economic geography literature. The cost of this choice was limited possibility to test different assumptions of correlation between independent variables and observation unit specific error term (i.e. estimation previously mentioned Hausman-Taylor model).

TABLE VII. ABB-estimations with the whole sample.

	FINSPE			FINGRPPC		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
ONE	0.08122**	–0.05313**	–0.10753**	975.59**	510.153**	346.275**
	(0.015448)	(0.007637)	(0.008441)	(52.9559)	(23.6779)	(18.1783)
AREA	–5.72E-06**	–6.66E-06**	–7.59E-06**	–0.00431**	–0.00543**	–0.00543**
	(8.19E-07)	(5.60E-07)	(4.74E-07)	(0.000422)	(0.000382)	(0.000339)
MYY	0.967105**	1.2224**	1.43145**	–830.994**	–112.678**	19.5691
	(0.124424)	(0.092761)	(0.07831)	(48.9751)	(28.5818)	(28.7845)
MGFIN		2.01159**	2.04382**		5144.33**	4075.85**
		(0.166796)	(0.123353)		(136.003)	(92.4347)
CENTER			0.063069**			99.0771**
			(0.004531)			(7.11847)
Lagged value of dependent variable	0.423518**	0.420374**	0.358351**	0.098215	0.226186**	0.386912**
	(0.079025)	(0.044932)	(0.036003)	(0.051472)	(0.029506)	(0.020805)
Bhargava-Sargan	0.006	0.000	0.001	0.000	0.000	0.000

Notes. The estimates are second step GMM-estimates. Standard errors are in parenthesis. Significance levels of 1% and 5% are indicated respectively by ** and *. Bhargava-Sargan is test statistic for the model specification. Reported figures are p-values.

Another problem relates to dynamics of concentration. In the data, time-series variation was strongly dominated by cross-sectional variation.[6] This implicates that possibly we should include the lagged dependent variable into estimation equations. Therefore we made tentatively Arellano/Bond/Bover IV (Arellano et al. 1991, 1995) estimation for dynamic panel data models for models 1–3 with whole sample. The results are presented in table VII. The results were pretty well in line (signs and significances of coefficients were same) with RCM and OLS estimations presented above and as assumed the lagged values of the dependent variable were significant. Compared to RE estimation results, the changes in significances were remarkable. However the Bhargava-Sargan specification test showed problem of over-identification in the dynamic models, i.e. it is likely that there are too many instrumental variables in the model.

5. CONCLUSIONS

In this paper, we analyzed specialization and absolute concentration of regional financial service output in Finland. For this purpose we estimated three sets of simple models where we

6 This can be seen also in RCM estimations: in most of cases the homogeneity hypothesis was not rejected.

included variables describing potential agglomeration forces in determination of the location of output.

Our models take it as given that general costs of ″exporting″ financial services from region to region are decreasing due to development in information technology. We add the intra-regional aspect of trade costs and proxy it with region's area. The significance of area was dependent on the estimation method. In all random effects estimations with no lagged values of dependent variable are was statistically insignificant. In OLS and random coefficients estimations effect of area was negative and highly significant. Also the inclusion of lagged values of dependent variables made effect of the area negative and highly. This led us to conclude that distance matters in the sense that there is a tendency of concentration to areas where demand is relatively close.

We argued that potential sources of (labor) immobility might slow down the agglomeration process and even turn it when trade costs are sufficiently low. In all estimations we found that, indeed, this seems to be the case in financial services as well. High percentage of public services and agriculture has a positive highly significant impact on specialization but not on absolute concentration. Immobility combined with gains from local banks' local knowledge implies that in these regions there is a comparative advantage in banking services. This does not, however, work in output per head where the effect is negative and significant.

The forward linkages obtain only weak and partial support. In terms of specialization the share of private market industries in output has significant positive effect only in our first model specification. When we exclude Helsinki and Maarianhamina or when we control their impact with dummies there is no evidence on significant forward linkages. In absolute concentration there seems to be significant forward linkages but also they seem to vanish if we control for the Helsinki effect.

In sum, the results of this paper suggest that the forward linkages do not obtain unambiguous support from location financial services in Finland. The results on intra-regional trade costs suggest that there are significant home market effects but concentration in financial services output seems to proceed more slowly than in industrial output. A phenomenon reminiscent to comparative advantage supports relative concentration of financial services into rural regions with high percentage of public services. ■

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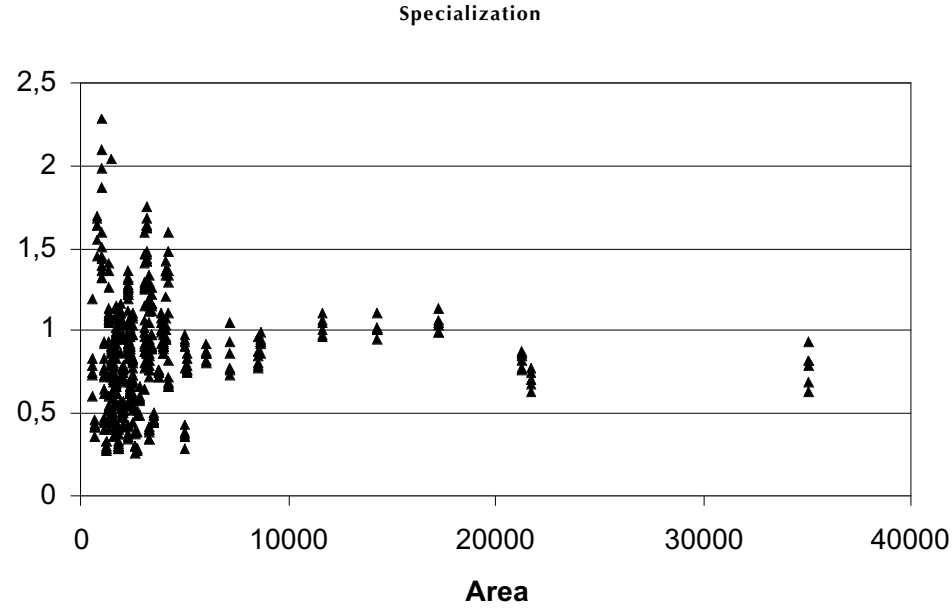
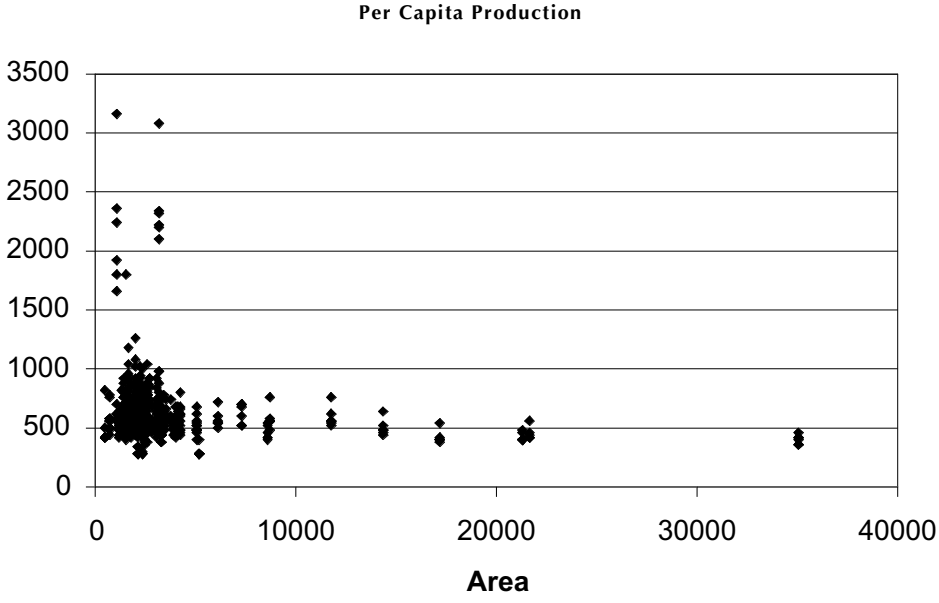
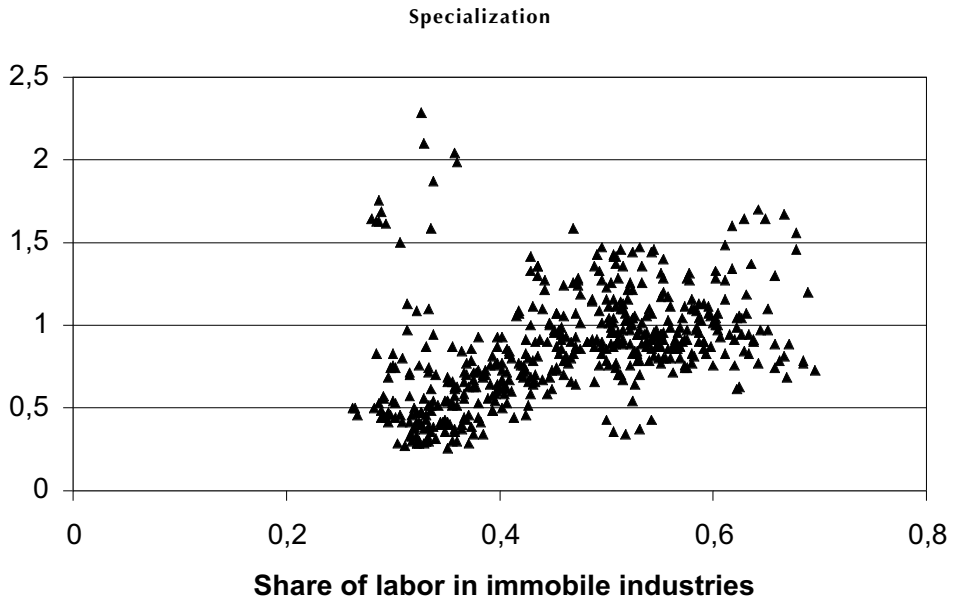
APPENDIX 1. Yearly descriptive statistics.

Variable	Mean	Std.Dev.	Minimum	Maximum
YEAR 1995, 85 Obs.				
FINSPE	.813853667	.305564081	.258510145	1.75952627
FINGDPPC	562.315575	253.654224	272.937224	2198.80272
MGFIN	.0117647059E	.0317889070	.343622000E-03	.287184613
AREA	3978.17094	5162.00011	517.870000	35108.6300
IMMOBLS	.484671226	.110334721	.285711197	.696533265
CENTER	.235294118	.426699929	.000000000	1.00000000
YEAR 1996, 85 Obs.				
FINSPE	.873887608	.325154284	.288562297	1.62040046
FINGDPPC	627.885028	264.955064	271.480928	2217.53591
MGFIN	.0117647058	.0331014157	.326342000E-03	.299656661
AREA	3978.17094	5162.00011	517.870000	35108.6300
IMMOBLS	.476549424	.110065441	.282107064	.689227298
CENTER	.235294118	.426699929	.000000000	1.00000000
YEAR 1997, 85 Obs.				
FINSPE	.871353674	.335402660	.284262560	1.87291759
FINGDPPC	602.305280	260.725494	277.373275	2098.90106
MGFIN	.0117647059	.0321813871	.259408000E-03	.290364221
AREA	3978.17094	5162.00011	517.870000	35108.6300
IMMOBLS	.468263580	.105900513	.286862493	.684782609
CENTER	.235294118	.426699929	.000000000	1.00000000
YEAR 1998, 85 Obs.				
FINSPE	.848782320	.353712136	.294191387	2.03787762
FINGDPPC	617.255387	321.311799	281.254395	2348.33558
MGFIN	.0117647059	.0346480469	.250801000E-03	.314224968
AREA	3978.17094	5162.00011	517.870000	35108.6300
IMMOBLS	.454025854	.102199143	.265748273	.648711944
CENTER	.235294118	.426699929	.000000000	1.00000000
YEAR 1999, 85 Obs.				
FINSPE	.864772795	.335353356	.275850249	2.09478889
FINGDPPC	597.210780	296.114005	283.607487	2358.28831
MGFIN	.0117647058	.0356553815	.232853000E-03	.323313442
AREA	3978.17094	5162.00011	517.870000	35108.6300
IMMOBLS	.447308592	.101774756	.262933805	.644666575
CENTER	.235294118	.426699929	.000000000	1.00000000
YEAR 2000, 85 Obs.				
FINSPE	.863563447	.349795680	.280060701	2.28591771
FINGDPPC	765.211253	401.204442	401.307115	3158.61362
MGFIN	.0117647059E	.0357947636	.240139000E-03	.323586904
AREA	3978.17094	5162.00011	517.870000	35108.6300
IMMOBLS	.445719295	.101460930	.265119864	.636960087
CENTER	.235294118	.426699929	.000000000	1.00000000
All observations in current sample				
FINSPE	.856035585	.333528503	.258510145	2.28591771
FINGDPPC	628.697217	309.266365	271.480928	3158.61362
MGFIN	.0117647059	.0337322997	.232853000E-03	.323586904
AREA	3978.17094	5136.58390	517.870000	35108.6300
IMMOBLS	.462756329	.105872922	.262933805	.696533265
CENTER	.235294118	.426699929	.000000000	1.00000000

APPENDIX 2. Scatter plots of specialization and per capita production of financial services.



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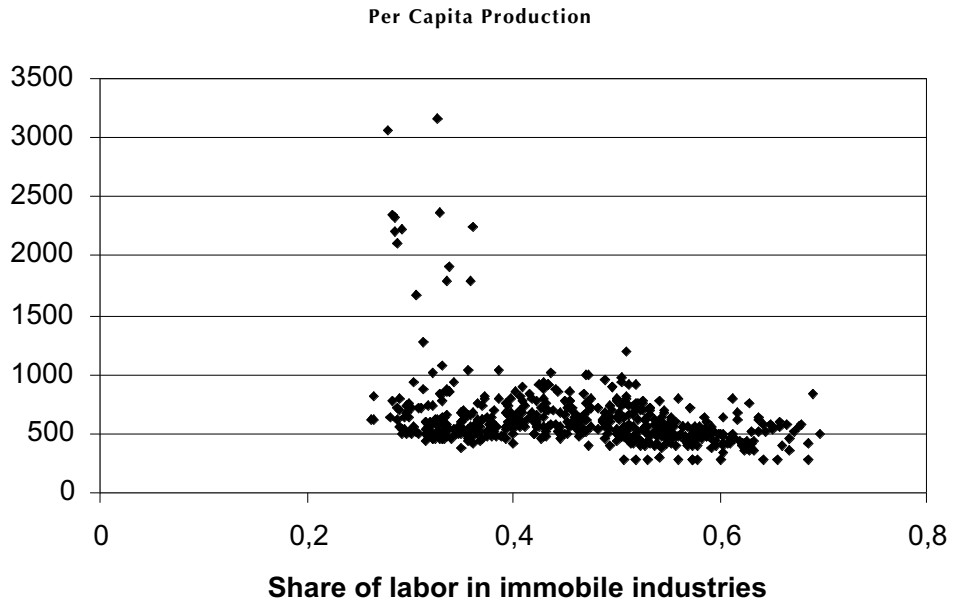
2
1,5
1
0,5
0
0
0,2
0,4
0,6
0,8
Share of labor in immobile industries


Per Capita Production
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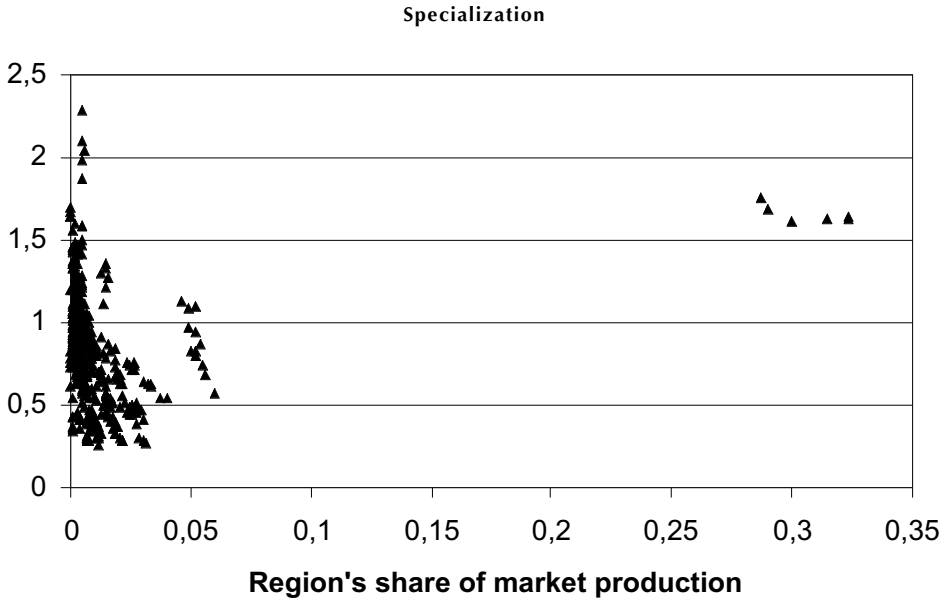
2500
2000
1500
1000
500
0
0
0,2
0,4
0,6
0,8
Share of labor in immobile industries


Specialization
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1,5
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0,1
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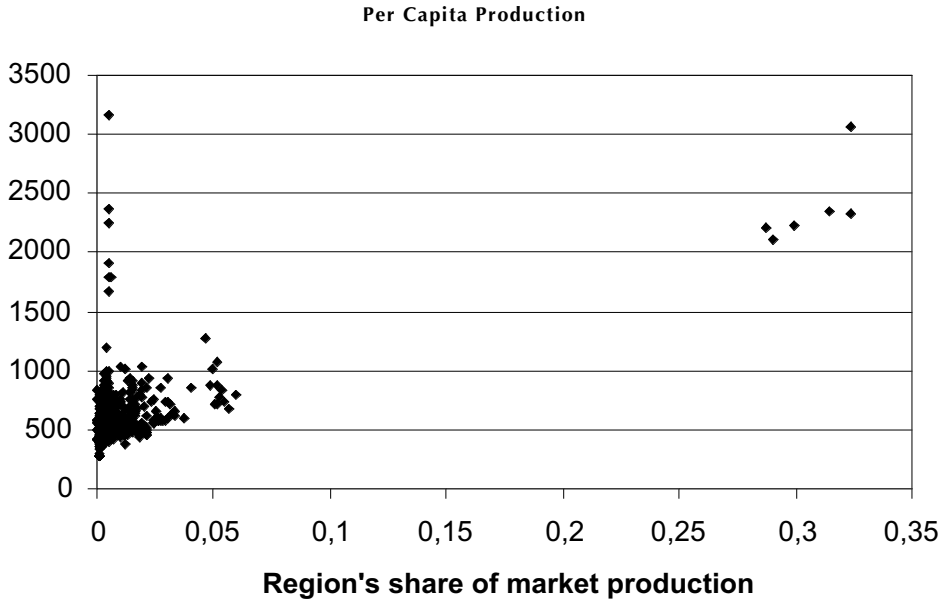
0,2
0,25
0,3
0,35
Region's share of market production


Per Capita Production
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3000
2500
2000
1500
1000
500
0
0
0,05
0,1
0,15
0,2
0,25
0,3
0,35
Region's share of market production