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Structural Preconditions of City Competitiveness: Some Empirical Results for European Cities

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Driven by growing internationalisation and high unemployment in Europe concerns about competition between regions and cities and it's consequences for economic and social standards are omnipresent. In their strive for "competitiveness" and a high position of their city in an "European City Hierarchy", urban policy makers take a strongly interventionist stance and foster specific patterns of economic activities, which they suppose to be beneficial to growth. Attempts to grow "future industries" (biotechnology, cultural industries, the media) and "clusters" seem nearly ubiquitous. While these interventions are not necessarily misguided, they seem to be based more on some "success stories" than on a sound empirical basis and hence vary little in content. In this paper we try to contribute to a better understanding of the issue by empirical work on a small database for 46 European Cities. After dealing with some conceptual issues on city competitiveness (section 1) and its measurement (section 2), we analyse the evolutions of European cities from the 1980s onwards (section 3). In what follows, we try to identify sectoral and regional components of growth in European cities (section 4), ask for their preconditions in terms of specialisation and diversity (section 5) and finally proceed to the question, to what extent structural characteristics matter for city growth (section 6). Section 7 concludes.

1. "Competitiveness" at the City level: A useful Concept?

While the term "competitiveness" is very popular in today's economic policy debates, it's meaning for regional entities is not undisputed in economics. Indeed, in economic theory the outcome of "competitiveness" is only clearly defined at the microeconomic level: Given perfect competition, all firms that produce efficiently achieve a yield on their capital in line with real interest rates; all other firms are forced out of the market. At a macroeconomic level the picture is less clear, however: In contrast to firms, regions and cities do not face "hard budget constraints"; if they lack "competitiveness", they may be unable to guarantee their inhabitants high and sustainable incomes - but they cannot go bankrupt[2].

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[1] I wish to thank my collegues Peter Huber and Gerhard Palme for helpful comments.

[2]) In spite of this and fundamental differences between firms and regions in target functions and decision making structures, popular texts (e.g. *Magaziner – Patinkin*, 1990; *Luttwak*, 1993 or *Garten,* 1992) often equate entrepreneurial and regional competition by analogy. The attractiveness of such a flawed argumentation may well be explained by *Krugman* (1996): "Tell a group of businessmen that a country is like a corporation writ large, and you give them the comfort of feeling that they already understand the basics. Try to tell them about economic concepts like comparative advantage, and you are asking them to learn something new. It should not be surprising if they may prefer a doctrine that offers the gain of apparent sophistication without the pain of hard thinking".

From this economists like *Krugman* (1996, 1996a) deny the existence of a (direct) competition between regional entities at all. Here only firms can be "competitive", if they are able to accumulate firm specific competitive advantages (by cost efficiency, innovativeness or marketing). All data at the regional level are then only rough indicators for the productivity of the regional firms, but not information that stands for its own. Moreover, the "obsession" with regional competitiveness is not only meaningless but "dangerous" in this view, as it treats trade as a 'zero-sum' - game and thereby overlooks the welfare gains of foreign trade and specialisation (one of the most stable results in theoretical and empirical trade economics).

Indeed, a gain in one region's (city's) competitiveness does not necessarily imply a loss of other region's (city's) competitiveness, and an economic policy that only aspires to "win" a supposed "economic battle" (*Thurow*, 1992) among nations and regions is indeed in danger to loose sight of essential policy targets like equity or sustainable development.

However, there are also sound arguments to concern about regional (city) competitiveness: As regional specialisation is fully determined by comparative advantage only if markets are perfect (*Begg*, 1999), "regional competitiveness" is only equivalent to "firm productivity" if resources are completely utilised (which we cannot assume in the case of European Cities unfortunately). As *Coase* (1960) did for the firm level, one may therefore thoroughly identify "productive assets" at the city level, whose combination and organisation determines regional performance. City competitiveness is then the ability of a city to support their firms striving for market success by the provision of complementary assets (infrastructure, human capital, market access and the like). As *Porter* (1995, 1996) puts it, a neglect of this aspect may well prevent fundamental insights in the way competitive advantages arise in international trade: The position a city can take over on the "quality ladder" of an (increasingly differentiated) international production system is all but unimportant for regional factor incomes and therefore wealth – and it's exactly this regional wealth that should be at the core of the target function of urban economic policy makers[3].

2. "City Competitiveness": How to measure it empirically?

If we therefore take the relevance of "city competitiveness" for granted, the question of a proper implementation of the term in empirical work remains. Economic literature provides a bulk of possible definitions[4], which are often tautological in nature[5]. However, in recent years a consensus arose, where regional (national) competitiveness is seen as "... the ability .. to

[3]) In this respect *Krugman*'s (1996a) argument that regional differences in productivity and (immobile) factors will anyway level out in the market process by adjustments in factor prices and exchange rates is not very convincing: Falling wages as well as currency devaluations imply shrinking incomes in international currency and therefore a decrease in regional wealth.

[4]) For a comprehensive survey see *Cellini – Soci* (2002).

[5]) As an example see *Kresl – Singh* (1999): "An urban economy will be competitive relative to other urban economies to the degree that its growth in variables that can be taken as indicators of city's competitiveness, during a specific period of time, exceeds, or does not, that of it's 'frame of reference' urban economies".

generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels" (*OECD*, 1996)[6].

The bulk of empirical studies relies on (the growth of) real GDP per Capita (Y/N) as a proxy for this ability. However, as *DeFreitas et al.* (2003) argue, this indicator is not the best one to assess regional competitiveness and the productive capacity to generate factor incomes.

To see this, refer to the following accounting identity:

$$Y/N = (Y/Q)(Q/N) = (Y/Q)(Q/A)(A/N),$$

whereby Y denotes urban GDP, Q stands for urban production (GVA), N for City population and A for the City's working age population (15 to 64 years old).

Note first that GDP per Capita is influenced by the difference between GDP (Y) and GVA (Q), which is essentially made of the reckoning of indirect taxes and (interregional) transfers. While these elements are relevant for overall regional income and should therefore be included in an attempt to measure social cohesion (as the *EU Commission,* 1999, 2001a, 2004 does in their cohesion reports), they have nothing to do with a city's capacity to produce high and sustainable factor incomes on its own.

In addition, GDP per Capita is influenced by the age structure of city's population (A/N) and therefore by a (demographic) impact factor that is essentially exogenous to policy. A high share of population out of working age will therefore impact negatively on Y/N, irrespective of a city's ability to generate production out of its labour force.

In our paper we therefore decided to rely on (the growth of) GVA per working age population (Q/A) as the main proxy for city competitiveness, an indicator that avoids the caveats mentioned. Given that

$$Q/A = (Q/E)(E/A),$$

this variable essentially covers two aspects of competitiveness, both endogenous to economic policy. First is overall city productivity (Q/E), a variable determined by the quality of a city's production factors and their efficient use - not the least influenced by the above mentioned "complementary assets" a city may provide. Second is the employment rate (E/A), a core structural indicator in the EU Lisbon-Agenda[7], which measures the ability to bring the regional labour supply into (paid) work.

The data for our empirical analysis stem from a harmonised city dataset, which was built up by Cambridge Econometrics on behalf of the European Economic Research and Advisory Consortium (ERECO) in recent years. The database provides a comparable set of indicators (including GVA and working age population) for 46 large European Cities, most of them

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[6]) A similar definition is used by the *EU Commission* (2001, 2004): "An economy is competitive if its population can enjoy high and rising standards of living on a sustainable basis".

[7]) As $Q/A = (Q/\hat{E})(\hat{E}/A) = (Q/\hat{E})[(E/A) + (IM/A)]$ with $\hat{E}$ = employment at the place of working, E = employment at the place of living, and IM = (net) commuting, our indicator additionally mirrors the city's attractiveness as an employment centre for the wider region. Therefore it may also be interpreted as an indication for the absorbing capacity of the city's labour market in addition.

available from the mid 1970s onwards[8]. With respect to time dimension and structural detail (15 sectors) this data base goes well beyond all other sources available, and its completeness and actuality is guaranteed by continuous work on the data base by national institutes. However, the scarcity of data at the level of 'functional' urban regions – which is common all over Europe[9] – applies also here. To proxy functional urban regions, the database therefore collects information on those administrative regional entities, which correlate the most with a functional delimitation of the city region in question[10].

3. Evolutions in European City Competitiveness, 1980-2003

A first look at our indicator (real) GVA per working age population (Q/A)[11] for 46 European Cities (table 1) supports the hypothesis, that there are relevant regional factors that shape firm's productivity and cause relevant and persistent differences in cities performance.

Even in our city sample, which covers only one (fairly homogenous) regional type, production per capita in working age diverges widely in 2003, with a Q/A in the most advanced city (München, 96,590 €) 7 times that of the least developed one (Budapest 13,750 €). In general, cities are the drivers of EU competitiveness, as can be seen by the high level of Q/A in our city sample (51,975 €) compared to the EU regional system as a whole (17,734 €). However, if we divide our sample into categories according to income (based on GDP per Capita), size (based on population) and sectoral orientation (based on Location quotients for 5 broad sectors[12]), as defined in table 2[13], some interesting differences appear.

First of all, we can see that not the largest EU agglomerations provide the highest levels of Q/A, but smaller ones. In addition (and interestingly) a strong orientation on manufacturing – a sector striving the most for high productivity – impacts negative on Gross Value Added per working age population. High Q/A levels can be shown instead in cities that are able to combine (modern) manufacturing and (complementary) services in servo-industrial complexes, as well as in services centres proper. This may represent a general (positive)

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[8]) Data for cities in the new EU member states and Eastern Germany (including Berlin) are not available before 1991. Therefore these cities were only partially integrated in our analysis.

[9]) Comparisons based on functional city regions are therefore rare and limited to a small set of (demographic) indicators (see *Cheshire – Hay*, 1989; *Cheshire*, 1990; *Cheshire – Carbonaro*, 1996).

[10]) Data used therefore spread from the NUTS–1 level (e.g. London) to a combination of NUTS-4 regions (e.g. Helsinki). See *ERECO* (2003) for the regional delimitation of individual cities.

[11]) GVA is expressed at constant (1995) prices but not in purchasing power parities (PPP). The reason is that we do not want to compare standards of living, but economic development levels. Here a measurement in common currency (€) seems more appropriate.

[12]) The location quotient is defined as $LQ_{ij} = \frac{GVA_{ij}}{\sum_{i=1}^{n} GVA_{ij}} \Big/ \frac{\sum_{j=1}^{m} GVA_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{m} GVA_{ij}} * 100$, whereby i = city (n = 46) and j = sector (m = 15). The limits of this indicator, which was introduced by *Florence* (1948) ,are 0 and ∞. A LQ of 100 indicates the same sector share in the city than in the whole sample. Values > 100 indicate a city's specialisation, values < 100 a low orientation on a sector compared to all European cities.

[13]) A list of the cities integrated in each city type is available from the author on request.

Table 1: Performance of European Cities, 1980-2003

Gross Value Added per Working Age Population; 1995 Euro[1])

	1980		2003		Growth p.a. in %		
		Ranking		Ranking	1980/1991	1991/2003	1980/2003
München	56,081	5	96,591	1	+ 2.9	+ 1.9	+ 2.4
Frankfurt	60,292	4	89,635	2	+ 2.7	+ 0.8	+ 1.7
Bruxelles	67,241	2	85,599	3	+ 1.5	+ 0.6	+ 1.0
Zürich	54,466	7	84,369	4	+ 1.4	+ 2.3	+ 1.9
Hamburg	65,687	3	81,047	5	+ 0.8	+ 1.0	+ 0.9
Geneve	74,077	1	80,710	6	+ 0.9	– 0.2	+ 0.4
Düsseldorf	47,731	9	76,541	7	+ 1.9	+ 2.2	+ 2.1
Köln	54,490	6	73,137	8	+ 0.4	+ 2.1	+ 1.3
Stuttgart	50,375	8	70,599	9	+ 1.7	+ 1.3	+ 1.5
Wien	46,547	10	67,196	10	+ 2.2	+ 1.1	+ 1.6
Oslo	24,610	31	65,616	11	+ 4.8	+ 3.8	+ 4.3
Paris	43,647	11	64,570	12	+ 2.5	+ 1.0	+ 1.7
Kobenhavn	40,750	13	62,077	13	+ 0.9	+ 2.7	+ 1.8
Amsterdam	40,351	14	60,172	14	+ 2.1	+ 1.4	+ 1.7
Stockholm	29,853	26	59,997	15	+ 2.9	+ 3.1	+ 3.0
Dublin	24,431	32	59,258	16	+ 3.3	+ 4.4	+ 3.9
Helsinki	25,374	29	54,344	17	+ 2.2	+ 4.3	+ 3.3
Lyon	39,518	16	53,967	18	+ 2.5	+ 0.3	+ 1.4
Milano	39,741	15	53,474	19	+ 1.1	+ 1.4	+ 1.3
Den Haag	42,215	12	51,269	20	+ 0.7	+ 1.0	+ 0.8
Utrecht	34,414	22	49,567	21	+ 1.9	+ 1.3	+ 1.6
Marseille	37,350	20	49,295	22	+ 1.7	+ 0.8	+ 1.2
Bologna	34,747	21	48,378	23	+ 0.8	+ 2.0	+ 1.4
London	28,344	27	46,449	24	+ 2.1	+ 2.2	+ 2.1
Rotterdam	37,724	18	46,095	25	+ 1.0	+ 0.8	+ 0.9
Strasbourg	37,601	19	45,149	26	+ 1.4	+ 0.3	+ 0.8
Roma	31,365	24	43,199	27	+ 2.1	+ 0.8	+ 1.4
Bordeaux	38,653	17	42,719	28	+ 1.3	– 0.4	+ 0.4
Torino	30,610	25	42,119	29	+ 1.5	+ 1.3	+ 1.4
Lille	34,017	23	40,058	30	+ 1.5	+ 0.0	+ 0.7
Berlin	,		38,492	31	.	+ 2.5	.
Madrid	27,331	28	37,628	32	+ 2.4	+ 0.5	+ 1.4
Barcelona	24,762	30	36,584	33	+ 1.6	+ 1.8	+ 1.7
Edinburgh	16,791	36	33,158	34	+ 4.2	+ 1.8	+ 3.0
Leipzig	,		32,035	35	.	+ 2.3	.
Glasgow	16,378	37	31,664	36	+ 3.9	+ 1.9	+ 2.9
Dresden	,		31,577	37	.	+ 3.1	.
Birmingham	21,110	33	30,722	38	+ 1.2	+ 2.1	+ 1.6
Cardiff	11,768	38	27,441	39	+ 5.8	+ 1.8	+ 3.7
Manchester	19,348	35	26,835	40	+ 1.1	+ 1.7	+ 1.4
Athina	20,936	34	23,227	41	– 0.2	+ 1.1	+ 0.5
Lisboa	9,568	39	17,990	42	+ 3.6	+ 1.9	+ 2.7
Praha	,		17,595	43	.	+ 5.6	.
Warszawa	,		15,401	44	.	+ 6.1	.
Budapest	,		13,751	45	.	+ 3.7	.
All cities	35,475		51,975		+ 2.0	+ 1.5	+ 1.7
All EU-Regions	13,938		17,734		+ 1.8	+ 1.6	+ 1.6
Services centres	35,572		52,097		+ 2.0	+ 1.3	+ 1.7
Industrial cities	32,860		48,169		+ 1.6	+ 1.6	+ 1.7
Servo-industrial	36,855		53,729		+ 2.0	+ 1.2	+ 1.6
High-income cities	46,541		69,315		+ 2.1	+ 1.3	+ 1.7
Mid-income cities	33,424		46,759		+ 1.7	+ 1.2	+ 1.5
Low-income cities	20,100		31,175		+ 2.1	+ 1.6	+ 1.9
Large cities	34,464		50,427		+ 2.1	+ 1.1	+ 1.7
Medium sized	36,177		52,382		+ 1.8	+ 1.3	+ 1.6
Small cities	35,888		54,564		+ 1.9	+ 1.7	+ 1.8

Source: ERECO-database, own calculations. – [1]) City types comprise only data available in all years.

relationship between development and tertiarisation, as suggested by early stage-theories of economic development (e.g. *Fisher*, 1939; *Clark*, 1940; *Fourastie*, 1949 or later *Bell*, 1974).

Note that differentials in Gross Value Added per working age population are not only large but highly persistent (figure 1). The correlation between Q/A levels in 1980 and 2003 is +0.877, and overall city ranking did not change fundamentally in a quarter of a century.

Table 2: City types used in the Analysis

High-income Cities	Cities with a GDP per Capita that exceeds the city average by more than 1/2 standard deviation
Mid-income Cities	Cities within a one standard deviation range in GDP per Capita from the city mean
Low-income Cities	Cities with a population that falls below the city average by more than 1/2 standard deviation
Large Cities	Cities with a population that exceeds the city average by more than 1/2 standard deviation
Medium-sized Cities	Cities within a one standard deviation range in population from the city mean
Small Cities	Cities with a population that falls below the city average by more than 1/2 standard deviation
Services Centres	Cities with a LQ in market services and/or non-market services > 100 and all other sectors < 100.
Industrial Cities	Cities with a LQ in manufacturing > 100 (all other sectors < 100)
Servo-industrial Cities	Cities with a LQ in manufacturing > 100 and a LQ in market services or non-market services > 100 (all other sectors < 100)

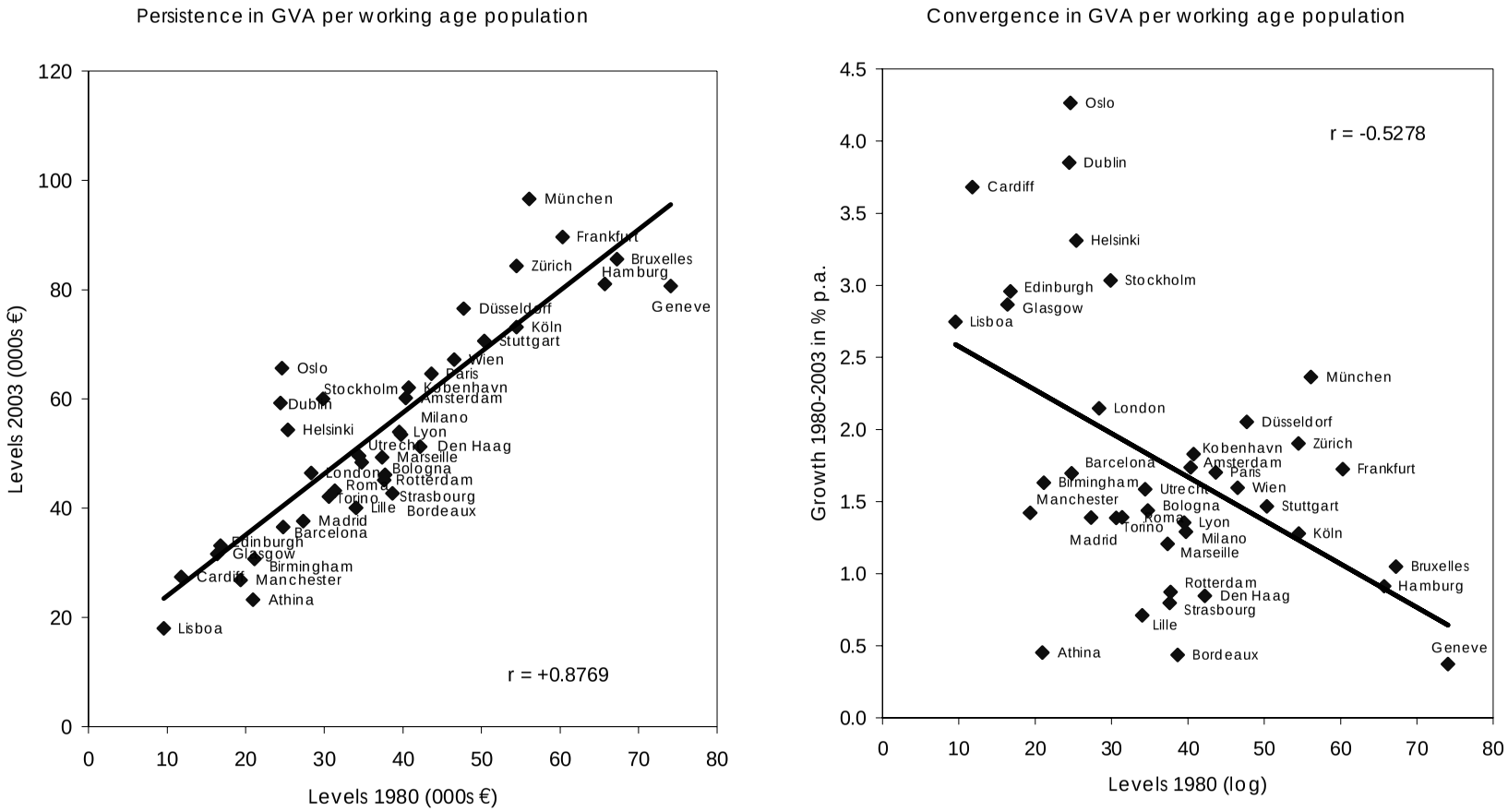
However, some cities managed to improve their record significantly in the last 25 years (e.g. München, Oslo, Stockholm, Dublin, Helsinki), while others (like Geneve, Den Haag, Bordeaux or Lille) lost ground. Indeed, growth processes in the city system are far from uniform (table 1). Q/A growth spreads from +4.3% p.a. (Oslo) to +0.4% p.a. (Geneva) in 1980 to 2003, and from the 1990s onwards growth divide appears even more pronounced, given the success of cities in the new EU member states (Praha, Warszawa) as well as Northern Europe (Helsinki, Oslo, Stockholm) and a lack of dynamism in some Western European (above all French) cities.

Looking at the different city types, we can see that it is not so much the broad sectoral orientation, but size and income levels that mattered for growth in 1980-2003. Smaller cities gained a 0.2 PP growth advantage per year in Q/A over the period, and low-income cities (+1.9% pa) developed favourably compared to cities with a high (+1,7% pa) and (especially) medium position in GDP per capita (+1.5% pa).

This indicates some catching-up of "poor" cities in competitiveness in the period analysed, and indeed we observe a marked negative correlation between cities Q/A growth rates 1980-2003 and their initial levels in 1980 (r = -0.53), with some cities in Northern Europe and Great Britain standing out (figure 1).

This stylized fact may well be interpreted as an indication of some convergence in competitiveness in the European city system. However, this does not mean that there is convergence in the whole European regional system too. Indeed, in 1980-2003 Q/A growth in (all) cities was slightly higher (+1.7% p.a.) than in all EU regions (+1.6% p.a.), albeit initial Q/A levels were 3 times higher in the former than in the latter. Hence, our results are more in line with an interpretation that looks at the city system as a (highly competitive) "convergence

Figure 1: Evolutions in European City Competitiveness, 1980-2003



Source: ERECO-database, own calculations.

club" (*Chatterji*, 1992; *Quah*, 1996), whose members are in the long run driven to a common steady state, which is certainly higher than that of other regional types in Europe[14].

4. Sectoral and regional Origins of City Competitiveness

Let us now turn to the question, where this (slightly higher) economic growth in European cities comes from. One obvious candidate is sectoral structure. As one can see in table 2, which denotes the situation at the level of European cities, growth rates in the period of observation differed markedly by sector, as did the distribution of sectoral activities in the city (and regional) system.

Table 2: Sectoral Impact on City Growth 1980-2003

	Coefficient of localisation		Cities with highest specialisation in the sector	Growth of GVA 1980/2003 in % p.a.
	2003	Δ 1980/2003 in pp	2003	2003
Other Market Services	19.6	+ 1.3	München 128.1, Paris 126.8, Hamburg 125.6	+ 7.7
Electronics	46.3	– 1.0	Edinburgh 558.2, Helsinki 518.9, Glasgow 383.0	+ 5.0
Mining and Energy Supply	42.1	– 2.8	Dublin 229.0, Stuttgart 183.2, Barcelona 210.4	+ 4.8
Transport, Communication	23.3	+ 3.2	Oslo 188.9, Helsinki 151.8, London 151.7	+ 4.5
Fuels, Chemicals	37.4	– 7.1	Manchester 253.1, Cardiff 213.2, Barcelona 193.0	+ 4.1
Hotels and Restaurants	37.7	+ 3.8	Barcelona 311.2, Athina 269.3, Madrid 235.6	+ 4.1
Wholesale and Retail	15.8	– 1.2	Oslo 157.2, Zürich 139.9, Amsterdam 137.9	+ 4.0
Agriculture	86.1	+10.1	Bordeaux 1,446.4, Strasbourg 427.2, Bologna 354,3	+ 3.8
Financial Services	28.9	+ 0.0	Zürich 274.9, Geneve 236.6, Amsterdam 162.8	+ 3.7
Non-Market Services	17.2	– 2.8	Den Haag 165.5, Berlin 149.5, Kobenhavn 138.7	+ 3.7
Transport Equipment	47.0	–12.6	Birmingham 604.6, Strasbourg 404.6, Cardiff 216.2	+ 2.5
Food, Beverages and Tobacco	43.2	– 1.7	Dublin 295.8, Glasgow 281.2, Manchester 257.3,	+ 1.9
Other Manufacturing	29.7	–21.3	Birmingham 274.7, Cardiff 191.0, Manchester 169.8	+ 1.7
Construction	28.5	+ 7.8	Dresden 246.0, Leipzig 244.6, Madrid 193.1	+ 0.9
Textiles and Clothing	78.5	+ 6.0	Lisboa 591.9, Milano 446.7, Torina 315.6	– 1.3
Sectoral aggregates				
Market Services	10.6	– 0.5	Prag 122.7, Amsterdam 119.8, London 118.7	+ 5.6
Agriculture	27.2	–48.7	Bordeaux 1446.4, Strasbourg 427.2, Bologna 354,3	+ 3.8
Non-Market Services	19.6	– 0.3	Den Haag 165.5, Berlin 149.5, Kobenhavn 138.7	+ 3.7
Manufacturing	29.6	– 6.1	Dublin 200.9, Stuttgart 183.2, Barcelona 178.5	+ 3.5
Construction	28.2	+ 7.4	Dresden 246.0, Leipzig 244.6, Madrid 193.1	+ 0.9

Source: ERECO-database; own calculations.

[14]) This interpretation is well in line with recent empirical studies for the EU, which find ample evidence for strong convergence at the national, but not at the regional level (*EU Commission*, 2001a, 2003).

As indicated by the coefficient of localisation[15] agriculture, most manufacturing sectors and tourism are rather concentrated in a few cities, while activities like wholesale and retail, other market services as well as non-market services are fairly evenly distributed across cities. While this uneven distribution of sectors in the city system may well be explained by standard location theory[16], it's implications for urban growth potentials are rather striking, given that sectoral growth rates range from +7,7% (other market services) to –1,3% (textiles) p.a. in 1980-2003. Without doubt, München, Paris or Hamburg as cities with a high specialisation in (fast growing) other market services should for example have better growth perspectives than Lisboa, Milano or Torino, cities heavily involved in (stagnant) textiles and clothing.

However, this "sectoral competitiveness" is not the whole story. There is ample evidence in regional economics that the same sectors grow differently in different regions, as the specific regional surroundings support regional firms to a different extent. Therefore it's not only a region's economic structure that determines success, but also it's endowment with growth-enhancing location factors and their efficient combination – exactly that "regional competitiveness" we mentioned in part 2.

To identify which of these kinds of "competitiveness" mattered (more) for the healthy growth performance of European cities (as compared to the whole regional system) in our period of observation, we decomposed growth processes in the whole European regional system (283 regions in the EU25) analytically in their (sectoral and regional) components. This can be done by means of a shift – share – analysis, a widely used standard tool in regional economics introduced by *Fuchs* (1959) and *Dunn* (1960)[17].

The methodology makes use of the fact that the overall growth rate of a single region i (x_i) equals the sum of it's sectoral growth rates (x_{ij}) weighted by the respective sector shares (s_{ij}) $x_i = \sum_j s_{ij} x_{ij}$, and that the overall growth rate of all regions (x) is $x = \sum_j s_j x_j$ equivalently. For this, the growth differential between a region and the regional system in total is

$$x_i - x = \sum_j (s_{ij} x_{ij} - s_j x_j) .$$

This can further be transformed to

$$x_i - x = \sum_j (s_{ij} x_j - s_j x_j) - \sum_j (s_{ij} x_j - s_{ij} x_{ij}) .$$

On the right hand side of this equation we see two growth components:

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[15]) The coefficient of localisation $CL_j = 1/2 \sum_{i=1}^{n} \left| GVA_{ij} \Big/ \sum_{i=1}^{n} GVA_{ij} - \sum_{j=1}^{m} GVA_{ij} \Big/ \sum_{i=1}^{n} \sum_{j=1}^{m} GVA_{ij} \right|$ with i = city (n=45) and j = sector (m=15) indicates the concentration of a sector within the city system compared to the overall distribution of activities in the system. The limits of this indicator are 0 and 1. The higher the coefficient, the more the sector is concentrated in a few places.

[16]| While concentration in most manufacturing sectors trace back to natural resources (e.g. mining) or increasing returns to scale at the firm level (electronics, transport equipment), services often follow regional population (representing demand) and are therefore more evenly distributed in space.

[17]) See e.g. *Rones* (1986), *Garcia-Milà – McGuire* (1993), *Mayerhofer* (1999) or *Acz* (2002) for regional applications of the methodology.

- A "structural effect" $\mu_i = \sum_j (s_{ij} - s_j) x_j$, measuring growth effects from the sectoral composition of a region's economic base. If a region is more specialised in (at the EU level) fast growing sectors than the whole regional system ($s_{ij} > s_j$), this effect is positive. A regional concentration of (in the EU) lagging sectors on the other hand would imply a negative structural effect.
- A "competition effect" $\pi_i = \sum_j s_{ij} (x_{ij} - x_j)$, representing regional growth differentials in the same sectors, due to differences in a region's ability to support their firms efficiently. Here a positive sign represents a positive regional growth differential, given (hypothetically) a sectoral structure identical to that of the EU regional system in total. A negative sign indicates a lower growth performance than expected if sectors would (hypothetically) be of equal size than in the "norm structure".

Table 3: Decomposition of European Cities Economic Growth, 1980-2003

City results from a Shift-Share-Analysis on all European regions, Contribution for GVA growth differentials in %

	GVA growth 1980-2003 (%)	Growth differential to the EU regional system in total	Structural effect	Competition effect
5 best growth performers				
Dublin	+ 281.2	+ 223.0	+ 5.9	+ 215.9
Oslo	+ 200.8	+ 142.6	+ 18.9	+ 123.7
Helsinki	+ 173.1	+ 114.9	– 2.6	+ 117.4
Cardiff	+ 170.3	+ 112.0	+ 2.4	+ 109.0
Stockholm	+ 135.0	+ 76.8	+ 3.8	+ 73.0
5 worst growth performers				
Bologna	+ 42.5	– 15.7	– 4.0	– 11.7
Bruxelles	+ 39.1	– 19.2	+ 7.1	– 26.2
Lille	+ 33.2	– 25.0	+ 2.7	– 27.7
Torino	+ 32.9	– 25.3	– 2.1	– 23.2
Genève	+ 14.2	– 44.0	+ 3.3	– 47.3
All EU-regions	+ 58.2	+ 0.0	+ 0.0	+ 0.0
European cities	+ 70.6	+ 12.4	+ 3.8	+ 8.6
Other regions	+ 53.1	– 5.1	– 1.6	– 3.6
Services centres	+ 75.4	+ 17.1	+ 5.4	+ 11.8
Industrial cities	+ 50.5	– 7.7	– 1.0	– 6.6
Servo-industrial cities	+ 71.1	+ 12.9	+ 3.0	+ 9.9
High-income cities	+ 71.3	+ 13.1	+ 4.7	+ 8.4
Mid-income cities	+ 59.8	+ 1.5	+ 3.2	– 1.6
Low-income cities	+ 88.1	+ 29.9	+ 1.6	+ 28.3
Large cities	+ 75.1	+ 16.9	+ 5.3	+ 11.6
Medium sized cities	+ 60.2	+ 2.0	+ 2.8	– 0.8
Small cities	+ 91.6	+ 33.4	+ 3.3	+ 30.0

Source: ERECO; own calculations.

Table 3 summarises the results of an application of this methodology on the European regional system, whereby we concentrate on the results for the cities. As one can see, GVA grew 70.6% from 1980-2003 in European cities (other EU regions +53.1%), a growth bonus of 12.4 percentage points compared to the expected value (assuming uniform structure and dynamics in the regional system). As both structural and competition effect show a positive sign, we may conclude that this growth bonus arose due to a better sectoral and regional competitiveness of cities (compared to the other EU regions): a sectoral structure more oriented on fast growing sectors and advantages in regional endowments. However, these bright preconditions do not apply to all European cities. While e.g. the 5 best performing cities show both positive structural and competition effects, the 5 worst growth performers do not. Also here we find some cities with a favourable economic structure (Bruxelles, Genève) compared to all EU regions, but this was well offset by marked regional disadvantages.

Table 4: Decomposition of European Cities Growth
Shift-Share-Analysis on all EU-regions; Results for cities 1980-2003

		Structural Effect	
		+	–
Competition effect	+	Lisboa (+0.005; +0.507) Utrecht (+0.008; +0.631) Cardiff (+0.024; +1.090) Madrid (+0.031; +0.479) Stockholm (+0.038; +0.730) Amsterdam (+0.046; +0.400) München (+0.051; +0.267) Rotterdam (+0.53; +0.031) Frankfurt (+0.057; +0.041) Dublin (+0.059; +2.159) Lyon (+0.065; +0.014) London (+0.074; +0.128) Paris (+0.082; +0.094) Oslo (+0.190; +1.237)	Wien (–0.054; +0.117) Helsinki (–0.026; +1.174) Glasgow (–0.023; +0.327) Stuttgart (–0.010; +0.039) Den Haag (–0.004: +0.052) Edinburgh (–0.004; +0.633) Barcelona (–0.000; +0.267)
	–	Zürich (+0.027; –0.047) Lille (+0.027; –0.277) Hamburg (+0.028; –0.173) Roma (+0.030; –0.001) Bordeaux (+0.32; –0.018) Geneve (+0.033; –0.473) Köln (+0.037; –0.090) Düsseldorf (+0.039; –0.022) Marseille (+0.043; –0.012) Kobenhavn (+0.058; –0.126) Strasbourg (+0.064; –0.108) Bruxelles (+0.071; –0.262) Athina(+0.134; –0.226)	Birmingham (–0.046; –0.090) Bologna (–0.040; –0.117) Manchester (–0.039; –0.109) Torino (–0.021; –0.232) Milano (–0.008; –0.102)

Source: Own calculations.

Indeed, only one third of all cities analysed combine positive structural and regional effects (table 4), while a group comparable in size was influenced by a growth enhancing economic structure, but an unfavourable environment. In comparison, negative structural impacts were more infrequent at the city level in the period observed, and the city group with deficits in both sectoral and regional competitiveness was rather small.

While more cities benefited from a favourable economic structure than from advantages in regional competitiveness in 1980-2003, these latter (competition) effects were more influential for the growth differentials observed[18]. As one can see in table 3, best performing cities were driven by large (positive) competition effects, while structural effects added only a few percentage points to the huge growth differentials these cities experienced compared to their hypothetical evolution. Also in the worst performing cities the main contribution to their problems cannot be attributed to structural effects, but rather to a negative impact from (a lack of) regional competitiveness (competition effects). Overall, the 12.4 PP growth advantage of European cities in 1980-2003 consists of a 3.8 PP growth bonus from structural effects and a larger 8.6 PP growth contribution from competition effects. The notion of a higher influence of competition effects on city growth thereby applies to virtually all city types defined. Note, however, that the sign and the evolutions of structural and competition effects are different across city types (table 3, figure 2). If we look at broad sectoral orientations, Services cities growth relied on significant structural as well as competition advantages, which were fairly stable over the period. Servo-industrial cities managed a similar overall growth, but lost a lot of their regional and some of their structural advantages in the course of the 1990s. On the other hand, Industrial cities were able to improve both components between the 1980s and 1990s, albeit a considerable growth penalty remained even compared to the EU regional system as a whole.

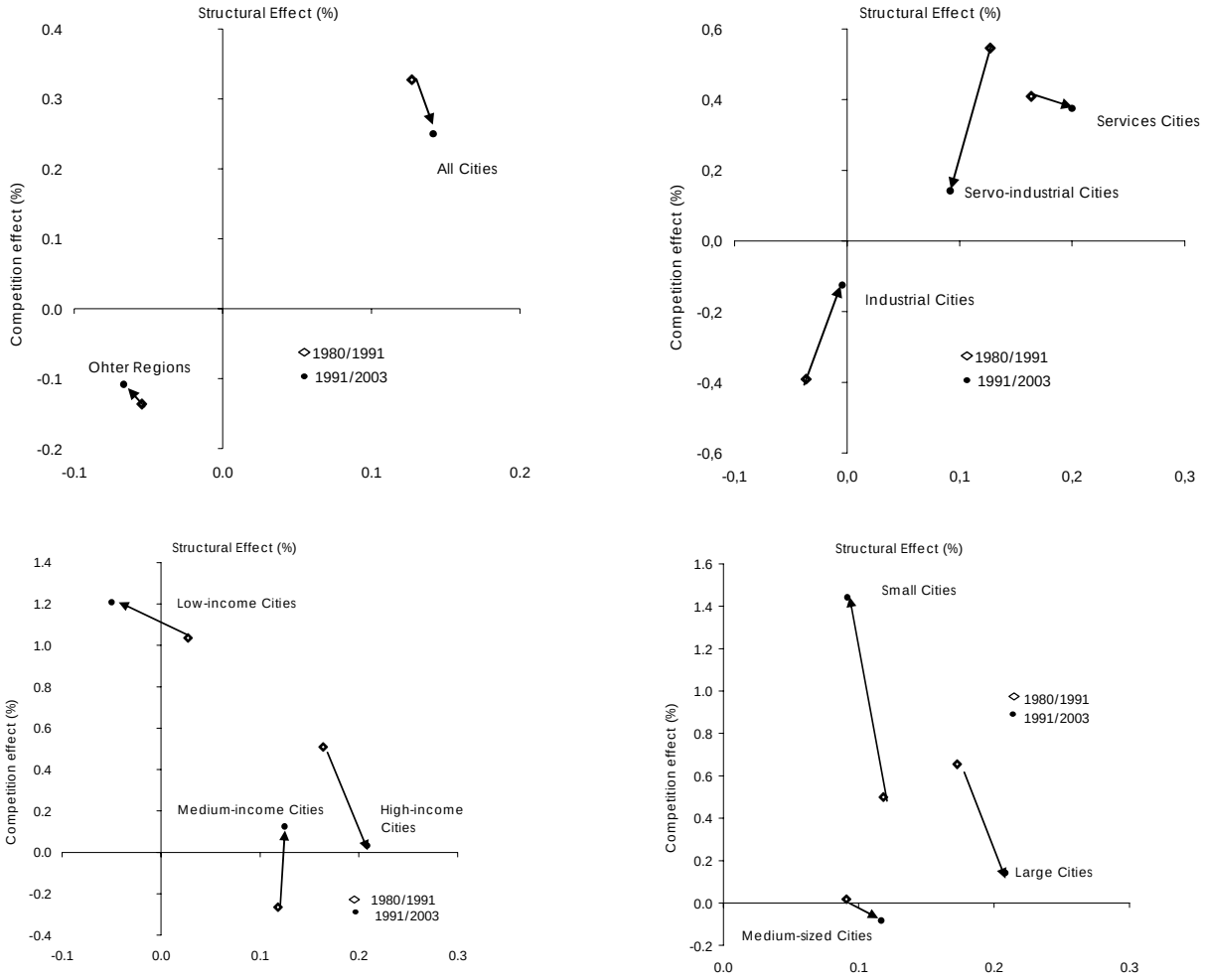
What concerns city size, the considerable growth advantages of Small cities mentioned above rely on a healthy economic structure, but more than that on a supporting regional environment, which these cities managed to develop further in the period observed. On the other hand, Large cities lost a relevant part of their regional competitiveness from the 1980 to the 1990 (possibly due to growing congestion costs), but were able to maintain a relevant growth advantage over the whole regional system by further specialising on fast growing sectors[19].

Last but not least it may be interesting that the above mentioned catching up of Low-income cities in 1980-2003 was not based on an improvement of that cities' economic structure, but solely on high and rising competition effects. In fact, structural precondition in Low-income cities even deteriorated from the 1980s to the 1990s, a growth penalty that was compensated, however, by a further rise in regional advantages. Convergence within the city system may therefore be driven more by cost-based factors than by an up-grading of Low-income cities' position on the quality ladder of the international production system.

[18]) This result is well in line with recent studies, which identify only limited contributions of the structural component to (employment) growth differentials between EU countries (*Müller – Schmutzler*,1997) and EU regions (*Esteban*, 2000). For Germany, *Bade* (1991) showed that a regional (employment) forecast based on the structural component of a shift-share framework performs worse than a forecast that simply assumes identical regional growth rates.

[19]) One may wonder why Large cities have a positive competition effect at all, given their steady loss of production units due to decentralisation to the agglomeration fringe. Note, however, that our city data proxy functional urban regions, which means that these effects occur within our city regions for the most part.

Figure 2: Evolution of Structural and Competition Effects in European Cities
Change in shift-share components 1980/1991 vs. 1991/2003 p.a.



Source: own calculations.

In sum, our evidence suggests that the healthy economic growth of European Cities in 1980-2003 was based on a favourable economic structure (structural effect), but that regional growth differentials were more than that driven by a city's ability to support urban firms by complementary assets, were they infrastructure, qualified human capital, a specific innovative milieu or agglomeration economies in general (competition effect).

This limited role of "growth sectors" for city performance may well challenge urban structural policies that try their luck in detecting and fostering "rising stars" at the sectoral level - an approach that was very popular in the 1960s and 1970s especially. However, it certainly does not question structural policies at the city level in general. Think about the nearly ubiquitous attempts to utilize external economies of scale by fostering inter-sectoral linkages in networks and "clusters". Think about the widely accepted notion that cities have to specialise in the ever growing city competition to reach "critical masses" in activities with increasing returns

and therefore gain in international competitiveness. The benefits of these activities – if they are really growth enhancing – are represented not in the structural component of a shift-share – framework, but in the residual (competition) component.

While we are not able to say much about the growth effects of inter-sectoral "clusters" here due to the severe limitations of our database[20], we are able to give some hints about the effects of specialisation (versus diversification) on European city growth. This is the topic to which we now turn.

5. Specialisation and Diversity at the European City level: Some stylised Facts

The question if specialisation in a few activities or a diversified economic structure is better for city growth is not fully determined by theory. What we can learn from urban economics in a nutshell is that the answer to this question depends on the way agglomeration forces work at the city level[21]: If external economies of scale (as the necessary centripetal forces that bring cities into existence) are strictly intra-industrial and therefore limited to the level of the individual sector (Marshall's "localisation economies"), a concentration on a few activities will enhance city growth, given that congestion costs (land rents, commuter costs) as the countervailing centrifugal forces are not industry specific. In the end, we will in this case find a system of totally specialised cities, whereby their size may differ, given that "localisation economies" are not equally important for all sectors (*Henderson*, 1974). If, however, external economies go across sectoral boundaries and work inter-sectoral also in the form of more general "urbanisation economies", the growth bonus of specialisation vanishes and a city system with specialised and diversified cities will arise. In this system again city size depends on sectoral structure, whereby diversified cities will generally be larger than specialised ones (*Abdel-Rahman*, 1990; *Abdel-Rahman – Fujita*, 1993).

Whether external economies work intra- or inter-sectoral, will be influenced in turn by the way technological spillovers spread over a city's economy. If spillovers are strictly intra-sectoral in nature and knowledge spills over between firms within an industry – the "Marshall-Arrow-Romer (MAR)" externality in the notion of *Glaeser et al.* (1992) – then the concentration of an industry in a city fosters knowledge creation and therefore growth of that industry and of that city. If, on the other hand, most important knowledge spillovers stem from outside the core industry (*Jacobs*, 1969), it's more the variety and diversity of geographically proximate industries than specialisation that matter for innovation and growth (*Glaeser et al.*, 1992).

To clarify the picture somewhat for European Cities, we first had to specify useful indicators of specialisation and diversity at the city level. We relied on *Duranton – Puga* (2000) here. As a reasonable measure of absolute specialisation these authors suggest the GVA share (s) of the largest sector (j) in a city (i). As non-market services is a very large sector in all European cities,

[20]) See however the growing empirical literature on the topic. Recent research developed methods to identify regional "clusters" without relying on a priori information (as was the case in the myriads of "case studies" on ever the same few cluster models in the 1970s and 1980s), and to measure the impacts of such clusters on growth by considering positive externalities by agglomeration, but also negative externalities by congestion effects. See *O'Donoghue – Gleave* (2004), *Fingleton et al.* (2005) and *Feser et al.* (2005) as recent examples.

[21]) For a comprehensive survey see *Duranton – Puga* (2000).

we implemented this indicator $ZI_i = \underset{j}{Max}(s_{ij})$ for the (14) sectors of market production only. Moreover, we also calculated a variant of this indicator ($DI3_i$) comprising the largest 3 sectors in each city for sensitivity tests.

To better handle the problem that some sectors are by definition larger than others, we in addition looked at the cities relative (rather than absolute) specialisation. By dividing the share of each sector in a city's GVA by its respective share in the whole city system, we got a Relative Specialisation Index $RZI_i = \underset{j}{Max}(s_{ij} / s_j)$, where s_j is the share of sector j in total GVA of the city sample. Also here we calculated an additional variant which widened the focus on the 3 most concentrated sectors ($RZI3_i$).

Turning to diversity, we introduced a conventional measure of variety based on the inverse of the Hirshman-Herfindahl index. This (absolute) diversity index sums for each city (i) the square of each sector's share in city GVA $DI_i = 1/\sum_{j=1}^{15} s_{ij}^2$ [22]. Note that also here the problem of uneven sectoral GVA shares at the level of the whole city system arises. *Duranton – Puga* (2000) therefore suggest a relative diversity index $RDI_i = 1/\sum_{j=1}^{15} |s_{ij} - s_j|$, which sums (over all sectors) the absolute value of the difference between each sector's share in city GVA and its share in GVA in the whole city system[23].

An application of these indicators to our city sample first of all generates ample evidence that specialised and diversified cities co-exist in the European city system (table 5).

Relative specialisation in the 5 most specialised cities is 5 times higher than in the 5 least specialised ones. Thereby cities heavily specialised usually depend on agricultural (Bordeaux) and industrial activities (Birmingham, Lisboa, Edinburgh), sectors we also identified as the most localised ones in the city system in table 2. Note that diversity and specialisation are not exact opposites, as a city with a main sector and a broad base in other activities may well be both specialised and diversified (*Duranton – Puga*, 2000). Nonetheless, diversified cities (highest: Stockholm, Paris, Hamburg) are as a rule not very specialised in one activity, which is indicated by a negative correlation between RZI (RZI3) and RDI (r = -0.239 and -0.395 respectively).

On average Small cities show far higher indicator values for relative specialisation and lower ones for (absolute and) relative diversity, which points to a systematic relationship between city size and specialisation (negative) as well as diversity (positive).

Indeed, in line with theoretical expectations and empirical results for the US (*Duranton – Puga*, 2000) larger European cities tend to be more diversified and less specialised (figure 3). However, the relationship is not very strong (correlation between city size and specialisation -0.210 and between city size and diversity +0.268), given a large share of non-tradable

[22]) The indicator is 1 if the city under consideration is fully concentrated in one sector, and shows higher values as diversity increases.

[23]) The indicator increases the more the composition of activities in city i mirrors the diversity in the whole city system.

activities in most of the cities and some larger cities with high specialisation (Lisboa, Milano) or low diversity (Barcelona).

Table 5: Specialization and Diversity in European Cities, 2003

	Specialisation		Diversity	
Ranking	City (Sector)	RZI	City	RDI
1	Bordeaux (Agriculture)	1,446.4	Stockholm	44.7
2	Birmingham (Transport Equipment)	604.6	Paris	27.1
3	Lisboa (Textiles and clothing)	591.9	Hamburg	23.8
4	Edinburgh (Electronics)	558.2	Lyon	22.8
5	Helsinki (Electronics)	518.9	Düsseldorf	22.0
6	Milano (Textiles and clothing)	446.7	München	21.1
.	.	.	.	.
37	Düsseldorf (Mining and Energy Supply)	127.6	Oslo	10.9
38	Paris (Other Market Services)	126.8	Glasgow	9.9
39	Hamburg (Other Market Services)	125.6	Geneve	9.7
40	Frankfurt (Other Market Services)	124.1	Dublin	9.3
41	Köln (Mining and Energy Supply)	123.6	Zürich	9.1
42	Stockholm (Other Manufacturing)	120.9	Barcelona	8.3
	All cities	100.0	All cities	14.4
	Services centres	117.2	Services centres	15.2
	Industrial cities	191.7	Industrial cities	11.4
	Servo-industrial cities	134.4	Servo-industrial cities	14.9
	High-income cities	111.5	High-income cities	16.0
	Mid-income cities	183.5	Mid-income cities	15.2
	Low-income cities	182.3	Low-income cities	12.4
	Large cities	134.1	Large cities	14.4
	Medium sized cities	128.6	Medium sized cities	16.3
	Small cities	249.5	Small cities	12.3

Source: ERECO; own calculations.

Last but not least a high specialisation seems to impact negatively on an European city's ability to guarantee their inhabitants high incomes. RZI is around 180 on average for Low-income cities but only 111 for High-income cities; and High-income cities are on average more diverse than "poorer" ones. However, this phenomenon may simply be driven by the fact that Industrial cities - the city type for which we identified lower GVAs per (working age) population in table 1 - are more specialised and less diverse.

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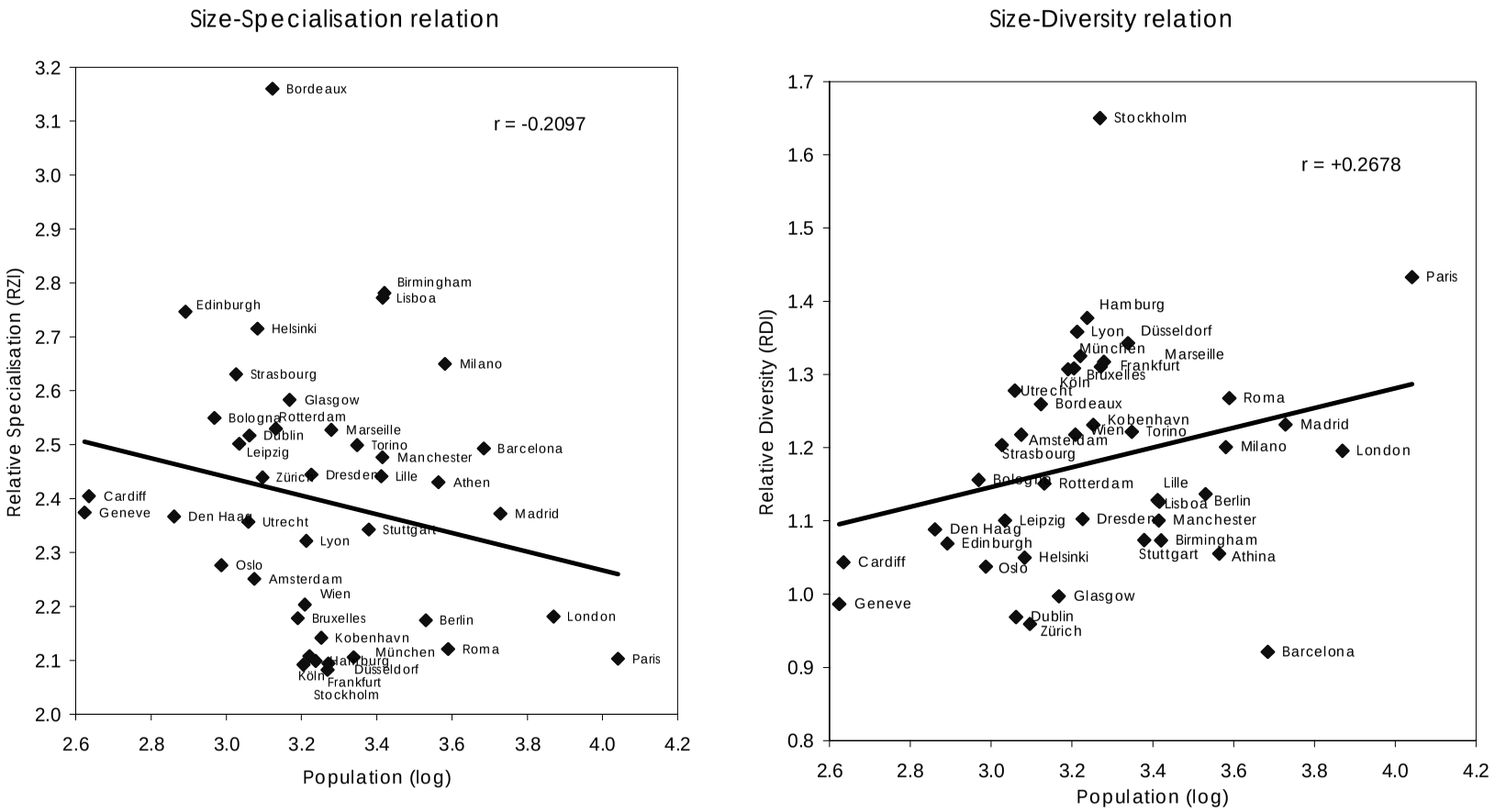
Figure 3: Specialisation and Diversity by City Size, 2003



Source: ERECO-database, own calculations.

6. Do Structural Characteristics matter for City Growth? An econometric Analysis

If we want to say something useful about the relationship between European city performance and structural issues, we therefore have to proceed to a somewhat more formal approach. Hence, in the rest of the chapter we try to identify the correlation between city dynamics and our structural variables by means of an econometric growth exercise in the tradition of *Barro* (1991, 1997). We use growth of Gross Value Added per working age population (Q/A) in our city sample as dependent variable. Due to a lack of data, our analysis is restricted to 40 cities (excluding those in the New EU Member States and Eastern Germany). For the same reason we are not able to use a panel-econometric approach in estimating the parameters, hence the well-known problems of a pure cross section (*Quah*, 1993) apply.

Our starting point for estimation is the neo-classical growth model, which emphasises the role of capital accumulation, i.e., the propensity to invest (which is identical with the propensity to save in a closed model) for growth. With marginal productivity of capital decreasing by assumption, the model produces a convergence expectation: The lower the starting level of a city (measured by Q/A), the higher the growth rate ceteris paribus. If cities were intrinsically the same except for their starting capital intensities, convergence would apply in an absolute sense: cities with a low Q/A would tend to grow faster than more developed ones. However, if cities differ in various respects, then convergence applies in a conditional sense only: growth rates tend to be high if initial Q/A is low in relation to its steady-state level[24].

Our regression equation is $g = \alpha + \beta \ln(y_{it-T}) + X_{it-T}\gamma + u$, whereby $g = (1/T)\ln(y_{it}/y_{it-T})$, y_{it} denotes Q/A in city *i* at time *t*, *T* denotes the period from the initial year (1980) to the last year (2003), *u* is the regression residual and ***X*** is a vector of variables influencing the steady-state.

Table 6 presents the results of our estimates. Note first that we were not able to reject the null hypothesis of normally distributed errors by means of a Jarque-Bera – normality test at the 5 % level in this and the following specifications. Additionally, we were not able to reject the Null of homoskedastic errors by means of a White test in all but model 2[25] . Therefore a simple Ordinary Least Squares (OLS) estimator seems appropriate[26].

Testing first for unconditional convergence (model 1), our results seem to confirm the importance of convergence forces in the European city system, which we already supposed in our descriptive analysis (section 2). The coefficient on the initial level of Q/A is negative and significant, indicating that, on average, less developed cities have grown faster in 1980-2003.

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[24]) Formally, the model can be represented as Dy = f(y,y*), where Dy is growth of Q/A, y is the initial level of output per capita at working age, and y* is the steady-state level. Dy is diminishing in y for given y* and rising in y* for given y, whereby y* depends on further variables determining the steady-state. For a given initial level of Q/A (y) an increase in y* raises Dy over a transition interval. For given y*, a higher y implies a lower growth rate.

[25]) In this model we therefore applied the heteroskedasticity consistent covariance matrix estimator proposed by *White* (1980) to correct standard errors.

[26]) OLS is the best linear unbiased estimator (BLUE) if and only if $u \approx N(0, \sigma^2 I)$.

However, adjusted R-squared tells us that model 1 explains only a quarter of the variance in cities growth rates, which should not be surprising given that this model implicitly assumes that European cities do not differ in their fundamentals and therefore converge to the same steady-state.

Table 6: Growth Regressions for GVA per Working Age Population (Basic Models)
Cross section estimates for European Cities, 1980 – 2003, OLS-estimator[1])

	Model 1	Model 2[1])	Model 3
Constant term	+0.05569***	–0.41047***	–0.39162***
	(5.48)	(2.99)	(3.29)
log (Q/A 80)	–0.01083***	–0.01205***	–0.00503
	(3.78)	(4.11)	(1.53)
LQCONST 80		+0.00033***	+0.00029***
		(3.51)	(3.39)
LQMAN 80		+0.00096***	+0.00088***
		(3.27)	(3.45)
LQMSERV 80		+0.00239***	+0.00208***
		(3.53)	(3.47)
LQNMSERV 80		+0.00104***	+0.00095**
		(3.28)	(3.48)
g_{NAT}			+0.53757**
			(2.44)
$\bar{R}^2$	0.259	0.444	0.512
F-statistic	14.288***	7.080***	7.115***
Akaike-criterion	–6.716	–6.913	–7.200
Jarque-Bera Normality Test	1.855	2.221	0.088
White (F-)test for Heteroscedasticity	2.336	1.939	0.503

Source: Own calculations. t-values in brackets. – *** significant at the level of 1%, ** significant at the level of 5%, * significant at the level of 10%. - [1])White Heteroscedasticity-consistent estimator.

Model 2 therefore controls for differences in the steady state by adding the location quotients of construction (LQCONST), manufacturing (LQMAN), market services (LQMSERV) and non-market services (LQNMSERV) to the regression. By this we assume (in line with the results of section 4) that the sectoral orientation of a city shapes it's long run (steady state) growth path. This presumption is well confirmed by our results. The added structural variables are statistically significant without exception, and the explanatory power of the equation nearly doubles to 0.44, which seems fairly satisfactory for a cross-section analysis that intends to explain growth rates by levels. The results indicate positive (long run) growth contributions from an orientations on market services, and (to a minor extent) non-market services and

manufacturing respectively. The convergence term is again negative and significant, indicating a speed at which cities approach their respective steady state Q/A level of 1.41% per year in 1980-2003[27].

However, this (slow) movement of European cities to their steady state level seems less driven by (autonomous) convergence forces at the European city level, but by respective forces at the country level. This is indicated by model 3, in which we integrated growth of Q/A at the respective national level (g_{NAT}) in 1980-2003 to control for long run growth differentials between countries. As we can see, this variable is significant at the 5% level and adds explanatory power to the equation, but causes the convergence term to halve and loose significance.

Table 7: Structural Variables explaining Growth of GVA per Working Age Population
Partial regressions based on Model 3; OLS-estimator

Variables	Definition	Coefficient	t-Value	$\bar{R}^2$	Akaike-criterion
log (ZI80)	Absolute Specialisation-Index (1 Sector) 1980	–0.00628	0.998	0.512	–7.179
log (ZI380)	Absolute Specialisation-Index (3 Sectors) 1980	–0.01786	1.400	0.527	–7.212
log (RZI80)**	Index of relative Specialisation (1 Sector) 1980	–0.01217	2.582	0.592	–7.358
log (RZI380)***	Index of relative Specialisation (3 Sectors) 1980	–0.019635	3.155	0.627	–7.449
log (DI80)**	Index of absolute Diversity 1980	+0.0295	2.059	0.561	–7.286
log (RDI80)	Index of relative Diversity 1980	+0.00428	1.332	0.524	–7.206
log (RZI80)*	Piecewise Regression of RZI for different City Sizes	–0.00765	1.794	0.698	–7.622
log (RZI80)*DUGROSS***		–0.00152	2.839		
log (RZI80)*DUMITTEL***		–0.00114	3.037		–7.200
log (RDI80)**	Piecewise Regression of RDI for different City Sizes	+0.00766	2.676	0.666	–7.523
log (RDI80)*DUGROSS***		–0.00307	2.904		
log (RDI80)*DUMITTEL***		-0.00276	3.455		

Source: Own calculations. – *** significant at the level of 1%, ** significant at the level of 5%,
* significant at the level of 10%. Formal definitions see chapter 5; DUGROSS and DUMITTEL denote dummy variables for large and medium-sized cities as defined in table 2.

[27]) As $\beta = -\left(1 - e^{bT}/T\right)$, the rate of convergence (b) can be estimated directly from OLS estimates of β (*Barro – Sala-I-Martin*, 1995).

Last but not least, we tried to capture the impact of a specialised and/or diversified economic structure on city growth by adding the indicators introduced in section 5 to our model 3. The results in table 7[28] indicate that diversity was in fact growth enhancing in 1980-2003, but that specialisation was definitely not. While we were not able to generate significant results for absolute specialisation, which is not surprising given the caveats of the indicator involved (see above), we were able to identify a significant but negative relationship between city Q/A growth and relative specialisation. The respective indicators are statistically significant at the 1% (RZI3) and 5% (RZI) level respectively and further enhance the explanatory power of our model to about 60% of total variance.

Turning to diversity, we are able to identify a significant (and positive) influence of absolute diversity on European city growth at the 5% level, and this applies to relative diversity too, if we allow the variable's impact on growth to vary according to city size by means of a piecewise regression approach. In this case RDI is significant at the 5% level, whereby the influence of diversity on growth seems higher for small cities than for larger ones, although the latter are more diversified on average. In line with recent studies on the US city system[29] our results therefore question the widely accepted notion that only specialisation is the way to success in city competition. A diversified economic structure may be impeding to localisation economies and to the coming up of "critical masses" in sectors with increasing returns. On the other hand, variety may foster knowledge spillovers and therefore innovativeness and in addition makes cities less vulnerable to sector-specific shocks. Overall, in line with recent research[30] we think that both specialised and diversified cities play their part in the European city system; and that both will find growth potentials, if they are well endowed with growth-enhancing location factors and therefore accomplish their specific function in the city system efficiently.

This may be seen in figure 4, that plots the deviation of a city's growth rate in 1980-2003 from it's (hypothetical) rate, computed from our extended model 3 (including indicators for relative specialisation and diversity). We see that individual cities deviate up to more than +/- 1 PP per year from their fitted values after controlling for different initial development levels and structural preconditions. This provides ample evidence for the importance of regional characteristics in city growth. Obviously, cities like Stockholm, München or Helsinki managed to support their firms very efficiently in their strive for market success by providing complementary assets, while the performance of cities like Athina, Lille or Manchester was

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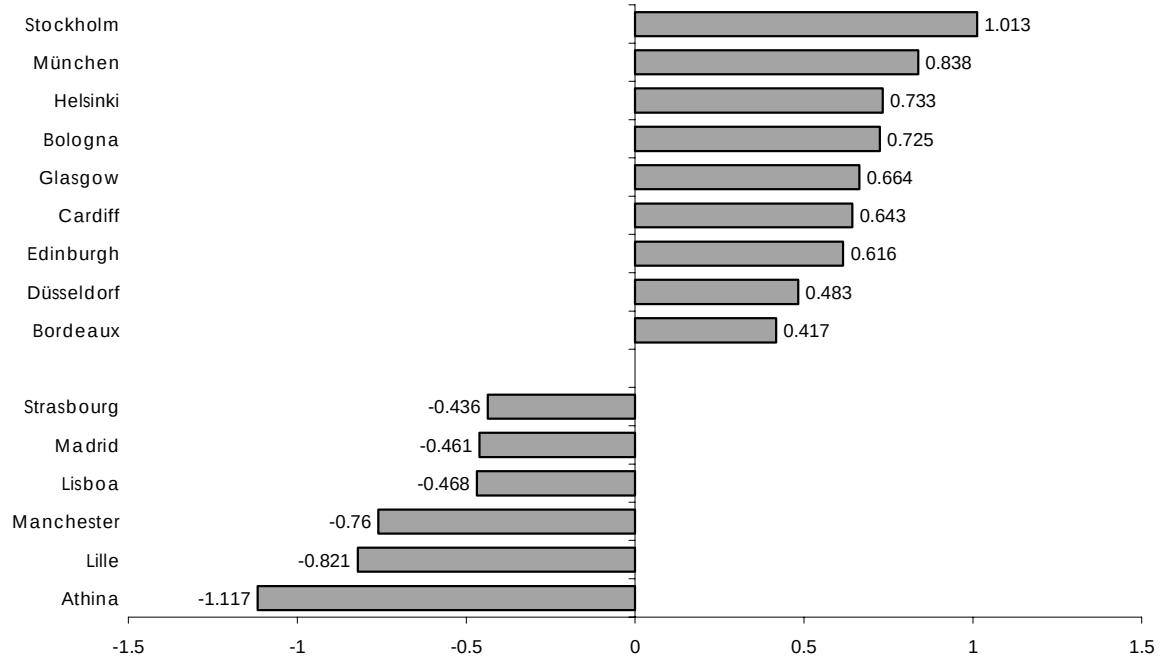
[28]) Parameter values of the basic model 3 were only marginally affected by the inclusion of these specialisation/diversity – indicators.

[29]) Here recent empirical studies have found that diversity fosters growth in US cities (*Glaeser et al*., 1992) or at least in their most innovative sectors (*Henderson et al*., 1995), while specialisation do not (*Glaeser et al*., 1992) or only in mature industries (*Henderson et al*., 1995). Diversity encourages firm birth (*Duranton – Puga*, 2001; *Rosendahl – Strange*, 2003) and innovation (*Feldman – Audretsch*, 1999), while narrow specialisation hinders it.

[30]) In the dynamic general equilibrium model of *Duranton – Puga* (2001), new products are developed in diversified cities by trying processes borrowed from different activities. On finding the ideal production process, firms switch to mass production and relocate to specialised cities with lower costs. In the end, specialised and diversified cities coexist, whereby firms start their production in a diversified ("nursery") city and move to a specialised one (to reap localisation economies) in later stages of the product cycle. Empirically, the authors present French data that support their arguments.

significantly worse than expected, given their structural attributes. This again points to the importance of "regional competitiveness" and "good governance" in shaping a city's long run evolution, a fact urban policy makers should be fully aware of.

Figure 4: Winners" and "Losers" in City Competition 1980 - 2003
Difference between actual growth and expected growth from model autput, in percentage points p.a.



Source: Own calculations; Cities with a deviation of at least 0.4 percentage points p.a. from fitted values only.

7. Conclusions

One major finding of the empirical efforts documented above is that it seems possible to deduce some useful insights on city competitiveness issues from European data, although data bases are more restricted here than (say) in the US. In line with *DeFreitas et al.* (2003) we used (growth of) Gross Value Added per working age population as a reasonable proxy for city competitiveness, as this indicator focuses on efficiency (and not distributional) issues and excludes factors exogenous to urban policies.

In an empirical application of this indicator on our European city sample we detected a wide (7:1) disparity in (real) GVA per working age population in 2003, whereby differences in cities competitiveness were not only large, but highly persistent within the 23 years period of observation. However, a considerable movement within the distribution of the indicator in the city system was present nonetheless. Growth rates spread from +4.3% p.a. to +0.4% p.a. in 1980-2003, whereby smaller (services and servo-industrial) cities and those with lower income levels took the lead.

Overall we were able to detect some convergence in the European city system. European cities moved slowly to their respective steady-state in 1980-2003, whereby this phenomenon

was driven less by (autonomous) convergence forces at the city level, but by respective forces at the country level.

In addition, the fact that European cities approximated in Q/A levels in the last quarter of a century was not equivalent to a convergence in the EU regional system as a whole: In 1980-2003, growth in EU cities slightly exceeded that of other EU regions, albeit initial Q/A levels were three times higher in urban places than in other regions.

Results from a shift-share framework told us that this growth bonus of European cities was due to both sectoral and competition effects – an economic structure more oriented on fast growing sectors ("sectoral competitiveness") as well as advantages in regional endowments ("regional competitiveness"). In quantitative terms, however, better regional environments were more important for city growth in 1980-2003 than favourable structural preconditions: The 12.4 PP growth premium of EU cities (compared to all EU regions) consists of a 3.8 PP bonus from sectoral effects and a 8.6 PP bonus from competition (regional) effects.

What concerns overall patterns of economic activities in European cities, our empirical evidence suggests that specialised and diversified cities clearly coexist, and that larger cities usually are more diversified and less specialised, as expected by theory. In addition, richer cities show more diversity than poorer ones, a fact that leads us to the question to what extent structural characteristics are causal to city growth.

In an econometric exercise we learned that sectoral preconditions significantly shape city growth, with cities more oriented on market services and (to a lesser extent) non-market services as well as manufacturing better off than cities concentrated in construction and/or agricultural activities. In addition, our results indicate that diversity was in fact growth enhancing in 1980-2003, while specialisation was not.

However, individual city's growth performance was only partially determined by structural preconditions in the period analysed, which points to the importance of the regional framework within which firms operate. Cities that managed to support their firms efficiently in striving for market success experienced far higher growth rates than expected in some cases, while other cities performed significantly worse than expected, given their structural attributes. Hence, it is obviously not only overall patterns of economic activity, but "regional competitiveness" and "good governance" that shaped European cities long run evolutions from the 1980s onwards.

If we want to draw a general policy conclusion from our findings – which can admittedly only be tentative given the restrictions of the database used - we may therefore conclude that policy measures to grow "future industries" and "clusters" seem promising if (and only if) they are accomplished by horizontal policy measures, that try to optimize entrepreneurial surroundings by providing complementary assets like transport- and telecommunication infrastructure, a qualified human capital, a flexible regulatory regime and a powerful regional innovation system. A common and consistent attempt of structural policies, infrastructure policies, qualification and training, labour market policies and innovation policies in a city may therefore - if implemented on a persistent basis - provide the best possible framework for structural change and innovation and therefore sound economic growth.

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