

# Industrial Diversity, Spatial Differentiation and Social Cohesion Communicative Structures in the Housing Topos

Edwin Deutsch, Martin Kerndler

University of Technology, Vienna  
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## Summary

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Address of the authors:

Prof. iR. Dr. Edwin Deutsch  
Institute for Mathematical Methods in Economics  
Research Group EOS  
University of Technology  
Argentinierstrasse 8  
A-1040 Vienna  
Mail: [edwin.deutsch@tuwien.ac.at](mailto:edwin.deutsch@tuwien.ac.at)

The industrial productivity of a country much depends on the degree to which the regions participate in the productive process, and on the quality of the labour force that is available there. The workers and employees support the process by education, learned skills and their living conditions, which can be valued, among others, by the quality of housing in which they spend their private life. These conditions are responsible for the extent of social cohesion on which the welfare of a society is built.

This project is about the interplay between the spatial allocation of productive activities and housing services. The allocation continuously varies over time due to demographic change, labour skills and general economic conditions. The innovative feature of the study is to test some hypotheses about the diversity of industrial structures and their impact on productivity and economic stability. In particular, the hypotheses cover the role of settlement structures, communication and social cohesion. The cohesion shows up in social interactions allowed for by the composition of social strata in housing. For that process the authors coined the notion of "Housing Topos", already introduced in the previous study of Deutsch and Wolf (2008), and investigated now in elaborated spatio-temporal econometric analysis.

A wide body of literature permits to conclude that spatial problems become acute if there is a mismatch between settlement structures, skill education and local employment opportunities. Starting from the seminal work of Jane Jacobs "The economy of cities" (1970), the theories discussed in the main text can be condensed in the basic proposition:

**The more vivid the diversity of activities and communicative structures, the more productive the regions.**

Together with the ties to contemporary theories of regional and urban economics, and even to the current EU-wide debate about the scope of social renting, the concept is worked out for labour productivity seen from four interrelated angles:

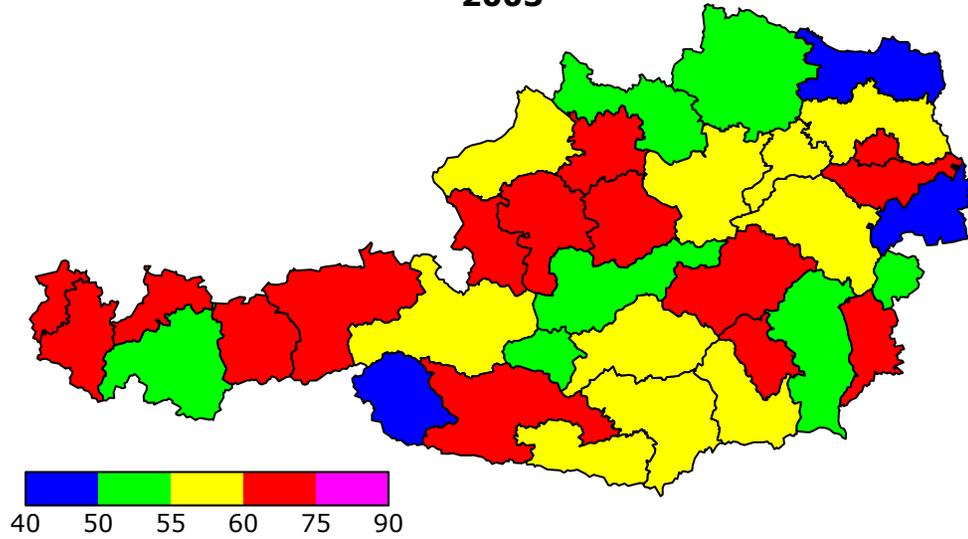
1. Diversity of regional productive activities through a rich variety of industrial sectors,
2. Social Cohesion through sufficient participation of labour in the productive process,
3. Demography of the characteristics of the workers like skills, ages and origin,
4. Polarisation between social strata, which includes the conditions of social housing.

As described below this design leads to four hypotheses that aim at testing the factors that may foster or impede the process of regional labour productivity.

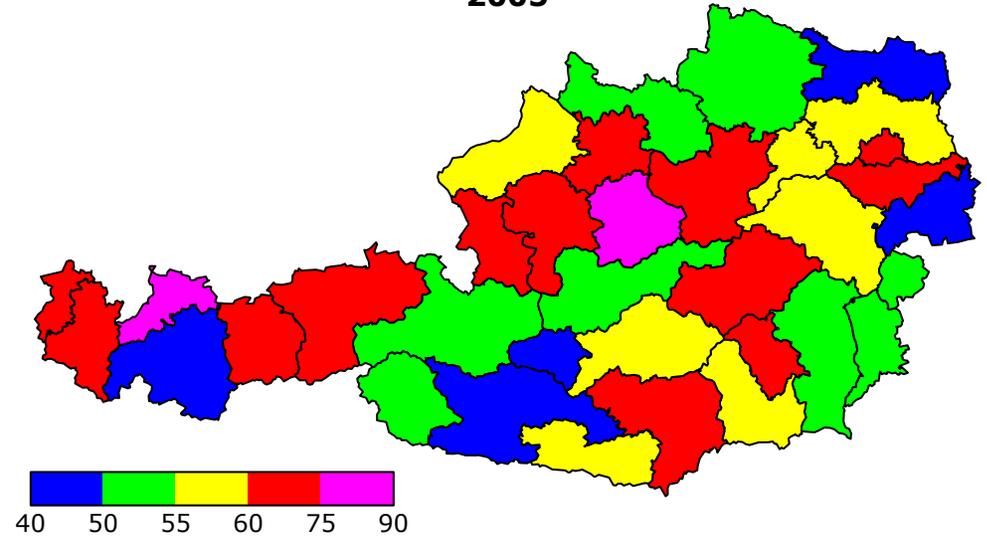
Looking briefly at the empirical evidence, Austrian productivity ranks above the OECD-average, on par with a group of countries that include France, Sweden and Germany. But a closer look reveals that the productivity varies considerably across the Austrian regions, see the substantial disparities shown in Figure 1. In the crisis year 2009, several traditional industrial regions could almost preserve the productivity level attained before the crisis. But interestingly, the Austrian regions along the North-Eastern border apparently profited from the new EU-member states and fared better. Instead the Northern, Southern and Alpine parts of Austria suffered the most.

**Fig. 1: Productivity level KEYPROD by NUTS3-region**  
in 1000 EUR, Prices 2007  
Source: Statistics Austria

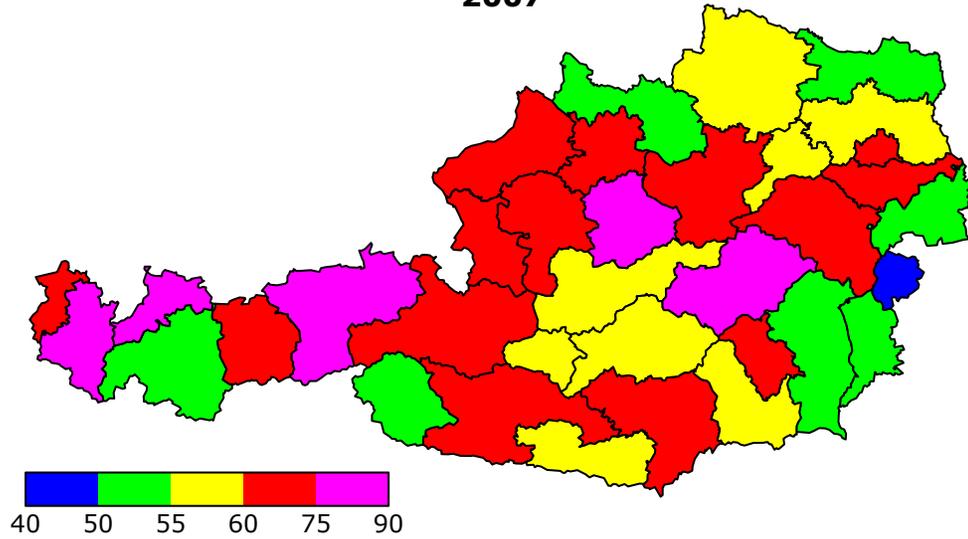
**2003**



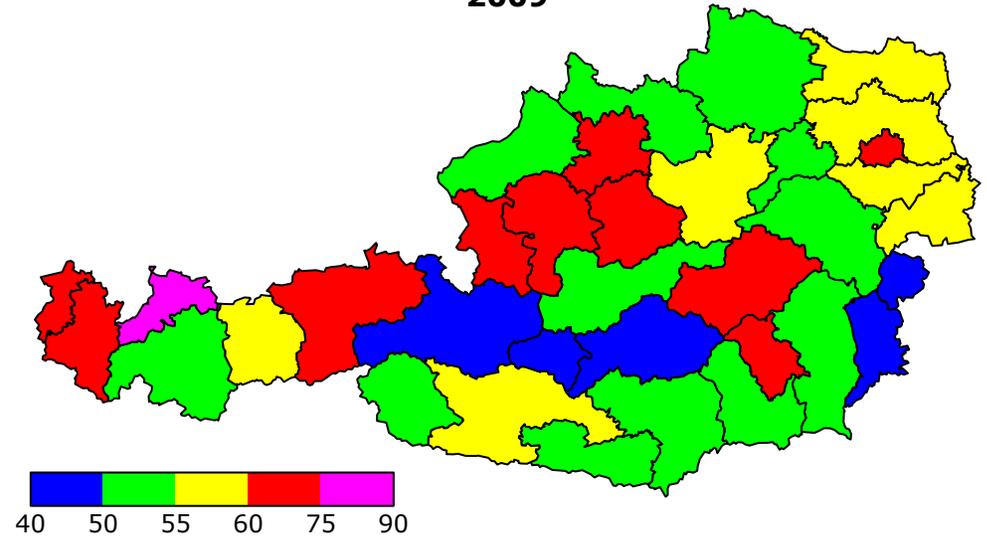
**2005**



**2007**



**2009**



## The data

The object under study are the Austrian industrial activities over the years 2003 to 2009, classified into 35 NUTS3-regions. The basic data are provided by Statistics Austria, which are the Structural Business Statistics ("Leistungs- und Struktur-erhebung"), the Austrian Census, and the migration statistics ("Wanderungsstatistik"). The data were completed by WIFO-data and other sources.

The study focuses on private firms in the industry, construction and selected services tied to industrial activities. Instead, the majority of private services like trade of consumer goods and the public sector remain excluded. From the Business Statistics we sorted out eight industrial segments called KEY-sectors: These are the manufacturing sectors Consumption goods, Metal industry, the total of Machines, Electric and Electronic products, then Chemical products and Building materials. Further KEY-sectors are Structural building ("Construction") and the service sector Car repair and Car trade. Most important are the Communicative services that cover essential activities like networking, research and development, but also non-industrial services like telecommunication and marketing. These eight sectors are selected according to the maximum amount of information contained in the data base.

The data were aggregated into a biannual panel from 2003 to 2009, on the meso-scale of NUTS3-units. The panel represents 1.1 million workers or one third of the employed Austrian work force. It permits to apply spatio-temporal models that were developed in the recent literature and extended by the authors of the present study.

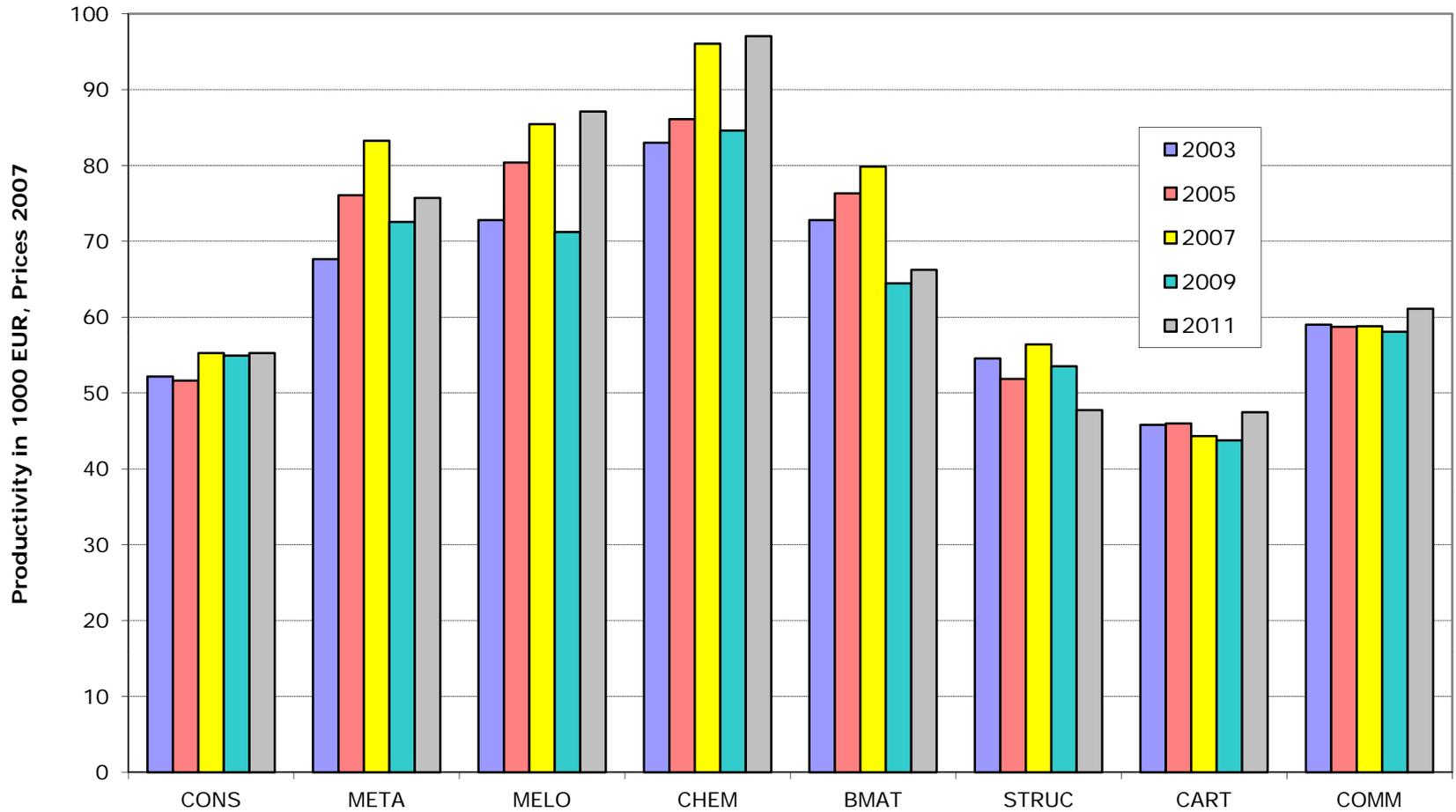
Of course, one might suspect that the time period is too short to allow for robust structural propositions. Indeed, the availability of adequate data limits the window of observation to the business cycle that starts with the slow upswing in 2003 and ends with the global economic crisis in 2009. Instead, from 2011 onwards the Census data contain no more NUTS3-classification, such that this study covers probably the last time period where a regional analysis of this kind could be performed. Figure 2 offers a short glance over the period where data in 2011 are added for convenience. It is therefore important that the method chosen here captures long-term developments.

Inevitably, there are a number of problems related to the scope and validity of the data. There is the main problem that the Structural Business Statistics refers to the firm seats, which in many cases are not identical to the locations of production. The large firms are particularly affected. For that reason we also investigated the smaller manufacturing firms below 50 workers, because the majority of these firms unifies the sites of management and production, and their workers live nearby.

Another problem accrues from the fact that the qualification levels of the workers have to be imported from the Census data, while the Structural Business Statistics report the total employment without classification into skill levels. Another problem to be mentioned are the leased workers that are not contained; currently they make only 3% of the industrial labour force but their trend is rising. These and other restrictions like commuting are discussed at length in the main text. The main results should now be summarized according to the four angles of investigation.

**Fig. 2: real Productivity per employed in KEY-Sectors, 2003-2011**

Source: SBS-Database, Statistics Austria



## Diversity

The main hypothesis postulates that the labour productivity rises with increasing diversity. The regional diversity of industrial sectors is measured by an indicator, which is the converse (i.e. the negative) of regional specialisation. For that we propose an index, which is akin but not identical to the well-known Krugman index.

Intuitively, an economy is specialised if the activities concentrate on selected sectors, and diversified if all sectors participate in that process. For that some reference is needed. We take the German national sectoral shares as a reference. That procedure provided better estimation results than the Austrian reference. It can be argued that Germany is not only the major trade partner of Austria, but has also a powerful and diversified industry.

The estimates of the aggregated KEY-sectors confirm significant productivity elasticities with regard to diversity, although they vary strongly across the regions. By and large, the diversity is higher in the agglomerations, but there are also several rural regions, which locate productive industrial centres. Overall, the regional ex-post elasticities (derived from by the observed data) deviate 2.5% from the Austrian average, where the latter amounts to €62.700 per worker and year.

Regardless of the fact that Austria is typical for the many small and medium firms SMEs (KMUs). from the estimates of the aggregated KEY-sectors it can be seen that the productivity increases with the firm size. The elasticities with regard to the firm size almost double those of the diversity. However, the productivity curve exhibits a strongly convex shape. The classification of manufacturing according to firm size yields the important result that the companies below 50 workers (including the employees) cannot increase their productivity by expanding their staff. Instead a pronounced productivity increase is noted for the large firms above 50 workers.

These findings corroborate the international evidence, see Combes and Overman (2004), that the companies in the European Union profit from substantial economies of scale. In practice, the opportunity to increase the productivity is likely one reason why the managements of large companies strive to further expansion, even at the risk that this strategy turns out to be unsustainable.

From the Austrian map it is seen that the large companies are mainly located in the traditional industrial regions of Upper Austria and Styria, while the firm sizes in the Eastern and Western parts of Austria are much smaller. The regions with a long-lasting industrial history certainly profit from the large companies, but that is not the only source of productivity. Besides the firm size, the diversity is a nearly independent and possibly sustainable instrument to raise the regional productivity.

The national economic growth favours the industrial productivity as well. The ex-ante elasticity with respect to a 1%-point increase of GDP is nearly 1. An increase of economic growth from 1% to 2% raises the productivity of a worker by € 600. The Manufacturing sectors respond more sensitive, while Construction and Communicative services appear less exposed to the international development.

## Social Cohesion

The main hypothesis postulates that the labour productivity rises with increasing labour participation. In a sense it is a test to which degree the industrial productivity is affected by several preconditions of social cohesion, which is favoured by a socially equitable integration of the labour force into the productive process.

The factors under study are the housing density measured by the agglomeration quota, the work participation quota of both genders together and of the females in particular, and the share of part-time which is most relevant for women.

The unemployed workers in a region do not directly affect the productivity, but they are included in the agglomeration quota. This quota is defined as workers in the potential labour force living in communities above 5.000 inhabitants, relative to the entire potential labour force in the region. This yields significant estimates throughout. Hence the positive impact of agglomeration externalities postulated by theory is evident. A higher settlement density offers more opportunities for the firms to cooperate and for the work force to find networks and alternative employments.

Since the mid-nineties, young people leave the rural sites and small towns, and look for job opportunities in the urban agglomerations. This has caused considerable tensions. On the countryside, the loss of population reduced the welfare, because many companies hesitate to choose their production sites in regions without adequate labour supply. Conversely, the influx of population into the agglomerations puts the social cohesion at risk, with the side effect of social polarisation.

Importantly, the social cohesion is promoted by a higher participation of work in the productive process. For that purpose we estimated the impact of the participation quota of both genders together, and the impact of female workers separately. The elasticities are significant. Quite interestingly, the elasticities for females alone are somewhat lower, but they are augmented by the elasticities of part-time which is widespread among women (currently around 40%). Thus, if the part-time quota is included in the estimates, women provide a significantly positive contribution to productivity as well. It is worth mentioning that the female participation quota assumes the highest values in urban agglomerations and in the East of Austria

## Demography

The main hypothesis concerning demography cannot be formulated for a single impact on productivity, but consists of rather complex relations where the middle skills, the age structure and the migration are involved.

The middle skills (die "Mittelklasse") are a characteristic feature of the Austrian socio-economic system. In this study they are defined by the educational and experience level of the labour force after sorting out the low and high skills. The low skills completed a primary school, and they work in elementary occupations. The high skills completed a university or specialist college, or work in leading managerial or

engineering positions. The middle skills in between are the dominant social class, with a rather stable share of 67%, in the industry even around 70%, see Figure 3.

In a regional perspective, the locally available middle skills do not create substantial differences of productivity. The estimates of the aggregated KEY-sectors show that the regional productivity deviates by 2% from the Austrian average. The companies appear rather stable with regard to the work force they want to employ.

The age structure (all skill levels) provided an unexpected result. An a priori reasoning would postulate that the maximum contribution to productivity is attained in the age group between 36 and 45 years. But similar to international studies the Austrian estimates show that the elder workers generate larger contributions. The type of firms that keeps them employed is twofold: the large manufacturing companies profit most from the senior workers, while the small companies profit most from the age group between 46 and 55 years.

The regional mobility of Austrian and foreign origin exerts only moderate impacts. In total, the regional immigration exhibits a slight rejuvenation effect, which means that the age structure of the cities and Vienna in particular gets younger, whereas the rural population ages faster. It can be deduced that the productivity in a region is 2.5% lower if it is a net receiver of workers. This likely results from the young who enter the urban agglomerations and who are not yet fully experienced workers.

But contrary to populist views, the industrial productivity rises significantly under the inflow of immigrants with foreign origin. The main receivers of immigrants are Construction and the Communicative sector, with different qualification levels.

The share of construction in Austria is still over 8% and higher than in other advanced EU-countries. A typical feature is the substantial share of middle skilled workers ("Facharbeiter") that are rather costly. The productivity in construction is only € 51.500, or € 10.000 lower than the industrial average. Hence the competition forces the companies to fill the elementary occupations with immigrants. The lack of a selective immigration policy therefore causes a "low diversity trap" mentioned in the literature, which delays the development of new and more productive activities.

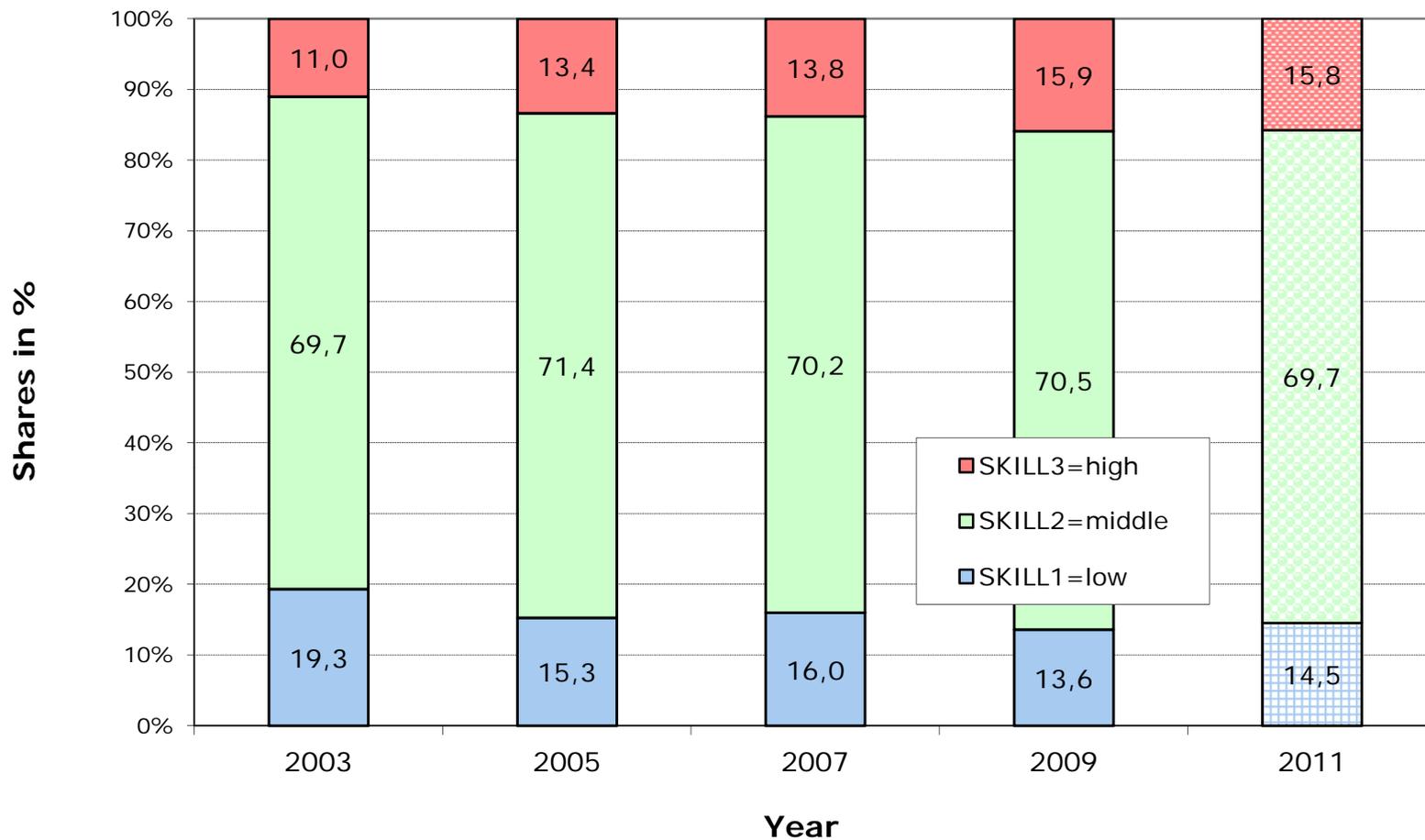
### Polarisation

The main hypothesis of the final part postulates that the labour productivity rises with a higher share of low skills living in social housing. The innovative feature of that approach is to embed it into the framework of potential social polarisation. This notion has a wide range of meanings discussed in the literature. We focus on a specific one, which is the spread between low and high skills, their living conditions and the potential repercussions on social cohesion.

The starting point is the regional distribution of the skill levels, which can be a source of polarisation. Although the share of the middle skills remained rather stable over the recent decade, there was a marked shift from low to high qualifications. By restricting the view to the employed workers in the KEY-industry the share of the low

### Fig. 3: Skill Shares in Employment of KEY-sectors

Source: Austrian Census Data, own calculations



skills declined from 19.3% to 13.6%, while the high skills increased from 11.0% to 15.9%, see again Figure 3. But the speed of the shift was slightly slower than in the entire economy, possibly because of the low-diversity trap mentioned before. The high skills are still less represented than in comparable EU-countries (differences of statistical accounting notwithstanding).

The estimates of productivity yields the following outcome. Across the regions, the productivity of the low skills varies only a little, hence the firms apparently want to preserve a basic productivity. Instead impact of the high skills is substantial. They preponderantly live and work in the cities and their environment. Their contribution to productivity is about 25% higher in the agglomerations than outside.

The high skills are strongly represented in the Communicative sector, which is mainly located in the agglomerations. Since that sector supports the productivity all over the country, the contribution of the high skills can be better understood.

Vienna has the highest share of employment in the Communicative services (54% of all KEY-workers), but there is also the strongest polarisation between low and high skills, because the share of the middle skills is the lowest one among the Austrian regions (only 56%). Similar to other European metropolises, this puts the social cohesion at risk.

Altogether, an escalation of conflicts could be hitherto prevented because, among others, the Austrian social housing policy today supplies 24.6% of all Austrian first residences, more than in comparable countries of the European Union. To prove the benefits of social housing, we calculated the share of the low skills living in social rentals, relative to the entire low skill labour force. The estimates are robust and highly significant. The low skill social renters contribute 7.4% more to productivity than the low skills in any type of tenure, the private rentals included. The contribution is even higher in Vienna and in the traditional industrial regions.

As such, this result provides no argument against the welfare effects of homeownership or private renting. It has to be understood in the sense that living in social rentals endows the low skills with a better bargaining position to get remunerated for their participation in the productive process.

### Policy conclusions

The estimations performed in this study were split into four interrelated sets of hypotheses. The very reason for that procedure is found in the mutual correlations between the many factors, which makes their appearance in one single equation unfeasible. Seen in this way, the results shed light on two central aspects:

Firstly, the regional productivity is promoted by a sufficient diversity of industrial and communicative activities. In that respect, the agglomerations offer more opportunities for the networks of companies and for the job chances of the labour force. Instead several preponderantly rural regions suffer from a "low-diversity trap" that impedes the development of new activities.

Secondly, the depopulation of the rural regions and the inflow of workers into the urban regions create the danger of a growing polarisation among the social strata. Up to now that danger could be limited by a housing policy that offers affordable social rentals for a mixed population, what fosters the productivity and the job opportunities.

Austria depends so much on the international development, that the fluctuations on the foreign markets cannot be fully offset by domestic policies. This motivates the search for adequate instruments to promote the variety of regional activities.

In that respect, Austria has a long tradition in fostering the construction industry, in particular outside the urban centres. To be sure, in many rural environments there are little industrial alternatives. Tourism and special agricultural products are often the only source to maintain the regional welfare. For that reason, the government offers considerable subsidies. The advantage is certainly the labour intensity of the activities, especially in construction, and the incentives received by private households, which stimulate the acquisition of housing and equipment.

A number of alternatives is discussed in the literature. In particular, there is the success story of Upper Styria ("Östliche Obersteiermark"), where the industrial decline and exodus of population could be stopped. The main reasons are innovative products developed by the companies, new forms of cooperation with the communities, and better opportunities of networking and local educational institutes. Although Upper Styria is certainly exceptional with regard to its historical heritage, certain principles apply also to other regions.

The diversity is not so much correlated with the average firm size. Hence the policy should be concerned rather with the creation of equitably rich production structures, which also helps to mitigate the fluctuations of the business cycle. Hence it is important that the firms outside the industrial clusters take part by networking and telecommunication. The advantage is not so much the industrial development, which could also be geared from the centres, but the profit from local job opportunities, in particular to promote the labour participation rate of women. In that respect, the often required reform of the education system with timely acquisition of skill endowments is overdue. Finally the promotion of the supply of affordable social housing for a mixed population is essential for maintaining the sustainability of social cohesion.

#### Literature:

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