The contribution to industrial productivity by social renters

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Abstract:

This is an empirical study about how the productivity of selected industrial sectors across the Austrian regions is affected by socio-economic factors like personal characteristics and life-styles. Starting with theories put forward in the available literature, the basic hypothesis asks whether low skill workers contribute more to productivity when they live in social housing than living in other tenures. The innovative feature of the study is to embed the topic into the framework of polarisation between social strata. Using a panel over the period 2003 to 2009 and 35 Austrian NUTS3-regions, the evaluation of spatio-temporal econometric models permits to test the hypothesis. It is shown that the hypothesis is not rejected which means that the contribution of low skill social renters is indeed relatively higher. This is important as the spatial structure permits to detect an inherent mechanism of growing income inequality. The importance to supply sufficient affordable flats in mixed tenure structures is emphasized.

Contents

1. Introduction

This study is about the interplay between the spatial allocation of productive activities and the housing services, where the tenancy by low skill workers is given special attention. For this purpose we set up the basic hypothesis that low skill workers contribute more to productivity when they live in social rentals than elsewhere. Of course, the hypothesis has to be justified by the institutional patterns of social renting, in particular the access conditions and the welfare system into which social housing is embedded. Moreover, it says nothing against the social welfare effects of other types of housing. It has to be understood in the sense of a conditional proposition: If the hypothesis is tested with empirical data and not rejected, then the low skill workers living in social rentals contribute relatively more to productivity than other workers of the same qualification level. But this statement cannot be used for example against homeownership as such.

For, the innovative feature of our approach is the context between the basic hypothesis and the occurrence of polarisation between social strata in a society. Just this context makes the hypothesis meaningful. We ask whether the workers of different skill levels are equally remunerated by an increase in productivity, or if there is an inherent mechanism that an increase in productivity raises the incomes of the higher qualifications while the income inequality between the qualifications increases. If the latter holds true, the society is challenged to offer a sufficient supply of social housing. But if the social housing hypothesis is also valid, this in turn keeps the social cost of that tenure within limits, because the public will better comply with the site provisions, tax payments and personal benefits that support the development and maintenance of social housing.

Of course there exist a lot of public resentments against social housing and their inhabitants, among them the immigrants in particular. A positive outcome of testing the basic hypothesis is an admittedly academic argument that puts such resentments on the touchstone. Even more important is the argument in favour of social cohesion on which a social welfare system is built.

The object under study is the Austrian economy over the years 2003 to 2009, classified into 35 Austrian NUTS3-regions. The data are described in the next section.

The data are a panel that permits to apply spatio-temporal econometric models that were developed in the recent literature.

From the data we select a number of industrial and industry-related activities that we call $KEY-$sectors or "industry" for the sake of brevitiy. Correspondingly, the notion of productivity is confined to these activities. It is measured per employed worker, which we shortly call the "$KEY-$workers. They encompass the workers and employees in the institutional sense (in German "Arbeiter und Angestellte"), but this distinction has no meaning in the present context. The $KEY-$workers have also nothing in common with notion that is used in labour market and housing research, where the keyworkers refer to essential public services.

Finally, the notion of Austrian social housing encompasses the municipal rentals and the rentals provided by the providers for the common good ("Gemeinnützige Bauvereinigungen"), which in turn include the social housing associations ("Genossenschaften"). As worked out in detail below, the municipalitites shifted much of their stock to the common good sector in the past. But the municipal stock and its architecture still exists, and the tenants were not affected by that transaction.

Besides some remarks on the welfare state characteristics in the theoretical discussion, we make empirically no distinction between the types of Austrian social housing.

The plan of the study is as follows.

The section 2 describes the data, which is important to assess the validity of the thoretical framework. The latter is worked out in section 3, which embedds the social housing hypothesis into the relevant literature about polarisation and housing. In section 4 the econometric models of panel estimation are presented, in particular the spatial econometric models that allow for the interpretation of a diffusion process across the regions. The empirical results of estimation are described in section 5. The final section 6 offers a review over the results obtained so far.

2. Data

It is convenient to start with the data that are used in the present study.

The object to investigate is the Austrian economy over the years 2003 to 2009, classified into 35 Austrian NUTS3-regions. The data are drawn from the Structural Business Statistics ("Leistungs- und Strukturerhebung", for short SBS), the Austrian Census and the Austrian mobility data base. All these data are issued by the official Austrian Statistical Institute that calls itself Statistics Austria. For our purpose, the data are aggregated into a biannual panel on the meso-scale of NUTS3-regions, which are called "regions" for short.

Of course, one might suspect that the time horizon is too short to allow for truly structural propositions. Indeed, the availability of data limits the time horizon to the business cycle that starts with the slow upswing in 2003 and ends with the global economic crisis in 2009. But from 2011 onwards the Census provides no NUTS3-classification anymore, such that the time horizon covers the last periods where a regional analysis of this kind could be performed. It is therefore important that the results fit into long-term developments, for which a theoretical framework is required.

The framework is presented in the next section. It depends of course on the type of activities we are going to consider. The study focuses on private firms in manufacturing, 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.

The SBS-data are the regional numbers of firms, the sector to which they belong, and the regional averages of employment and productivity.

The Census data are the degrees of industrialisation, the part-time, the qualification levels, the aggregation quota and the housing data of each region.

The basic data used her is the panel of the SBS-data, into which the Census data are imported.

The Mobility data contain the exits from and entrants into regions together with the nationality. These data are used for the interpretation of results only.

A list of variables with definitions and data sources is found at the bottom of the paper. All values are real at prices 2007.

From SBS-database we sort out data of eight industrial segments that we call the $KEY-$sectors, because they give a representative picture of the Austrian productive activities.

Table of $KEY-$sectors		belongs to	aggregate classification	
Symbol	single sector	aggregate	ÖNACE 2003	ÖNACE 2008
$CONS$	Consumption goods	$MANUF$	D	C
$META$	Metal industry	$MANUF$	D	C
$MELO$	Mechanical engineering	$MANUF$	D	C
$CHEM$	Chemical products	$MANUF$	D	C
$BMAT$	Building materials	$MANUF$	D	C
$STRUC$	Structural engineering	Construction	F	F
$CART$	Car repair and car trade	Trade & Craft	G	G
$COMM$	Communicative services	Services	D,K	C,J,M

The ÖNACE classification is the Austrian version of the international NACE.

In the present study the eight KEY-sectors are called "industry" for brevity, although they contain also non-industrial activities.

The first five $KEY-$sectors belong to manufacturing, which is the classical industry in the proper sense.

The sector $STRUC$ is structural engineering, for short "construction". It forms a separate item in the NACE-classification.

The sector $CART$ covers Car repair and Car trade. It is the only sector that belongs to trading activities. It forms part of the KEY-sectors because it is typical for spatially scattered small scale business.

The sector $COMM$ is representative for services in the modern informational society. It encompasses industry related activities of information, research and development, networking and marketing. The communicative services do also cover certain non-industrial activities like internet- and market research services ("unternehmensbezogene Dienstleistungen").

The eight sectors cover around 64% of industrial employment and value added, where the latter is the total of the ÖNACE-2003 segments D,F,G and K. The sectors are selected according to the maximum amount of information contained in the SBS-data. A few interesting sectors were left aside because of data secrecy (too little firms in a number of regions).

The productivity is the central endogenous variable of our study. It follows the classical concept of labour productivity. In international comparison, Austrian productivity ranks above the OECD-average, on par with a group of countries that include France, Sweden and Germany. But as demonstrated in Combes and Overman (2004), a closer look reveals that the productivity varies considerably across countries and regions. This is also true for the regional productivities in Austria and especially for the KEY-sectors, see Figure 1.

For the Figure we used the regional productivities averaged over the time horizon. They are derived from gross value added and employment taken from the SBS-database. For each year and region, the regional productivity called $KEYPROD$ is defined as labour productivity = total added value divided by total dependent employment in that region, where the totals represent the aggregates over the KEY-sectors. The dependent employed are called $KEY-$workers throughout.

Somewhat problematic is the fact that the SBS-data measure employment in numbers of persons, but not in hours of work or full time equivalents FTE. Because FTE-productivity would be preferable, we added the quota of part-time from the census data, in order to correct the observed productivity in estimation.

A few critical remarks are in order.

Firstly, the firms do not necessarily locate at their production sites. Therefore the regional productivity defined above is somewhat biased [1].

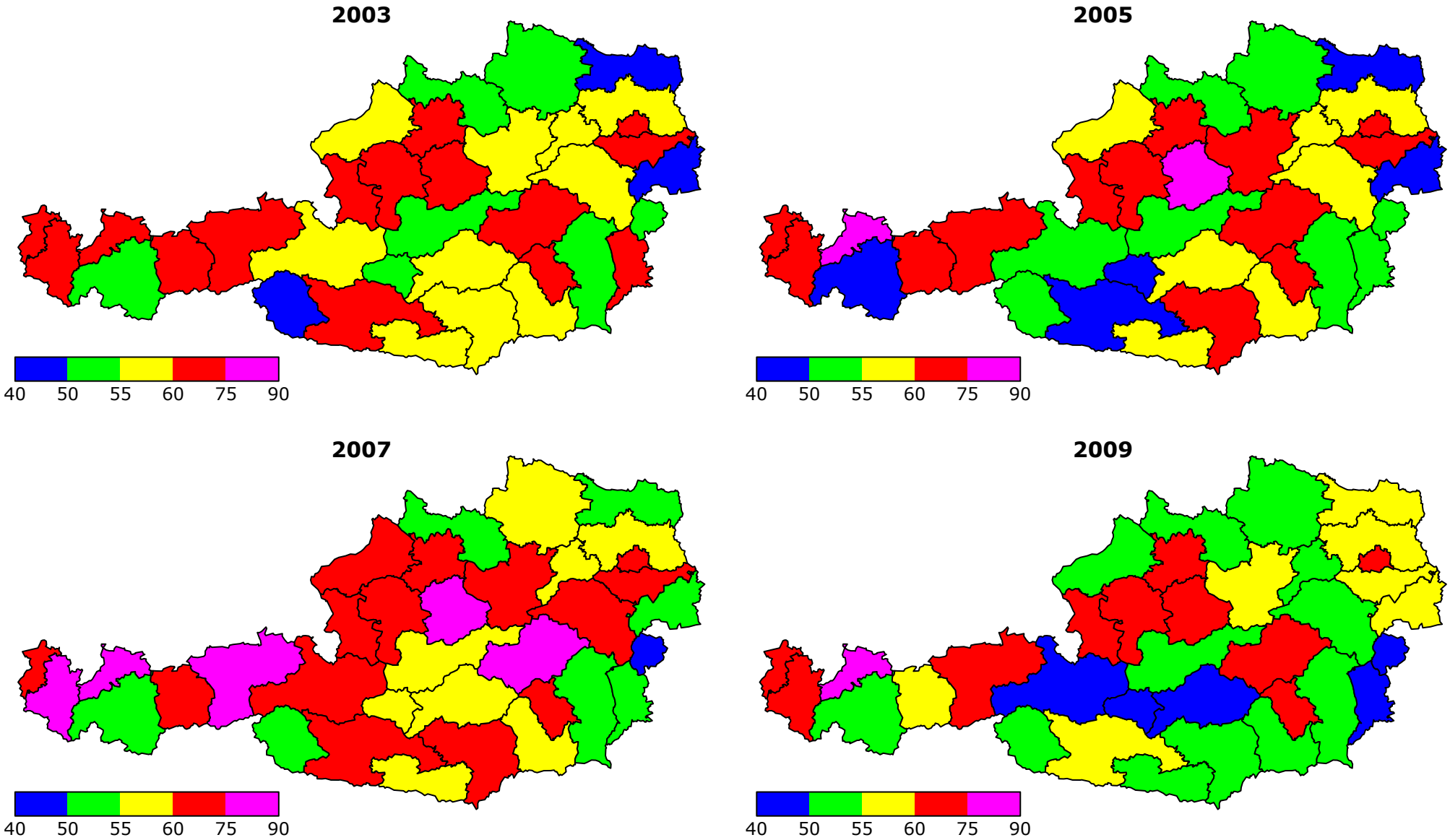
Secondly, the relation between the locations of firms and the residences of workers is difficult to handle. A considerable part of the population works in a region which differs from the region of their home. Certain characteristics of the work force like skill level=qualification and housing have to be imported from the Census, with the

[1] In the panel used here the firms were also categorized according to their size. Since the production sites of the firms up to 50 workers are mainly in the region of their firm management, the location problem is mitigated for that category.

Fig. 1: Productivity level KEYPROD by NUTS3-region

in 1000 EUR, Prices 2007

Source: Statistics Austria



consequence that the location of the responding workers possibly differs from the region where their job is situated. Up to now neither the SBS nor the Census data give satisfying informations about commuters [2]. Also the leased workers are not included in the SBS-database, nor do we dispose of the location of their first residence. But their number is still small (2% of the total kabour force). Some of the locational problems can be filtered out by the spatial models based on neighbourhoods discussed in section 4. But the potential symmetry of the neighbouring effects can hardly be removed.

Thirdly, the geographical structure is based on the NUTS3-regions that are quite unevenly distributed. For the majority the regions are relatively homogeneous in structure, although we are always faced with the problem that the rural sites cannot really be mixed with the regional centres. But the regions differ substantially in size. The smallest Austrian NUTS3-region called Lungau is situated in an alpine environment, and has less inhabitants than the smallest district in the NUTS3-region Vienna.

Finally, we cannot perform any true microeconometric analysis. The firm data drawn from the SBS-database are averages over sectors and regions. The data added from the Austrian census must be aggregated accordingly. Thus the econometric analysis is based on the mesoscale of sectors and regions. That implies that the estimated marginal effects are probably underestimated. Moreover, in econometric analysis every region has the same weight. Fortunately, that creates no serious drawback since the econometric data are mainly shares, quotas and ratios that do not depend on the size of a region.

[2] We investigated potential commuting with the data at hand for Vienna and the neighbouring NUTS3-regions, which count the largest number of commuters (170.000 persons per work day). The econometric results showed gradual but not substantial differences between Vienna with and without its neighbours.

3. Theoretical aspects seen from literature and data

We start this section with the basic social housing hypothesis that we want to test in the present paper:

The low skill workers living in social rentals contribute more to industrial productivity than the low skills living in other types of tenure.

The innovative feature of the approach is to embedd the social housing issue into the framework of polarisation. It is asked whether the occurrence of polarisation between social strata exerts negative impacts on industrial productivity, or whether the productivity is promoted by an equitable distribution of social resources. The empirical problem are the many potential aspects. Polarisation is a social phenomenon, hence it does not affect productivity on the firm level alone, but it works through various channels that characterise the environment into which the firms are embedded. Moreover, it may interfere with social cohesion, with negative effects on productivity.

Polarisation can be defined as social or economic inequality between social groups, which are distinct with regard to the access to resources, see Amartya Sen (1973), Stefan Hradil (2001). A formal polarisation index was proposed by Esteban and Ray (1994), later on reconsidered in cooperation with Duclos (2004). It is based on a limited number of social groups that are relative homogeneous but distinct from each other. The resulting index is an extension of the Gini, with the important property that a shift of characteristics across the groups normally changes the indicators of inequality and polarisation in parallel, but they can also move in opposite directions. On similar lines Michael Wolfson (1997) argued that the rising inequality of incomes is not necessarily generated by a growing polarisation of social classes, and the observation of a "disappearing" middle class might be deceptive. For, beyond inequality an essential feature are the potential conflicts between the social groups that give the notion of polarisation a concrete meaning, see the survey in Deutsch and Silber (2010).

Indeed, not every inequality can be termed as polarisation. There are inequalities that result from a fair trade of endowments on the market, provided that the access to resources is not controlled by specific elites. But liberal societies that grant equitable access are an ideal, albeit with normative power in the paradigm of Adam Smith (1776). However, following Bourdieu (1984), imposed inequalities are an omnipresent

reality, which often result in undesired socioeconomic outcomes, like the heritage of skill endowments. Social inequalities are particularly relevant in the cities, where the polarisation becomes visible in the spatial segregation of social groups, see Häußermann and Siebel (2000), (2004) and Sako Musterd (2006).

In the following, we study the polarisation with regard to the distributions of income, skill endowments and housing conditions. The basic hypothesis aims at explaining productivity from that angle. While the empirical relation of productivity to incomes and skills has been extensively studied, the impact of housing and its spatial distribution is treated in theory but rarely found in the econometric literature.

To start with the incomes, Combes and Overman (2004) have noted that the European interregional income inequalities, measured by average national incomes, have mostly diminished. Instead the intraragional disparities, measured by suitable characteristics of the local income distributions, have increased in many countries, for a theoretical underpinning see Combes and Lafourcade (2012). In Austria, the interregional disparity of the regional income levels has also decreased over the period of observation, see Table 2 last row, which shows steady decline of their standard deviation. There is also a clear positive relation between the agglomeration quota and the regional income level, see Figure 2. Concerning the intraregional income distribution, the official Austrian Census does not ask for the personal incomes. Instead the skill endowments are reported, which we use as a proxy for the income levels.

Indeed, higher regional incomes attract the productive labour force, whereas the poorer regions often loose the most productive workers and activities. Therefore we contend that higher regional income levels lead to higher productivity. Moreover, the regional skill distribution can be studied in detail over the observation period. In the aggregate over Austrian industrial employment the share of the middle skills declined to around 70%. Instead the low skill share declined from 14.8% to 13.6%, while the high skill share increased from from 11.2% to 16.4%, see Figure 3. Thus the middle skills could still maintain a strong position. For the entire Austrian economy, the share of middle skills remained at 67%. whereas the shift from the low to the high skills was even stronger. This phenomenon reflects the trend to better education. As such, that is no sign for a rising polarisation.

Fig. 2: Effect of Agglomeration on Income

Averages 2003-2009, Source: Statistic Austria

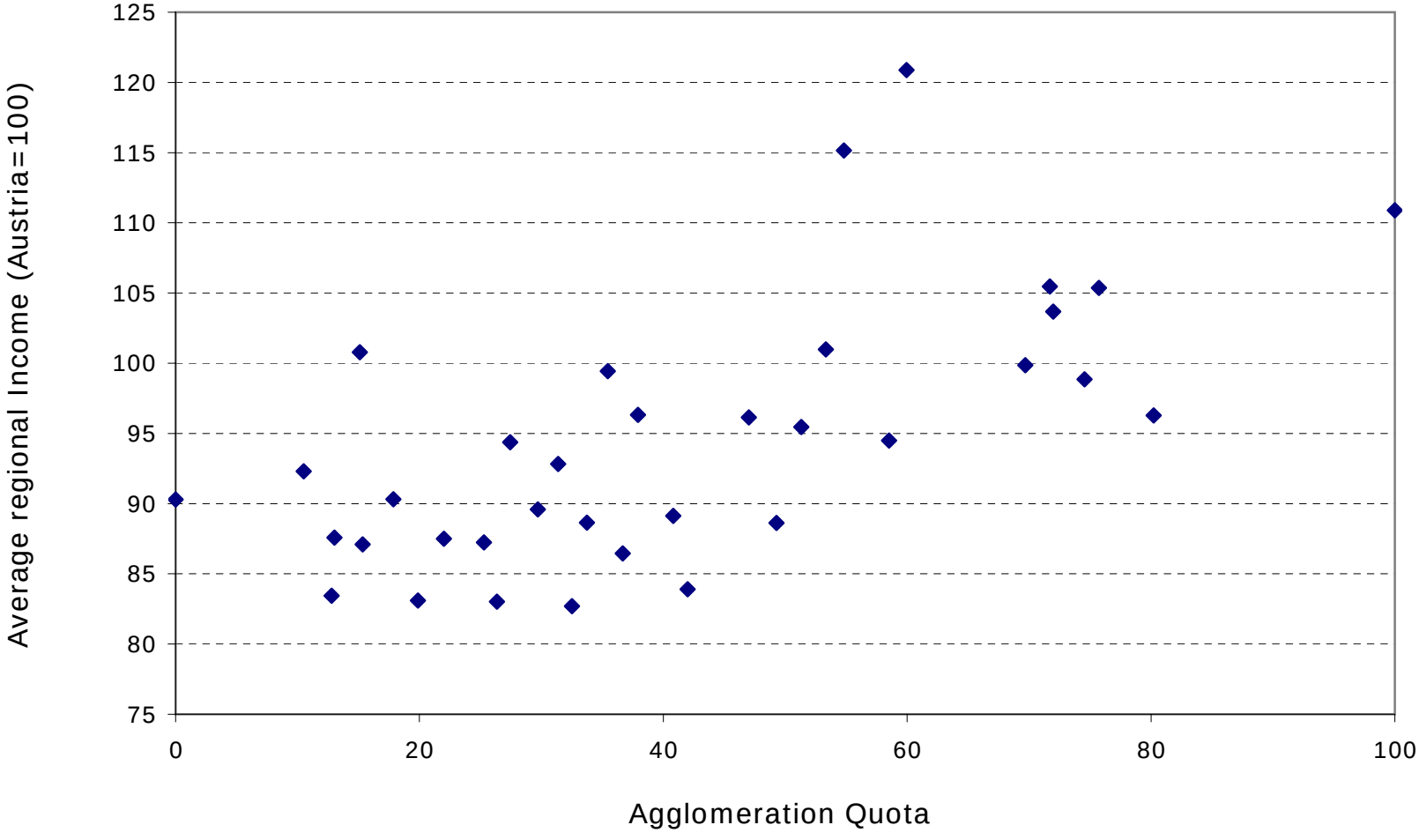
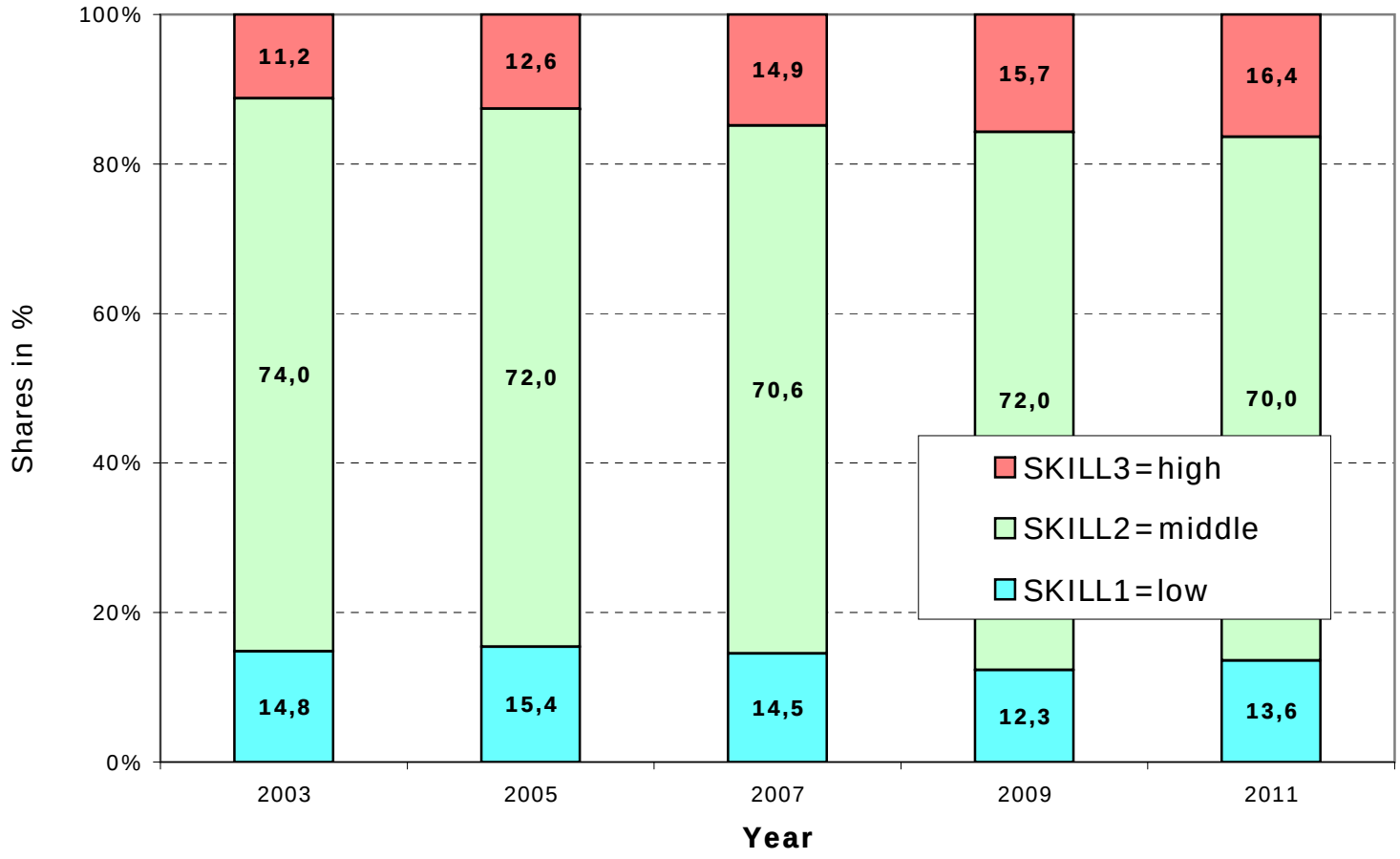


Fig. 3: Skill shares in Employment of KEY-Sectors
Source: Austrian Census Data, own calculations



But this pattern changes drastically if the regional differentiation is taken into account. The Table 3 shows the development of the middle skill shares of the Austrian labour force over space and time. The Austrian NUTS3-regions are ranked according to the degree of agglomeration. The rural regions are dominated by the middle skills, while in urban regions their shares rank below the Austrian average, especially in the greater cities Graz, Linz, Salzburg and Vienna. The polarisation towards high and low skills is most pronounced in Vienna, where the middle skill share now reaches only 56%, which is far below the Austrian average of 70%. It is worth mentioning that many middle skill Viennese have left the city and settle now in the urban neighbourhood, mainly in the North and in the South-East, while the city received low-skill immigrants and high-skill movers from other regions of the country.

Vienna is definitely no singular case. Even more severe situations can be observed in various European capitals. But one has to be careful because a smaller city size does not imply that polarisation is absent, see Douglas Krupka (2007). It may exert repercussions on productivity, and for that issue we need more information about the living conditions of the working population. This is the reason why the spatial distribution of housing, and of social housing in particular, is elaborated.

In his masterpiece "The production of space" that first appeared in 1974, the French urbanist Henri Lefebvre (2000) argued that urban space is fundamentally a social product. Starting from a Marxist approach, he maintained that the urban structures, which become visible in the spatial distribution of housing, are controlled by hegemonic elites who are interested in the reproduction of their dominance. In this way, they strive to enhance the workers productivity as far as it augments and sustains the profitability of capital. On similar lines, the famous British urbanist David Harvey (1973) argued that this process generates class conflicts which end up in polarisation and social segregation, regardless of whether a more equitable distribution of resources could promote productivity to the benefit of workers.

For our purpose, we do not follow the Marxist approach. But we keep the dominance of the prevailing elites in mind. By doing so, the development of the social housing structures in Austria is much better understood [3].

[3] In Austria, the political, but informal platform of the dominant elite of entrepreneurs and trade unions is the social partnership ("Sozialpartnerschaft"). Developed during the fifties, It is responsible for collective wage bargaining. It provides guidelines for the government and contributed to the development of common good sector.

The Austrian social housing sector consists of municipal rentals and of rentals supplied by the providers for the common good.

The municipal rentals were formerly wifespread in the cities. After 1984, most of the municipal housing stock was transferred to the common goods sector. Vienna is an exception as the stock built before 2004 remains in the ownership of the municipality, but since then new social flats are built by the common goods sector. In the present context it makes sense to subsume the municipal flats in social housing.

The Austrian providers of social housing for the common good (the "Gemeinnützigkeit") developed after 1945 with the objective to supply affordable housing to a broad population, in order to overcome the previous class conflicts and the devastations during the Second World War [4]. In principle, it is a product of the corporatist welfare state regime, Gösta Esping-Andersen (1990). As demonstrated in detail by Walter Matznetter (2002), corporatism forms an essential attribute of the Austrian conservative welfare state, which besides corporatism is characterised by fragmentation of social insurance, familialism where social care is considered as a responsibility of the family, and immobilism where subsidies for housing construction are viewed as an instrument for promoting social cohesion. We want to add that a certain neglect of marginal strata is also a characteristic of the (Austrian) conservative welfare state.

It is important to remark that municipal renting does also share some features of the conservative welfare state, albeit mitigated as it pays more attention to marginal strata in society.

In spite of the equitable goals, during the fifties and sixties the housing association sector became monopolized by the political parties of the left and right, which tried to supply their clienteles with adequate flats. Interestingly enough, the expansion of single family homes after 1970 moderated the political influence and the dominance of corporatism weakened. Instead the provision for the poor started to receive more attention. Today, a substantial portion of newly built flats must be offered to the needy and low incomes.

[4] The common goods law does also cover the housing cooperatives, but with regard to estimation the distinction is irrelevant.

Nevertheless, the maintenance of a social mix remains a dominant strategy, with the explicit target to promote social cohesion, see Edwin Deutsch (2009). This forms a contrast to other countries where social housing is restricted to the poor, with the consequence of social segregation. Instead, the Austrian common goods associations have a mandate to build social rental flats wherever they are demanded, regardless of the size of cities and towns. This is particularly important for the local industries, which are interested to attract the desired work force by affordable housing opportunities nearby. To achieve that goal, the subsidies for housing are still considered as an indispensable tool for maintaining social rental construction. Altogether the Austrian social rental share has reached 24% of all first residences, which except for the Netherlands is the largest share among all countries of the EU, see Roland Ghekière (2007) and Noémie Houard (2011).

To understand the relation to productivity, we will investigate the contribution of the low skills who live in social rentals. The issue is important because the social rented sector in Austria can illuminate the gains in productivity from preventing polarisation and segregation. This is particularly important for studying the productivity of working immigrants who are most affected by segregation.

Before 2003 the non-Austrian citizens were excluded from social renting in several Austrian Länder, even if they had the right of permanent residence. The only alternative was to live in private rentals, which are expensive, often overcrowded and of low quality. Thus the formation of ghettos among the low skilled immigrants could not be avoided. Moreover, these ghettos were situated in districts where the Austrian low skills lived as well, what created a number of conflicts and resentments. But shortly before 2003 the European commission required that the immigrants from the EU have the same right of access to social renting as the Austrian citizens. Vienna was the last region to execute that command. Although many immigrants, especially from outside the EU, continue to live in private rentals, the rise of the immigrant social renters can reveal important facts about the effectiveness of better housing conditions.

Since our data start in 2003, we can test the productivity of social renters, including the immigrant workers. For that purpose we introduce the notion of low skill households. These are the households where the householder and his/her partner belong to potential labour force and both are low skilled; the notion also includes

housmen/houswifes living in partnership. For econometric estimation, the share of the low skilled social renter households relative to the low skill households living in any type of residence, private rentals and family houses included, is labelled $SOCRENT1$, see Table 4. The Figure 4 suggests a positive impact on productivity, hence the low skills likely contribute more when living in social rentals than elsewhere.

It also ueful to look at the nationwide distribution of social rentals regardless of the skill levels. For that purpose we introduce the quota $SOCRENTQ$, which measures the active households living in social rentals relative to the active households living in any type of residence. Figure 5 demonstrates that this quota is higher in agglomerations, but there is also some heritage from historical developments, in particular the concentration of social rentals in the traditional industrial regions between Lower Austria and Styria where manufaturing dominates. It should be reminded that the quota $SOCRENTQ$ is used only to interpret the econometric estimates of the quota $SOCRENT1$, while it does not appear itself in the corresponding equations.

Returning to the contribution of low skill social renters to productivity, it is clear that this process will not work without the simultaneous presence of higher skilled work. In that respect Anthony Venables (2011) has shown that high skills are attracted by cities because living there improves their odds to match with other qualified people. The resulting diffusion process improves the productivity of all ability types. Also the services profit from manufacturing plants situated in the neighbourhood, provided that the required skills are locally available. For the US, Enrico Moretti (2010) found a local work place multiplier of no less than 1.6 meaning that 1 additional manufacturing job creates 1.6 jobs in the non-tradeable sector; with regard to highly skilled labour the multiplier raises even to 2.5 jobs in the services.

We add that a minimum amount of social cohesion is required for that process. Although the high skills live in social rentals to a lesser degree, it is important that lower abilities are found in the proximity. Indeed, the Austrian housing associations are traditionally in search for locations close to the working places. In contrast to the huge suburban cities of the functionalist era, the modern architecture is better oriented towards a social mix of tenants. The activities of the social rented sector might indeed be one reason why the occurrence of severe segregation appears moderated in Austria.

Fig. 4: Low skill social renters against productivity

averaged over 2003 - 2009

Source: Statistic Austria

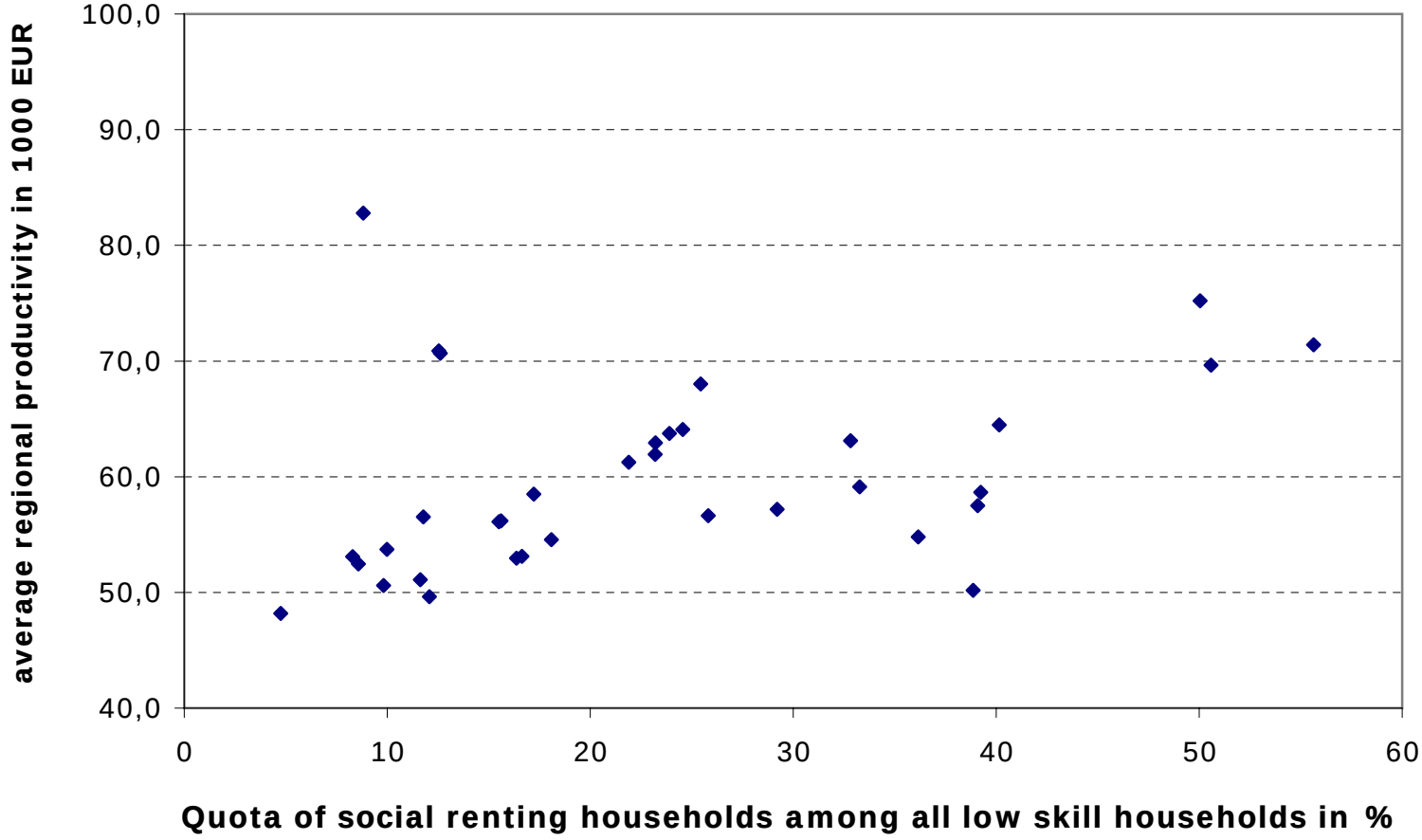
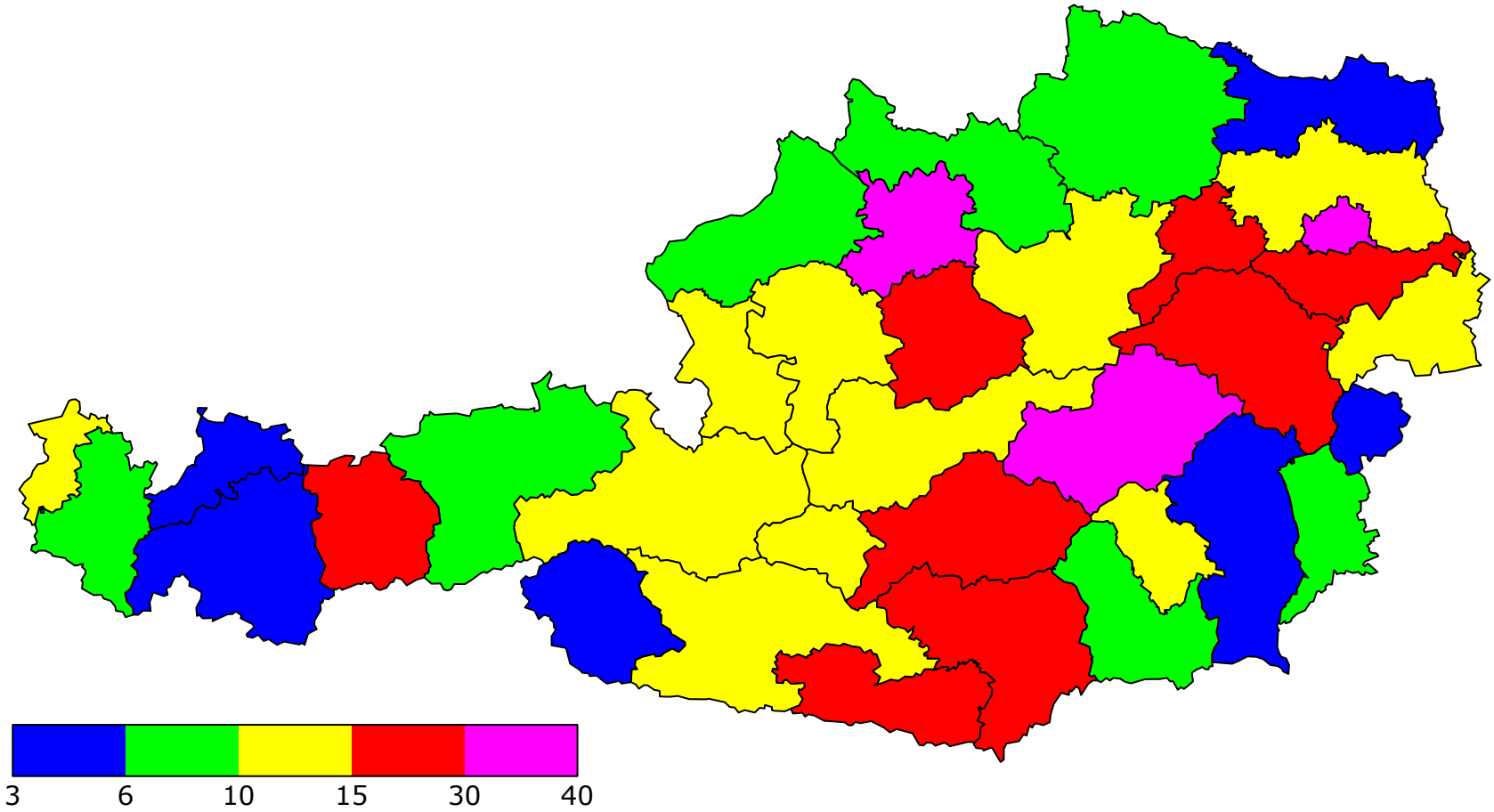


Fig 5: Social renting shares by NUTS3-region

averaged over 2003-2009

Source: Statistics Austria



It is important to stress a critical point. In the tradition of corporatism social renting acts as a workers discipline device. Upon entry into a social flat, the workers have to prove a regular job and income. Though, the income ceilings up to which access is permitted are quite generous in international comparison. But depending on the regulations of the Länder, the entrants also have to afford an entry downpayment. That downpayment is often transferred from the family, fully in the tradition of the Austrian conservative welfare state. Thus, there are low skill workers who are unable or unwilling to comply with the entrance conditions. Consequently, many low income households, in particular the immigrants, continue to live in the private rented sector. The tests will demonstrate that the existing income inequality could be enhanced in this way.

The next step is to discuss the spatial econometric methods used in the present study.

4. The econometric framework

The methods to estimate the productivities by means of contemporary data are feasible generalised $FGLS-$models, for panel data these are spatio-temporal econometric models of which we selected the $SARGLS$-model type. In this paper we must confine ourselves to a short glance on the relevant models that produced the most satisfying results.

Although some early work dates back to the fifties (Peter Whittle (1954)), the spatial methods are a relatively recent development. The first encompassing studies are Luc Anselin (1988) and Noel Cressie (1993), followed by the anthology in Anselin, Florax and Rey (2004). An illuminating survey of available models is provided Le Sage and Pace (2009). The book of Roger Bivand et al. (2008) and the paper of Millo and Piras (2012) deal with spatial econometric models implemented in **R**. We used that software in evaluating the empirical data of our study.

The models are classified according to the type of data (either contemporary data or panels), and the spillovers, which characterize how the locations = regions influence their neighbourhood.

The spillovers take the form of a spatial autocorrelation λ between the variables. The scalar λ depends on a symmetric matrix W that characterises the type of neighbourhood. This is either a matrix of neighbours that is set equal to one for all neighbours immediately at the border of each region while zero otherwise. Or it is a matrix which consists of the reciprocals of all mutual distances. In the latter a zero distance, which is the distance of a region to itself, is also set to zero. Moreover, the distances can be limited by a certain maximum distance, such that the reciprocals of larger distances are set to zero as well. In our study we used a matrix of immediate neighbours.

For contemporary data the spillovers take the form of spatial autocorrelation between contemporary variables, described in Le Sage and Pace op.cit., for a full account see next page.

The relevant model over N regions is called the spatial autoregressive (SAR) model

$$y_t = \lambda W y_t + X_t\beta + u_t, \quad u_t \sim i.i.d.(0, \sigma^2 I_N). \tag{SAR}$$

where λ is the spatial autocorrelation and (under suppression of the time index t and with $w_{ij} = w_{ji}$)

$$y = \begin{bmatrix} y_1 \\ \\ \\ y_N \end{bmatrix}, \quad W = \begin{bmatrix} w_{11} & \cdots & \cdots & w_{1N} \\ \vdots & \ddots & & \vdots \\ \vdots & & \ddots & \vdots \\ w_{N1} & \cdots & \cdots & w_{NN} \end{bmatrix}, \quad X = \begin{bmatrix} x_{11} & x_{1K} \\ \vdots & \vdots \\ \vdots & \vdots \\ x_{N1} & x_{NK} \end{bmatrix}, \quad u = \begin{bmatrix} u_1 \\ \\ \\ u_N \end{bmatrix}$$

Since our data form a panel with 4 observations over time and a fixed number of regions, we had to expand the contemporary structure to more general models. Leaving the spatial autocorrelation λ aside, the traditional panel data model, see Jeffrey Wooldridge (2002), is a feasible GLS ($FGLS$) approach with an a priori unspecified serial correlation matrix. In precise terms, the general least squares (GLS) model is

$$y_t = X_t\beta + u_t, \quad u_i \sim i.i.d.(0, \Omega) \tag{GLS}$$

where Ω is an arbitrary positive definite and symmetric matrix of dimension $T \times T$.

In practice, the temporal covariance matrix Ω is unknown and replaced by a consistent estimate $\hat{\Omega}$. This method is commonly known as feasible GLS or $FGLS$. Jeffrey Wooldridge op.cit. p.263 proposes to use the residuals of a fitted pooled OLS model $\hat{u}_i$, and sets

$$\hat{\Omega} = \frac{1}{N} \sum_{i=1}^{N} \hat{u}_i \hat{u}_i'. \tag{1}$$

If the spatial autocorrelation λ is considered as well, the $SAR-$model has to be expanded to panel data to account for spatial and time dapendence. This yields the $SARGLS-$model

$$y_t = \lambda W y_t + X_t \beta + u_t, \quad u_i \sim i.i.d.(0, \Omega), \quad t = 1, \ldots, T \tag{SARGLS}$$

where the covariance matrix has to be estimated like in panel GLS. Millo and Piras op.cit. implemented the algorithm in **R**.

The following discussion of the results is mainly based on $FGLS$ that we simply call GLS. This selection is feasible because many estimated coefficients of the spatial autocorrelation model $SARGLS$ do not fall apart from those of GLS even if the estimate λ is significant. Though, there are a few cases where the estimate λ is highly important. In these cases the results of $SARGLS$ will be discussed in detail.

5. Testing the social housing hypothesis

The presentation proceeds as follows. We formulate again the basic hypothesis:

The low skill workers living in social rentals contribute more to industrial productivity than the low skills living in other types of tenure.

The hypothesis deals non only with the social housing question, but also with the potential occurrence of polarisation. For that, the econometric models cover the regional income conditions, the significance of the spread between the low and high skills, and the housing conditions.

The data used in the econometric models form a panel over 33 NUTS3-regions and four observation years 2003, 2005, 2007 and 2009 [5]. The estimations concerns aggregate over the KEY-sectors called "industry" for brevity. The explanatories that appear in the equations are called "factors" from now on.

The estimations are performed by GLS without spatial autocorrelation, see the previous chapter. Since most $GLS-$estimates do not differ substantially from $SARGLS$ that takes a spatial autocorrelation into account, it appears sufficient to discuss the $GLS-$results. In the special case of growing polarisation the results about $SARGLS$ will be discussed in detail. All the estimates of the industry are shown in Table 1.

The endogenous variable in all specifications is the regional productivity $KEYPROD$. There is a difficulty as the $SBS-$data report the productivity per employed person. From a theoretical view the productivity per full time equivalent FTE would be preferable. For that reason the productivity per worker is corrected by the factor $PARTTIME$ that is used in each equation[6].

We continue with a description of the factors and the meaning of the elasticities.

Two sets of factors are considered, the first one with the regional income levels $NUTSMINC$, which for every year are standardized by Austria=100 (Models 1 and 3 in the Table), the second one with the shares of low and high skill workers $SKILL1$

[5] Austria has 35 NUTS3-regions. In econometric estimation, two outliers had to be excluded. For the good reasons see the original project-report.

[6] The $SBS-$data report neither full time equivalents nor the volume of parttime. The latter has to be taken from the Census data.

and $SKILL3$ (Models 2 and 4 in the Table). All specifications contain the low skilled social renting household quota $SOCRENT1$, the growth rate $GDPGROW$ of the real national GDP, the factor $PARTTIME$ mentioned above, and the quota of the $KEY-$workers relative to overall Austrian employment called $KEYQUOT$, which is an indicator for the degree of industrialization of a region.

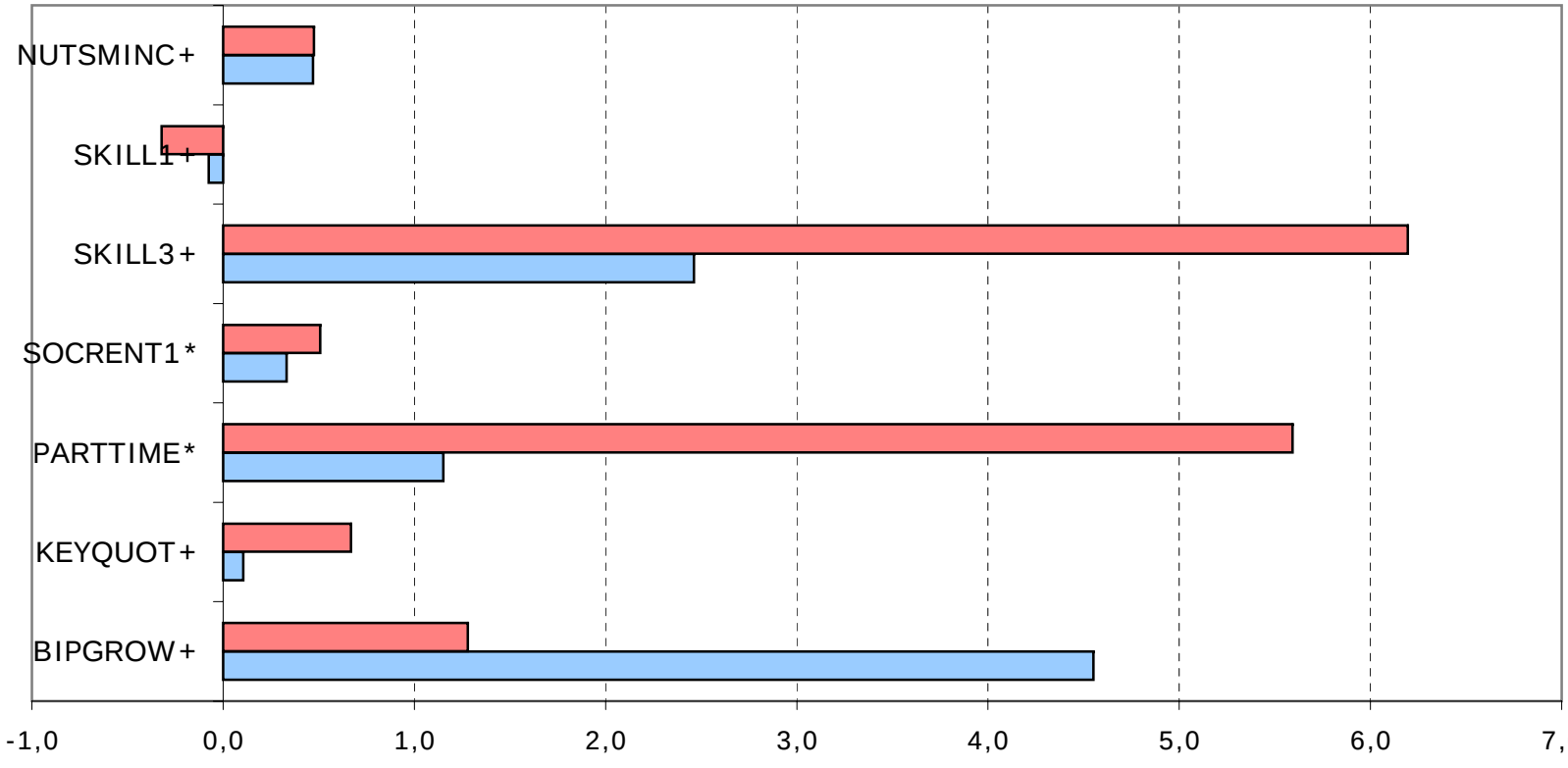
The share of the middle skills is excluded from the Models 2 and 4 because the skill shares sum up to 100%. The regional income level is excluded as well, because it is strongly correlated with the high skills share, with a partial correlation of 0.71. We remind that the regions with higher income levels, mainly the urban agglomerations, attract the high skills. In that respect see again Figure 2 that shows a positive relation between the agglomeration quota and the income.

The estimation results will be interpreted by means of elasticities as usual. The productivity elasticities shown in Figure 6 are calculated from to the $GLS-$estimates of Models 1 and 2, for which most of the detailed comments are given. The length of the bars represent the relative changes of the aggregated $KEY-$sector productivities under changing factors. Two cases have to be discussed. The red bars indicate ex-ante elasticities which result from a-priori changes of the factors, while the blue bars are ex-post elasticities where the factors change according to their observed variability in the data set [7]. The factors with relative changes 1% are marked with an asterisk $*$, while those with absolute changes by 1 percentage points are marked with $+$.

We start the interpretation of the outcome with the variables $GDPGROW$ and $PARTTIME$. Their elasticities are the largest ones among all factors. The importance of the national growth rate for maintaining or increasing the industrial productivity is evident. Also the part-time yields a highly significant estimate. One may wonder why the coefficient is positive. This results from the fact that the number of FTEs is smaller than the number of employed persons, hence the FTE productivity is larger than the observed one. It shouid be added that the partial correlations of $PARTTIME$ with the other factors are small and insignificant, and there is virtually no interplay between part-time and social renting. In other words, part-time is distributed equally across all tenures.

[7] To be precise, the variability is the observed coefficient of variation of the factor. The ex-post elasticity is that variabilty times the estimate of the factor in the model at hand.

Fig. 6: Productivity-Elasticities of social housing hypothesis derived from Models 1 and 2 for Industry



change of factor

red bars: ex-ante elasticities, *: 1% relative change, +: change of 1 percentage point

blue bars: absolute and relative changes according to observed variability

only little difference between last 4 elasticities of Model 1 and Model 2

The next factor to discuss is the degree of regional industrialization $KEYQUOT$. Its estimate is significant. This results from the fact that the industrial structure changes slowly over time, but the degree varies considerably across the regions. Hence its coefficient of variation attains 0.157, and combined with the estimate the resulting ex-post elasticity is still around 0.1. Therefore, regarding the economic role of the $KEY-$sectors and the housing needs of the $KEY-$workers, the importance of a sufficient supply of affordable housing in industrialized regions becomes evident.

Turning to potential polarisation, the estimates of $NUTSMINC$ and $SKILL3$ are all highly significant. From the ex-post elasticties it is seen that the regional productivities exceed the national average by 0.047 % and 0.246%. Thus a stronger presence of high skill employment can be considered as a driving force for productivity.

Instead, the estimates of the low skill shares $SKILL1$ are insignificant throughout. Even if it can be expected that the low skill workers themselves do not enhance the regional productivities, their occupation does not work in the opposite direction, but appears to maintain a basic productivity level. Nevertheless, combined with the results on regional income and high skill shares, the outcome is not innocent, but it points to the growing danger of income polarisation. With stagnant contributions to productivity, the wages of the low skill workers will not improve. Instead the high skill employment receives higher salaries, in particular in the urban agglomerations. Thus, if the regional polarisation between the low and high skill workers gets more pronounced in tendency, there is an inherent mechanism that the spread between lower and higher incomes increases nationwide.

This finding is corroborated by the results of the spatial autocorrelation $SARGLS-$models 3 and 4 shown in Table 1. With the exception of the insignificant $SKILL1$, the estimates decline relative to the $GLS-$model. The estimates become smaller because the autocorrelation subsumes some part of the productivity impacts. Now, the spatial autocorrelation admits the interpretation of a diffusion process across the regions. This means that the economic conditions in one region spill over to the neighbouring regions, and to lower degrees to the rest of the country.

To discuss the relevant example, consider the case where the high skill share increases in one region. The ex-ante elasiticities show that the productivity in that region rises. The diffusion process will transmit the rise of the productivity to the other

regions. In that situation, the sector of communicative services takes a leading role. It is contains the initiatives of information about scientific progress, then research and development, networking and marketing [8]. In that sector, the high skills find many job opportunities, preponderantly in the larger cities and especially in Vienna which in 2009 counted 54% of all $KEY-$workers living there. Since the communicative services work even at distance, a rise of the high skill employment promotes the productivity in other industrial sectors all over the country.

With an increasing share of high skill employment, the demand for (the number of) low skill workers may rise as well, but because their productivity estimate is insignificant, their contribution to productivity is not affected. This holds true for the construction sector in particular, which plays an important role in Austria. In this country, the sector is traditionally extended and still contributes about 8% to national GDP, more that in other EU-countries. The highly competitive market explains why the sector strives to attract cheap workers, among them the low and middle skilled immigrants. Through the channel of construction subsidies, the sector is also supported by the government, where construction is traditionally considered as a "job machine" in order to mitigate the downswings of the business cycle. Through the development of social housing the construction subsidies also increase the welfare of the low skills. But according to the estimates their incomes as such get not increased through rising productivity. They remain in the role to support a basic productivity.

Although that danger exists also in other countries, the welfare conditions in Austria are still relatively equitable. The loss of social cohesion has hitherto been avoided. We demonstrate parts of this proposition by means of the housing conditions, where we focus on the contribution to productivity of $SOCRENT1$ that measures the quota of low skill workers living in social housing. It was really encouraging to receive highly significant and meaningful estimates for that variable that appears unusual but is based on a number of theoretical reasonings.

According to the estimates shown in Table 1, the estimates of $SOCRENT1$ are positive and significant throughout. The corresponding ex-post elasticities are significant as well but relatively small in value. To some extent, this is a consequence

[8] It is reminded that the communicative services can only partly be assigned to the industry, the rest are non-industrial activities like certain internet- and market research services ("unternehmensbezogene Dienstleistungen").

of the character of housing, which is rather long-term with little variability in the short-run. Of course one might object that social renting is more widespread in agglomerations, which as such exhibit higher productivities, compare Table 4. But in essence the positive outcome turned out to be robust against alternative specifications, for instance if $SOCRENT1$ is combined with the aggregation quota while the other skill levels are excluded. Hence living in a social flat increases the productivity of the low skill workers, relative to the cases where they live in homeownership or private rentals [9].

To conclude, the social housing hypothesis cannot be rejected. Of course, the positive test result provides no argument against the welfare effects and the social importance of homeownership or other tenures. It can be interpreted only in the sense that the low skill social renters contribute **relatively** more to productivity than the other low sill workers. In a sense, this fits to the tradition of the Austrian housing for the common good, where the workers discipline device is still alive. The resulting productivity effect may also be welcomed by the entrepreneurs, whose representatives belong to the elites who take part in the decision process to maintain the governmental subsidies for social housing. Thus, besides some critical points in the allocation of social renting, the results presented above demonstrate that the prevalence of mixed social estates occupied by low, middle and even high skills may improve the regional productivites and may promote the social cohesion.

[9] The private rentals include the company flats ("Natural und Dienstwohnungen"), mostly owned by large firms and the authorities. It was not possible to sort them out; if added to the social rentals, the result might be even more pronounced.

6. Conclusions

The study was about selected socio-economic factors that exert significant impacts on the industrial productivity in the Austrian regions. The basic hypothesis asked whether the low skill workers contribute more to productivity when they live in social housing than when they live in other tenures. The innovative feature of the study was to embed this topic into the framework of polarisation between social strata.

By means of spatio-temporal econometric models it was indeed shown that the hypothesis cannot be rejected. But in its very essence this is a conditional proposition. It says nothing about the validity or the welfare effects of homeownership or other tenures. Instead it has to be interpreted in the sense of a partial contribution to productivity, because the productivity as such results from the combined effort of different social strata.

The essential point is to which degree that effort is remunerated. In that respect the spatio-temporal approch provided the important result that the low skill workers by themselves sustain a basic productivity, whereas the highly skilled workers contribute the most. This in turn likely improves their odds to get higher salaries. Moreover, the spatial autocorrelation estimates support the thesis that the contributions of the high qualifications exert a diffusion process across the regions. If the share of high skilled workers rises in one region, the induced productivity increase spills over to the neighbouring regions and to a lesser extent to the rest of the country. In an alternative study one could think of a labour augmenting technical progress, which increases the share of high skill work in efficiency units.

Instead the low skill workers do not induce such a process because their contribution - after allowing for the tenure effects - remains insignificant. If labour is remunerated according to its partial contribution to productivity (which in a market economy without trade unions would be the normal case), there is an inherent mechanism of growing income inequality.

With regard to social housing, the importance to supply sufficient affordable flats is apparent. Starting from a theoretical perspective, the study put forward arguments in favour of mixed tenure structures, such as in Austria where this type of social housing is still supported by the government.

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Appendix

Tables and Datalist

Table 1 **The Social Housing Hypothesis**
Industry: The aggregated KEY-Sectors
Endogenous: Regional productivity KEYPROD

Estimates

Explanatories	GLS Model 1		GLS Model 2		SARGLS Model 3		SARGLS Model 4	
Lambda					**0,248**	(2,52)	**0,286**	(2,91)
NUTSMINC	**0,281**	(4,27)			**0,264**	(3,93)		
SKILL1			-0,019	(-0,17)			-0,086	(-0,82)
SKILL3			**0,366**	(3,20)			**0,314**	(2,81)
SOCRENT1	**0,073**	(2,72)	**0,072**	(2,55)	**0,066**	(2,54)	**0,066**	(2,54)
PARTTIME	**0,513**	(4,81)	**0,501**	(4,25)	**0,381**	(3,77)	**0,381**	(3,77)
KEYQUOT	**0,373**	(5,88)	**0,418**	(5,84)	**0,339**	(5,44)	**0,339**	(5,44)
BIPGROW	**0,724**	(5,49)	**0,788**	(5,59)	**0,521**	(4,04)	**0,521**	(4,04)
Multiple R^2:	0,414		0,399		0,376		0,342	
Adjusted R^2:	0,391		0,370		0,351		0,310	

Sample Statistics

Variables	Mean	Stddev	CoeffVar
KEYPROD	59,08	7,95	0,135
NUTSMINC	94,89	9,39	0,099
SKILL1	16,85	3,95	0,234
SKILL3	12,18	4,84	0,397
SOCRENT1	24,16	15,77	0,653
PARTTIME	15,34	3,16	0,206
KEYQUOT	36,79	5,80	0,158
BIPGROW	0,80	2,85	3,557

ex-ante Elasticities **ex-post Elasticities**

GLS		SARGLS		GLS	
M-1	M-2	M-3	M-4	M-1	M-2
0,476		**0,447**		**0,047**	
	-0,032		**-0,146**		-0,008
	0,619		**0,531**		**0,246**
0,511	**0,504**	**0,462**	**0,462**	**0,334**	**0,329**
5,659	**5,527**	**4,203**	**4,203**	**1,165**	**1,137**
0,631	**0,707**	**0,574**	**0,574**	**0,100**	**0,112**
1,225	**1,334**	**0,882**	**0,882**	**4,358**	**4,744**

Estimates significant at 5% level in bold
Unrestricted estimates. Intercepts not shown in Table.
Coefficient of variation = standard deviation / mean
NUTSMINC in sample statistics: unweighted average

Elasticities: %-change of KEYPROD under
PARTTIME, SOCRENT1: 1% relative change
other explanatories change by 1 percentage point

Table 2 **Mean regional income, Austria = 100**

NUTS3	ZONE	MINC03	MINC05	MINC07	MINC09	MINC	WEIGHT
111	Mittelburgenland	88,72	89,48	90,20	92,79	90,30	0,426
112	Nordburgenland	98,82	100,95	100,89	102,50	100,79	1,773
113	Südburgenland	86,73	86,99	87,70	88,91	87,58	1,159
121	Mostviertel-Eisenwurzen	93,38	93,67	95,15	95,32	94,38	2,897
122	Niederösterreich-Süd	99,38	98,99	99,54	99,84	99,44	3,109
123	Sankt Pölten	100,53	101,14	100,83	101,43	100,98	1,832
124	Waldviertel	88,10	89,39	89,95	90,93	89,59	2,782
125	Weinviertel	97,11	95,28	95,45	97,46	96,33	1,581
126	Wiener Umland-Nordteil	112,08	115,64	115,96	116,90	115,15	3,520
127	Wiener Umland-Südteil	121,55	120,51	121,22	120,21	120,87	3,362
211	Klagenfurt-Villach	95,23	100,04	100,00	100,16	98,86	3,001
212	Oberkärnten	87,35	85,78	86,45	86,25	86,46	1,452
213	Unterkärnten	90,98	87,28	88,30	87,93	88,62	1,959
221	Graz	105,07	106,37	105,34	105,09	105,47	4,238
222	Liezen	86,87	87,75	86,87	87,44	87,23	1,056
223	Östliche Obersteiermark	93,36	94,21	94,96	95,45	94,49	1,968
224	Oststeiermark	82,63	83,17	83,50	84,45	83,44	3,433
225	West- und Südsteiermark	86,19	87,72	87,75	88,32	87,49	2,284
226	Westliche Obersteiermark	88,35	88,86	89,59	89,75	89,14	1,199
311	Innviertel	86,81	86,84	87,44	87,33	87,11	3,389
312	Linz-Wels	105,74	105,18	105,38	105,17	105,37	6,691
313	Mühlviertel	92,01	91,28	92,46	93,46	92,30	2,474
314	Steyr-Kirchdorf	96,14	96,15	96,46	95,84	96,15	1,758
315	Traunviertel	95,02	95,12	95,67	96,00	95,45	2,698
321	Lungau	82,29	82,63	82,78	83,05	82,69	0,279
322	Pinzgau-Pongau	84,49	84,58	83,51	83,03	83,90	2,031
323	Salzburg-Umgebung	103,41	103,92	103,65	103,74	103,68	4,293
331	Außerfern	89,98	91,34	91,04	88,91	90,32	0,402
332	Innsbruck	100,53	100,13	99,65	99,10	99,85	3,440
333	Osttirol	82,85	82,66	83,08	83,45	83,01	0,525
334	Tiroler-Oberland	82,87	82,94	83,22	83,40	83,11	1,154
335	Tiroler-Unterland	88,69	88,78	88,78	88,31	88,64	2,946
341	Bludenz-Bregenzer Wald	95,74	92,02	91,69	91,88	92,83	1,348
342	Rheintal-Bodenseegebiet	95,92	96,69	96,22	96,25	96,27	3,099
130	Wien	111,97	111,27	110,55	109,80	110,89	20,644
	Mean unweighted	91,58	91,80	91,98	92,22	94,52	
	standard deviation unweighted	9,29	9,46	9,37	9,27	9,31	
	Mean weighted with population	100,00	100,00	100,00	100,00	100,00	
	standard deviation weighted	10,47	10,37	10,12	9,82	10,17	

MINC: mean net income per person before transfers in 2003, 2005, 2007, 2009 and average, prices 2007
WEIGHT: regional population shares in Austrian population, average 2003-2009.
Source: Income statistic of Austrian fiscal authorities, population from Statistics Austria

Table 3 **Regional middle skill shares 2003-2009**

Austrian population in the working age

NUTS3	ZONE	SKILL203	SKILL205	SKILL207	SKILL209	SKILL2	AGGQUOT
111	Mittelburgenland	70,66	78,99	78,91	78,11	76,67	0,00
313	Mühlviertel	71,79	74,25	72,78	78,39	74,30	10,52
224	Oststeiermark	72,52	77,06	74,41	76,57	75,14	12,79
113	Südburgenland	68,07	71,52	74,71	74,47	72,19	13,03
112	Nordburgenland	67,38	75,64	73,14	73,54	72,43	15,11
311	Innviertel	63,68	70,59	71,40	68,78	68,61	15,34
331	Außerfern	69,34	72,25	71,37	85,50	74,62	17,86
334	Tiroler-Oberland	69,30	73,52	71,37	72,41	71,65	19,87
225	West- und Südsteiermark	71,73	77,45	73,72	75,28	74,55	21,99
222	Liezen	70,78	74,90	82,70	76,30	76,17	25,30
333	Osttirol	77,56	79,72	71,22	73,17	75,42	26,35
121	Mostviertel-Eisenwurzen	78,13	73,90	72,59	77,78	75,60	27,44
124	Waldviertel	71,25	68,69	71,34	71,19	70,62	29,70
341	Bludenz-Bregenzer Wald	67,09	70,84	74,59	75,44	71,99	31,38
321	Lungau	77,66	75,69	79,55	73,88	76,70	32,50
335	Tiroler-Unterland	68,05	69,67	71,00	69,69	69,60	33,74
122	Niederösterreich-Süd	72,52	69,33	72,29	70,28	71,11	35,44
212	Oberkärnten	80,61	80,29	80,08	78,49	79,87	36,67
125	Weinviertel	69,01	73,37	71,69	77,98	73,01	37,91
226	Westliche Obersteiermark	69,25	80,66	82,44	75,04	76,85	40,81
322	Pinzgau-Pongau	70,62	73,97	73,11	71,96	72,42	41,99
314	Steyr-Kirchdorf	63,72	73,70	66,95	72,99	69,34	47,02
213	Unterkärnten	75,68	73,86	74,95	78,79	75,82	49,28
315	Traunviertel	64,59	71,94	71,90	71,95	70,10	51,33
123	Sankt Pölten	72,86	64,29	68,80	72,08	69,51	53,34
126	Wiener Umland-Nordteil	72,06	70,27	68,03	72,71	70,77	54,82
223	Östliche Obersteiermark	67,25	73,55	78,91	77,53	74,31	58,51
127	Wiener Umland-Südteil	64,59	70,54	70,93	66,83	68,22	59,96
332	Innsbruck	66,33	68,98	62,66	63,85	65,46	69,69
221	Graz	63,37	60,77	59,27	60,20	60,90	71,70
323	Salzburg-Umgebung	65,46	67,90	64,81	66,95	66,28	71,99
211	Klagenfurt-Villach	66,71	71,07	68,88	68,92	68,90	74,54
312	Linz-Wels	63,71	67,84	65,20	64,18	65,23	75,73
342	Rheintal-Bodenseegebiet	64,30	65,78	67,95	66,44	66,12	80,22
130	Wien	55,74	57,04	55,46	55,40	55,91	100,00
	Mean unweighted	69,24	72,00	71,69	72,37	71,32	
	Standard deviation unweighted	5,08	5,12	5,88	5,90	4,87	
	Mean weighted with population	65,90	68,13	67,27	67,72	67,25	
	Standard deviation weighted	6,47	6,82	7,51	7,83	6,89	

SKILL2: middle skill shares 2003, 2005, 2007, 2009, in persons employed
AGGQUOT: Agglomeration quota, measured for active households
Weights given by population in the working age
Source: Census data of Statistics Austria

Table 4 Regional shares of low-skill social renting households, averages over 2003-2009

NUTS3	ZONE	SOCRENT1	KEYPROD	AGGQUOT
111	Mittelburgenland	12,08	49,64	0,0
112	Nordburgenland	11,62	51,10	15,1
113	Südburgenland	9,99	53,73	13,0
121	Mostviertel-Eisenwurzen	21,90	61,25	27,4
122	Niederösterreich-Süd	39,24	58,65	35,4
123	Sankt Pölten	29,21	57,20	53,3
124	Waldviertel	16,37	52,95	29,7
125	Weinviertel	4,76	48,20	37,9
126	Wiener Umland-Nordteil	15,50	56,10	54,8
127	Wiener Umland-Südteil	32,83	63,12	60,0
211	Klagenfurt-Villach	39,09	57,51	74,5
212	Oberkärnten	17,22	58,49	36,7
213	Unterkärnten	33,28	59,12	49,3
221	Graz	23,22	62,94	71,7
222	Liezen	18,09	54,56	25,3
223	Östliche Obersteiermark	55,63	71,40	58,5
224	Oststeiermark	8,58	52,46	12,8
225	West- und Südsteiermark	11,78	56,53	22,0
226	Westliche Obersteiermark	36,16	54,79	40,8
311	Innviertel	15,61	56,18	15,3
312	Linz-Wels	50,59	69,65	75,7
313	Mühlviertel	16,64	53,11	10,5
314	Steyr-Kirchdorf	50,04	75,21	47,0
315	Traunviertel	25,44	68,03	51,3
321	Lungau	38,87	50,19	32,5
322	Pinzgau-Pongau	25,81	56,63	42,0
323	Salzburg-Umgebung	24,55	64,09	72,0
331	Außerfern	8,82	82,79	17,9
332	Innsbruck	23,20	61,93	69,7
333	Osttirol	8,30	53,10	26,3
334	Tiroler-Oberland	9,82	50,60	19,9
335	Tiroler-Unterland	12,61	70,67	33,7
341	Bludenz-Bregenzer Wald	12,54	70,87	31,4
342	Rheintal-Bodenseegebiet	23,91	63,76	80,2
130	Wien	40,15	64,48	100,0

SOCRENT1: low skill households in social renting over all low skill households
Low skill households refer to potential labour force, defined by householder and/or partner is low skilled, no partner of higher skill
KEYPROD: Regional productivity averaged over 2003-2009, in 1000 EUR, prices 2007
AGGQUOT: Agglomeration quota, measured for active households, where householder and/or partner belong to potential labour force
Source: SBS Statistics from Statistics Austria, Austrian census and population data

Datalist **List of variables including data sources**

Symbol	Type	Description	Source	Explanation
YEAR	N	Observation year (from 2003 to 2011)	OWN	
NUTS3	N	NUTS3-Code of region	SBS	
KEYEMPLO	N	Number of employed in KEY-Sectors	SBS	
KEYGDP	R	real gross domestic product of KEY-Sectors	SBS	
KEYPROD	R	Productivity per employed in KEY-Sektors	SBS	
KEYQUOT	P	Share of KEY-Employment relative to Austrian labour force	MZ	dependent employed labour force
PARTTIME	P	Part-time quota (up to 29 regular weekly hours)	MZ	up to 29 regular weekly hours
SKILL1	P	Share of low skilled workers relative to potential labour force	MZ	completed primary school and employed in elementary occupations
SKILL2	P	Share of middle skilled workers relative to potential labour force	MZ	all workers in between SKILL1 and SKILL3
SKILL3	P	Share of high skilled workers relative to potential labour force	MZ	university degree, specialist college or leading managerial or engineering position.
AGGQUOT	P	Share of active households in communities above 5000 inhabitants	MZ	relative to all active HH in region
SOCRENTQ	P	Quota of social rentals over all tenures, for active households	MZ	occupied by active HH in region
SOCRENT1	P	Social rental share of active low skill households relative to active low skill housholds in any tenure	MZ	active HH: householder and/or partner in potential labour force
NUTSMINC	X	Mean regional income level relative to Austria=100	LST	
GDPGROW	P	real growth of Austrian GDP	WIFO	

Legend:

Type	Explanation
N	Numeric
P	Percentage
R	Real values at prices 2007
X	Index

Source	Institution
SBS	"Leistungs- und Strukturerhebung", Statistics Austria
MZ	Census data "Mikrozensus", Statistics Austria
LST	Income tax statistic ("Lohnsteuerstatistik"), Austrian Fiscal authorities
WIFO	Austrian Institute of Economic Research
OWN	Own calculations