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Job Hopping and Economic Agglomeration in Germany

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Zusammenfassung

This paper investigates whether labor mobility varies with the degree of agglomeration and, if so, how the differences can be explained. The theoretical basis rests on the advantages agglomerations exhibit in providing a large pooled labor market, one of Marshall's famous three sources of agglomeration economies. Only a small number of studies have so far investigated how the concentration of economic activity interacts with local labor market dynamics. They generally find support of the hypothesis that labor market pooling works better in agglomerations. Since most of the relevant literature is limited by sectoral and geographic restrictions, however, the question whether there exists a general relationship between job hopping and economic density still remains to be answered. This paper aims at answering this question and thus at contributing to the still sparse literature on the effect of both urban and industrial agglomeration on labor market pooling. Taking advantage of a unique and comprehensive data set on all establishments and employees for Germany that are subject to social security contributions, I exploit information on the movement of workers in and out of establishments as well as detailed information on worker and establishment characteristics. The analysis covers the years from 2001 to 2009 and is carried out for Germany on the level of NUTS3-regions and a disaggregated industry classification. In total, it contains information on roughly 29 million establishments and 291 million employees. First empirical results do not support the hypothesis that, in general, it is easier for employees to job hop in agglomerations than in rural areas. The data for all industries shows that, although job mobility tends to diminish with the degree of deagglomeration, in rural regions it is almost as high as in the dense core cities. This pattern is especially pronounced in the manufacturing sector, where labour turnover rates in the rural regions are 10 percentage points higher than in core cities. In the service sector, by contrast, labor mobility is indeed higher in agglomerated regions. This pattern can be regarded as a first hint in favor of the advantages of agglomerations in terms of labor market pooling. The relationships that emerged with respect to the broad sectoral classifications will be further investigated with the help of econometric techniques that also take into account the information on the establishment and worker characteristics.

JEL classification: R12, J63

Keywords: labor mobility, agglomerations, labor market pooling

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1 Introduction

The uneven distribution of economic activities across space that can be observed in many countries is by now a well-documented but still not fully understood phenomenon (see Rosenthal/Strange, 2004 for an overview). Identifying agglomeration economies as a major determinant of the spatial pattern, Marshall (1890) emphasized the sharing of common inputs, spillovers in knowledge and labor market pooling as three key drivers of agglomerations. While there has been much work on the role of input sharing and of knowledge spillovers,¹ so far only a small number of studies has investigated how the concentration of economic activity interacts with local labor market dynamics (see, for example, de Blasio/Addario, 2005, Fallick/Fleischman/Rebitzer, 2006, or Freedman, 2008). The hypothesis that labor market pooling works better in agglomerations rests on the idea that workers should be better matched in large cities or in industrial concentrations. Taking the turnover of workers as an indicator, this would imply that in large agglomerations workers can more easily change jobs and firms can more easily change employees than in rural areas. Indeed, the empirical literature largely finds support of the hypothesis that labor market pooling works better in agglomerations. Since most of the relevant literature is limited by sectoral and geographic restrictions, however, the question whether there exists a general relationship between job hopping and economic density still remains to be answered.

This paper aims at filling this research gap. It wants to determine on a broad level of economic activity whether labor mobility is higher in agglomerations and, if so, how this relationship can be explained. To this end, I take advantage of the Employment Statistics Register, a unique and comprehensive administrative data set on all establishments and employees for Germany that are subject to social security contributions. I exploit information on the movement of workers in and out of establishments as well as detailed information on worker and establishment characteristics. The analysis covers the years from 2001 to 2009 and is carried out for Germany on the level of NUTS3-regions and a disaggregated industry classification. In total, it contains information on roughly 29 million establishments and 291 million employees. Labor mobility is measured by labor turnover, i.e. the sum of all inflows and outflows of employees in an establishment in a given time period set in relation to the establishment's stock of employees.

The first part of the empirical analysis is dedicated to a detailed description of local job hopping according to district types. I look at labor mobility in the total economy and in manufacturing and services, respectively. In addition, in line with the existing empirical studies focusing on high-technology sectors (see for example Fallick/Fleischman/Rebitzer, 2006), the knowledge-intensive manufacturing and service sectors are analyzed as well. The second part of the analysis will contain an econometric analysis of the determinants of

¹See again Rosenthal/Strange, 2004 for an overview.

the labor turnover rates to find out in more detail how the spatial patterns interact with the job mobility patterns. Here, information on worker and establishment characteristics will be incorporated as well.

The paper proceeds as follows. The next section reviews the theoretical and empirical literature on agglomerations and labor mobility. In section 3 the data is described, along with the definitions of the central concepts and variables. Section 4 presents detailed descriptive evidence on the relation between the degree of labor mobility and agglomeration. The econometric analysis in section 5 aims at explaining the patterns found in the descriptive part. Section 6 concludes.

2 Related literature

The theoretical background on agglomeration rests heavily on the existence of external effects as mentioned by Marshall (1890). According to the agglomeration literature, cities must benefit from some kind of local increasing returns or indivisibilities in order to exist and maintain their size. Marshall (1890) suggests three sources of agglomeration economies (see also Rosenthal/Strange, 2004). The first source is the sharing of inputs whose production involves internal increasing returns to scale. The second are advantages created by the existence of pooled markets for specialized workers. Agglomeration allows a better match between an employer's needs and a worker's skills and reduces the risk for both. The third source are knowledge spillovers that take place between nearby individuals and/or establishments. In this paper, I will focus on the second source of agglomeration economies, i.e. the interrelation between labor market pooling and agglomeration.

Rosenthal/Strange (2004) point out that one possible approach to identify labor market pooling would be to look at turnover. The implications of the labor-market pooling hypothesis are that workers can readily change jobs and that establishments can just as easily change employees. In addition, if clustering improves labor market coordination or promotes greater human capital accumulation among workers, Freedman (2008) emphasizes that job mobility could be higher within clusters. For example, if agglomeration reduces job search frictions, working in an industry cluster could induce more job hopping as workers and firms seek out better matches. A more general theory of turnover and job matching was developed by Jovanovich (1979). It has to be taken into account, however, that when firms cluster in the same local market, they are confronted with a trade-off between the benefits of labour pooling (i.e., access to workers whose knowledge help reduce costs) and the costs of labour poaching (i.e., loss of some key workers to competition and a higher wage bill to retain the others). Theoretically exploring this tradeoff in a duopoly game, Combes/Duranton (2006) show that co-location is not necessarily the non-cooperative equilibrium outcome. In fact, Frank (2008) argues that for film-related services, the poaching argument has greater practical weight than the Marshallian labour

pooling mechanism.

Andersson/Burgess/Lane (2007) concentrate on the matching of workers and jobs and show that thicker urban labor markets are associated with more assortative matching in terms of worker and firm quality. Another study that deals with the importance of urban areas for the job matching process comes from Wheeler (2008). He argues that the career search process may exhibit important differences depending on the size of a worker's local market. The likelihood that a worker changes industries rises with the size and diversity of his local labor market when considering the first job change he makes. However, this association gradually decreases as a worker makes greater numbers of job changes.

Among the many studies that look at certain sectors or regions, de Blasio/Addario (2005) estimate the extent to which the probability of being employed and that of being an entrepreneur are higher in Italian industrial districts than elsewhere. They also analyze whether the likelihood of transiting from wage- and salary employment to entrepreneurship and the number of jobs held over the course of a career significantly differ between the industrial districts and the rest of the economy. de Blasio/Addario (2005) conclude that industry agglomeration seems to increase mobility between jobs for blue-collar workers, but decreases it for white-collar workers. According to the labor pooling hypothesis, this would imply that only skilled workers benefit from better quality matches. Carrying out a case study on job hopping in Silicon Valley, Fallick/Fleischman/Rebitzer (2006) find significantly higher rates of job mobility in the computer industry than in computer clusters situated outside of California. In another case study, Freedman (2008) focuses on the relationship between job hopping and industrial agglomeration in the software publishing industry. His main finding is that clustering makes it easier for workers to job hop within the sector. As to ICT clusters in Sweden, Power/Lundmark (2004) empirically verify the idea that labour market mobility is significantly higher in the cluster than in the rest of the urban economy.

In this first overview of the related literature, case studies seem to dominate, probably mainly due to data restrictions. The results of these studies basically support the hypothesis that job hopping is higher in agglomerations, implying that labor market pooling works better in regions with denser economic activity in the sector or cluster under consideration. Yet it remains unclear if this relationship is restricted to single sectors or regions or if it also holds in more general terms. The present study aims at shedding more light on this question by covering all economic activity within a country.

3 Data and definitions

3.1 Data

The empirical work is based on the Employment Register data of the German Federal Employment Services. The Employment Statistics Register is an administrative data set of individuals based on the notifying procedure of the German health insurance, statutory pension scheme, and unemployment insurance. Since employers are obliged to notify the social security agencies about the beginning and the termination of any employment relationship of workers covered by social insurance, the data are very reliable. In addition, since 1999 it contains information on the so-called 'marginal part-time jobs', which are jobs with no more than 15 hours per week of temporary jobs that last no longer than 6 weeks. Furthermore, it gives information on important personal characteristics like sex, age, and education.² In total, the Employment Statistics Register covers nearly 80 percent of the German workforce, excluding only the self-employed, civil servants and individuals in (compulsory) military service. All workers employed by the same establishment can be matched via an establishment identifier. Hence, it is possible to calculate the stock of employees at any given point in time. In 2009, the Employment Statistics Register contained information on about 3.2 million establishments and roughly 33.3 million employees.

In principle, the data of the Employment Statistics Register is available since 1975. The information on employment is generally observed once a year at the cut-off date of June 30. However, the consideration of both West and East Germany, changes in the industry classification, the consideration of the marginally employed as well as missing data reporting in the year 2000 in some regions restrict the time period under consideration to the years from 2001 to 2009. The industry classification follows the NACE classification at the three-digit level. Since the primary and the energy sector is highly dependent on geographical factors, it is excluded from the analysis. Likewise, I do not consider the public sector, because decisions on hiring and firing workers are often subject to political considerations.

The regional information refers to the location of the establishment/workplace at NUTS3 (district) level. To map agglomeration effects, I resort to a widely used classification scheme of the Federal Office for Building and Planning (*Bundesamt für Bauwesen und Raumordnung* - BBR). It differentiates between 9 district types according to their centrality and population density that are depicted in table 2. They are assigned to three larger structural region types that define regions with large agglomerations, regions with features of conurbation, and regions of rural character.

Overall, the database for the empirical analysis covers 9 years, 412 districts and 222 NACE three-digit classifications and contains information on 27.9 million establishments

²For more detailed information on the data set and the notifying procedure see Bender/Haas/Klose (2000).

Tabelle 1: Characterization of the German districts

Structural region type	District type	Description
Regions with large agglomerations	type 1	Core cities
	type 2	Highly urbanized districts in regions with large agglomerations
	type 3	Urbanized districts in regions with large agglomerations
	type 4	Rural districts in regions with large agglomerations
Regions with features of conurbation	type 5	Central cities in regions with intermediate agglomerations
	type 6	Urbanized districts in regions with intermediate agglomerations
	type 7	Rural districts in regions with intermediate agglomerations
Regions of rural character	type 8	Urbanized districts in rural regions
	type 9	Rural districts in rural regions

and 291.3 million employees.

3.2 Definitions

The number of employees that change jobs is the central variable in the empirical analysis. The number of employees is measured in full-time equivalents, where a full-time employee enters with a factor of 1.0 and a part-time employee with the factor 0.5. With this procedure, I try to capture the increasing trends in part-time and marginal employment in Germany which might lead to biases in the flows in certain sectors or regions. In 2009, the data set counted about 25.1 million full-time equivalents.

The social security notification process requires employers to report any permanent or temporary changes in employment relationships. Hence, the data on the movement of employees in and out of establishments is basically available on a day-to-day basis. To simplify data processing, I sum up all inflows and outflows measured at a daily basis in an establishment between the years $t - 1$ and t at the respective cut-off dates (30.6) in every year. The magnitude of job hopping is expressed in rates. To this end the absolute values are related to the average number of employees (in full-time equivalents) in the establishments at $t - 1$ and t (see also Davis/Haltiwanger/Schuh, 1996). The resulting fluctuation rate gives information on the relative amount of job movers per establishment and can be aggregated according to region or industry. Hence, in this paper job hopping is defined as the rate of starting or ending a job in an establishment.

In the first step of the analysis, I consider labor dynamics in all economic sectors to find out about the general relationship between job hopping and agglomeration. Then, I divide the sectors into manufacturing and into services. Since most case studies discussed in section 2 focus on some kind of knowledge-intensive sectors, I will also explicitly consider these activities in the following descriptive analysis. It is based on work by Legler/Frietsch (2007) and has the advantage that it incorporates both the research-intensive manufacturing sectors as well as knowledge-intensive service sectors.³

³See table A.1 in the Appendix for a detailed description of the corresponding NACE groups.

4 Empirical evidence

If labor market pooling should be more effective in agglomerations, then job hopping should be more frequent in agglomerated regions than in rural areas. This implies that there should be some kind of relationship between the job hopping rates and the districts according to the district types of table 2.

Table 2: Labor flow rates according to district types in Germany (Averaged across the years 2001 to 2009)

Structural region type	District type	Labor flow rates			
		total	manufacturing	services	knowledge-intensive sectors
Regions with large agglomerations	type 1	84.55	46.73	94.20	<i>work in progress</i>
	type 2	72.39	46.58	84.95	
	type 3	74.37	49.45	81.94	
	type 4	79.06	53.31	80.42	
Regions with features of conurbation	type 5	80.39	46.94	90.51	
	type 6	70.90	47.37	82.28	
	type 7	72.51	49.72	79.83	
Regions of rural character	type 8	76.64	49.13	85.90	
	type 9	82.13	56.87	84.14	

5 Explaining the patterns

Proposed setup of this section:

- The aim here is to econometrically find out in how far the degree of agglomeration can explain the degree of labor mobility.
- The dependent variable would be the job-turnover rate, and the independent variables would comprise the district types. Furthermore, a set of further exogenous variables that comprise establishment characteristics (age, size, sector,...) and employee characteristics (age, sex, qualification,...) will be included.
- Interaction terms will capture any interdependencies between the exogenous variables.
- For the pooled data, I will first use ordinary OLS techniques.
- I will also take advantage of the panel data at hand and estimate appropriate panel data models (first of all, random and fixed effects).
- According to the results, I will further refine the estimations as well as the sectoral delineation of the data.

6 Conclusions

..... It would also be interesting to focus not on the general level of agglomeration, but on sectoral concentration and examine the relationship between, for example, the location quotient or the Ellison-Glaeser index and labor mobility.

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Appendix

Tabelle A.1: Industries contained in the knowledge-intensive sector

Group	three-digit NACE code
Manufacturing	232, 233, 241, 242, 244, 245, 246, 247, 283, 291, 292, 294, 295, 296, 300, 311, 312, 314, 315, 316, 321, 322, 323, 331, 332, 333, 334, 341, 343, 351, 352, 353
Services	221, 523, 603, 611, 622, 623, 643, 651, 652, 660, 671, 701, 721, 722, 723, 724, 725, 726, 731, 732, 741, 742, 743, 744, 921, 922, 923, 924, 925

Source: Legler/Frietsch (2007).