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The Labour Market Impact of Immigration: Quasi-Experimental Evidence

Albrecht Glitz

Centre for Research and Analysis of Migration
Department of Economics, University College London
Drayton House, 30 Gordon Street, London WC1H 0AX

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Albrecht Glitz*

* Universitat Pompeu Fabra

Non-Technical Abstract

With the fall of the Berlin Wall, ethnic Germans living in the former Soviet Union and the Warsaw Pact countries were given the chance to migrate to Germany. Within 15 years, 2.8 million individuals moved. Upon arrival, these immigrants were exogenously allocated to different regions by the administration in order to ensure an even distribution across the country. Their inflows can therefore be seen as a natural experiment of immigration, avoiding the typical endogeneity problem of immigrant inflows with regard to local labour market conditions. I analyse the effect of these exogenous inflows on relative skill-specific employment and wage rates of the resident population in different geographical areas between 1996 and 2001. The variation I exploit in the empirical estimations arises primarily from differences in the initial skill composition across regions. Skill groups are defined either based on occupations or educational attainment. For both skill definitions, my results indicate a displacement effect of around 4 unemployed resident workers for every 10 immigrants that find a job. I do not find evidence of any detrimental effect on relative wages.

Keywords: Immigration, Labour Market Impact, Skill Groups, Germany

JEL Codes: J21, J31, J61

Centre for Research and Analysis of Migration
Department of Economics, Drayton House, 30 Gordon Street, London WC1H 0AX
Telephone Number: +44 (0)20 7679 5888
Facsimile Number: +44 (0)20 7916 2775

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Abstract

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*Department of Economics and Business, Ramon Trias Fargas 25-27, 08005 Barcelona, Spain, e-mail: albrecht.glitz@upf.edu. This paper was written while working at University College London and the Centre for Research and Analysis of Migration (CReAM). I am grateful to Christian Dustmann, David Card, Kenneth Chay, Emilia Del Bono, Ian Preston, Imran Rasul, Regina Riphahn and Matti Sarvimäki for helpful comments and suggestions, and to Stefan Bender for invaluable support with the data. I have benefited from many useful comments of conference participants at ESPE 2004, EEA 2005, the COST A23 meeting 2005, the CReAM/TARGET conference 2006, EEA 2006, EALE 2006 and participants of the Labor Lunch Seminar at Berkeley. Parts of this paper were written while visiting the Department of Economics at Berkeley, which I thank for the hospitality. I also thank the ESRC for funding the project (award No. RES-000-23-0332) and the Barcelona Economics Program of CREA for its support.

1 Introduction

The impact immigration has on the labour market outcomes of the resident population is a central issue in the public debate on immigration policies. In most European countries it has been widely discussed in recent years in connection with the eastern enlargement of the European Union and, in particular, the potential introduction of transitional measures to restrict labour migration from the new member states. There is a widespread concern that immigrants exert downward pressure on wages and reduce job opportunities for resident workers. Since the 1990s, numerous studies have tried to empirically assess the labour market effects of immigration for a number of countries, sometimes with conflicting results and using a variety of methodological approaches.[1] The most common approach in the literature is the spatial correlation approach, in which a measure of the employment or wage rate of resident workers in a given area is regressed on the relative quantity of immigrants in that same area and appropriate controls.[2] One of the main difficulties of this strategy arises from the immigrants' potentially endogenous choice of place of residence. Immigrants tend to move to those areas that offer the best current labour market opportunities, which typically leads to an underestimation of the true effect they have on the labour market outcomes of the resident population. To address this endogeneity problem, some studies have used instrumental variables that are based on past immigrant concentrations, exploiting the fact that these are good predictors of contemporary immigrant inflows while assuming that they are uncorrelated with current unobserved labour demand shocks.

In this paper, I follow an alternative approach by taking advantage of a natural experiment in Germany in which a particular group of immigrants was exogenously allocated to spe-

[1] See Friedberg and Hunt (1995), Gaston and Nelson (2002) or Dustmann and Glitz (2005) for comprehensive surveys of the literature.

[2] Examples include Altonji and Card (1991), LaLonde and Topel (1991), Butcher and Card (1991), and Card (2001) for the U.S., Winter-Ebmer and Zweimüller (1996, 1999) for Austria, Hunt (1992) for France, Pischke and Velling (1997) for Germany, Carrington and de Lima (1996) for Portugal, Dustmann et al. (2005) for the UK, and Hartog and Zorlu (2005) for the Netherlands, the UK and Norway.

cific regions upon arrival by government authorities. The prime objective of the allocation policy was to ensure an even distribution of these immigrants across the country. Since, to an overwhelming extent, the actual allocation decision was based on the proximity of family members and sanctions in case of non-compliance were substantial, the possibility of self-selection into booming labour markets was severely restricted for this group of immigrants, allowing us to view their settlement as exogenous to local labour market conditions and providing a unique opportunity to study its effect on the resident population.

Only in few instances is it feasible to view immigration as a natural experiment in which the immigrant inflows into a particular region are not driven by local labour market conditions. The only example in the literature that uses such an experiment to identify the labour market impact of immigration on the resident population is the Mariel boatlift analysed by Card (1990).[3] The main conceptual difference between that study and my analysis is that Card examines a large exogenous inflow into a single local labour market, the city of Miami, whereas this analysis uses exogenous but relatively homogenous inflows into all regions in Germany. As I will show, in this case the main source of variation stems from differences in the skill composition of the resident labour force across regions. Edin et al. (2003), Piil Damm (2006) and Gould et al. (2004) are further studies that are related to my analysis insofar as they use spatial dispersal policies for refugee immigrants in Sweden, Denmark and Israel, respectively, as a source of exogenous initial regional allocations of immigrants. Rather than looking at the labour market impact of these inflows on the resident population, the aim of the former two studies is to assess how living in an ethnic enclave affects immigrants' own labour market outcomes whereas the latter investigates the effect of school quality on the high school performance of immigrant children.

In this paper, I set up a model in which immigration affects the relative supplies of differ-

[3]There are a number of studies, however, in which the immigrant inflow to a country as a whole - rather than to particular regions within the country - can be seen as a natural experiment, for instance the inflow of repatriates from Algeria to France analysed by Hunt (1992) or the mass migration of Russian immigrants to Israel studied by Friedberg (2001).

ent skill groups in a locality. I then estimate how changes in these relative supplies affect the employment/labour force rate and wages of the resident population, first by OLS and then using the exogenous immigrant inflows to instrument the potentially endogenous changes in relative skill shares in a locality. I define skill groups in two alternative ways based on either occupations or educational attainment and distinguish between the effect on native Germans and foreign nationals. To investigate whether out-migration of the resident population in response to the immigrant inflows potentially dissipates their labour market impact across the economy, I regress overall and skill-specific local population growth rates on immigrant inflow rates. The results from these regressions also allow an assessment of whether there is any positive association between immigrant inflows and the growth rates of the resident population, which would cast doubt on the exogeneity of the allocation decisions with regard to local demand conditions. Finally, I ascertain whether the initial skill composition in a locality, which turns out to be the main source of variation in my estimations, has an independent effect on future changes in labour market outcomes that could be driving the results.

The particular group of immigrants at the centre of this study are so called "ethnic German immigrants". These are individuals who were living in large numbers in Central and Eastern Europe and the former Soviet Union and who were particularly affected by the divisive ideological developments in the aftermath of World War II. Only as a result of the political changes in the former Eastern Bloc towards the end of the 1980s did this group gain the opportunity to immigrate to Germany, which, after 40 years of isolation, was eagerly seized. Between 1987 and 2001 more than 2.8 million ethnic German immigrants moved to Germany, increasing its population by 3.5%. Based on Germany's principle of nationality by descent, this particular group of immigrants as well as their descendants are regarded as German by the constitution and granted German citizenship in the event of immigration. I collected annual county-specific inflows of this group of immigrants directly from each of the sixteen federal admission centres and combine these figures with

detailed information on local labour markets that I obtained from social security based longitudinal data. The analysis focuses on West Germany, excluding Berlin, and covers the period 1996 to 2001, during which the allocation policy was in effect.

The empirical results point towards the existence of unobserved local demand shocks that are correlated with changes in relative skill shares and lead to upward biased estimates of the labour market impact of immigration from simple OLS regressions. Using the ethnic German immigrant inflows to instrument the endogenous changes in the relative skill shares leads to substantially larger negative effects on the employment/labour force rate. The estimates imply that for every 10 immigrant workers finding employment, about 4 resident workers lose their jobs. Since all regressions are based on annual variation, this displacement effect has to be interpreted as a short-run effect. The increase in magnitude of the estimates by a factor of 3 to 7 when moving from OLS to IV is comparable with the results Card (2001) found in a similar study for the U.S., in which the instrument, however, was based on past immigrant settlement patterns. The fact that I find a negative effect on the employment/labour force rate of the resident population stands in contrast to a number of earlier studies for Germany, for instance to Pischke and Velling (1997) and Bonin (2005), who do not find such effects. My results do not show evidence of detrimental effects on relative wages of the local population. Finally, there is no indication that the obtained results are underestimates of the immigrant labour market impact due to compensatory outflows of the resident population or that they are driven by an independent effect of initial relative skill shares on future labour market outcomes.

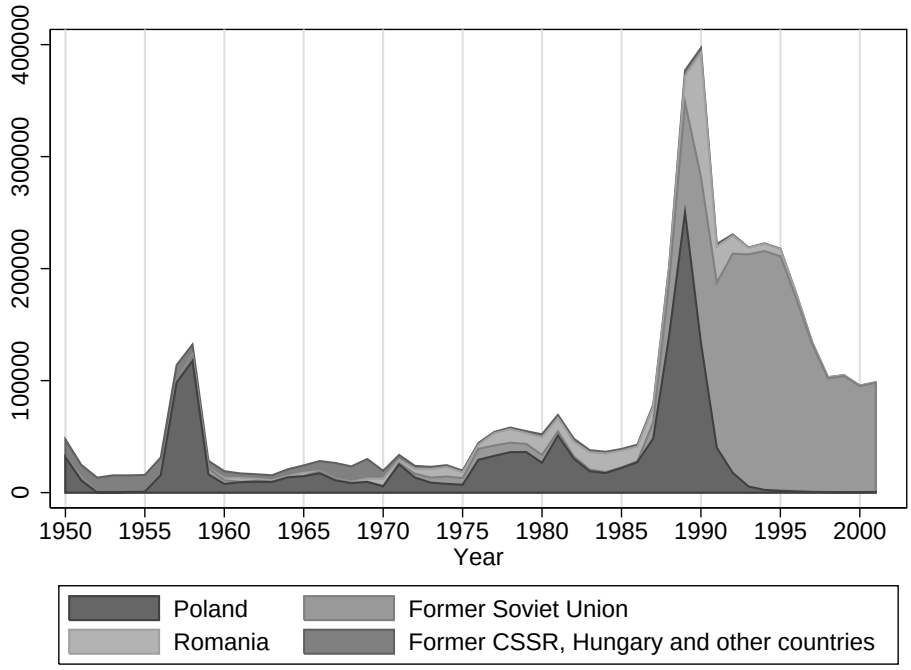
The remainder of this paper is organised as follows. In the next section, I will provide some background information on ethnic German immigration since World War II and the institutional setting in which it took place. In Section 3, I explain the underlying theoretical model and identification strategy of my analysis. I then describe the data sources in Section 4 and provide some descriptive evidence in Section 5. Finally, I present and

discuss the estimation results in Section 6. Section 7 concludes.

2 The German Migration Experience - Some Facts

2.1 Historical Background

Figure 1: Ethnic German immigrant inflows by country of origin, 1950 to 2001



Source: *Bundesverwaltungsamt*

To understand the origin of ethnic German immigrants we have to consider their historical background. During the terror regime of the National Socialists in Germany, a large number of German citizens fled the country or were forcibly resettled to the eastern occupied territories. After the end of World War II and the ensuing repartitions and forced resettlements across Europe, about 15 million German citizens became refugees or expellees, most of whom moved back to Germany in the immediate post-war years. According to Salt and Clout (1976) some 7.8 million of these refugees had settled in West Germany and 3.5 million in East Germany by 1950. However, many German citizens and

their descendants continued to live outside post-war Germany. Their inflows gradually ebbed away as Eastern European countries became increasingly isolated. After the initial post-war displacements, immigration of ethnic Germans, then called *Aussiedler*, took place on the basis of bilateral agreements between Germany and the corresponding source countries. However, after the construction of the Berlin Wall in 1961 and the worsening of the East-West relations, these flows were severely limited. Between 1950 and 1987, the number of ethnic Germans who came to West Germany added up to 1.4 million, of which 848,000 had come from Poland, 206,000 from Romania, and 110,000 from the former Soviet Union.[4] In 1988, with the end of the cold war looming, travel restrictions in Central and Eastern Europe were lifted. This caused an immediate resurgence of ethnic German migrations. In 1990 alone some 397,000 individuals, mainly from the former Soviet Union (37%), Poland (34%) and Romania (28%), arrived in Germany (see Figure 1). Faced with these enormous movements, the government limited their inflow in subsequent years at a level of around 225,000 per year. This quota was met until 1995 after which the annual inflows gradually decreased. From 1993 onwards more than 90% of the ethnic German immigrants originated from territories of the former Soviet Union. It is important to emphasise that the ethnic German immigrant population I analyse in this study does not include Germans who used to live in East Germany and who moved to West Germany after unification in 1990. This group had complete freedom of movement within Germany from the day of unification.

2.2 Institutional Framework

All ethnic German immigrants who want to come to Germany have to apply for a visa at the German embassy in their country of origin and prove their German origin in terms of descent, language, education and culture. Once applications are accepted and a visa is granted, which takes around one year, all arriving immigrants have to pass through a central admission centre where they are initially registered. In case they do not have a job or

[4]Source: Bundesverwaltungsamt, Jahrestatistik Aussiedler 2003.

other source of income that guarantees their livelihood, which applies to the vast majority of immigrants at the time of arrival, they are then allocated to one of the sixteen federal states according to pre-specified state quotas.[5] Within each state, they are subsequently further allocated to particular counties, using a state-specific allocation key as guidance which, with two exceptions, is fixed over time and based on the relative population share of each county.[6] By far the most important factor determining the final destination of the ethnic German immigrants is the proximity of family members or relatives. The responsible authority at the Ministry of the Interior estimates that this has been the decisive factor in the allocation decision in approximately 90% of all cases. Additional factors are the presence of health and care facilities and the infrastructure for single parents. Crucially for this study, the skill level of the immigrants did not play any substantial role in the allocation process.

The legal basis for this system is the "Assigned Place of Residence Act" (*Wohnortzuweisungsgesetz*), which was introduced in 1989 in response to the large inflows experienced at the time. These inflows tended to be concentrated towards a few specific regions where they caused considerable shortages in available housing space while in other, particularly rural areas, facilities remained empty.[7] The intention of the law was to ensure a more even distribution of ethnic German immigrants across Germany and avoid a capacity overload of local communes, who are responsible for the initial care of the immigrants. However, in practice, the introduction of this law turned out to be ineffective because the entitlements

[5] According to the so-called *Königsteiner Distribution Key*, the quotas since 1993 have been: Baden-Württemberg 12.3%, Bavaria 14.4%, Berlin 2.7%, Brandenburg 3.5%, Bremen 0.9%, Hamburg 2.1%, Hesse 7.2%, Mecklenburg-Pomerania 2.6%, Lower Saxony 9.2%, North Rhine-Westphalia 21.8%, Rhineland Palatinate 4.7%, Saarland 1.4%, Saxony 6.5%, Saxony-Anhalt 3.9%, Schleswig-Holstein 3.3%, and Thuringia 3.5%.

[6] The exceptions are Lower Saxony where the quotas are annually adjusted for changes in each county's population, and North Rhine-Westphalia where quotas are based on both population and geographical area and annually adjusted to population changes.

[7] The problem of housing space was particularly pronounced in the late 1980s and early 1990s when annual inflows of ethnic German immigrants were largest. By the mid 1990s, however, sufficient capacities in social housing and hostels had been established and were even partly shut down again due to the smaller annual inflows. Therefore I do not expect that housing availability, which may depend directly on the state of the local economy, would have affected the number of immigrants allocated to a region and in that way introduced endogeneity into the allocation process.

to considerable statutory provisions such as financial social assistance, free vocational training courses, and language classes were not affected should the ethnic German immigrant choose to settle in a region different from the one allocated upon arrival. As a consequence, unregulated internal migration of ethnic Germans led to the creation of a few enclaves, in some of which their concentration reached up to 20% of the overall population (Klose, 1996). In response to these developments, the Assigned Place of Residence Act was substantially modified on 1 March 1996. As a key feature of the new law, ethnic German immigrants would now lose all their statutory entitlements in case of non-compliance with the allocation decision. Due to the federal structure of Germany it was subject to each of its states to adopt and implement the new legislation. Apart from Bavaria and Rhineland-Palatinate, all West German states chose to do so, most of them with effect from 1 March 1996. Only Lower Saxony and Hesse adopted the law at a later point, the former in April 1997 and the latter in January 2002. For an overview see Table B-1 in Appendix B. The perception at both the Ministry of the Interior as well as the Association of German Cities and Towns is that the new provisions and sanctions have been successful and ensured a high compliance with the initial allocation decision.[8]

The regional allocation of the ethnic German immigrants becomes void if they can verify that they have sufficient housing space as well as a permanent job from which they can make a living, at the latest, however, three years after initial registration. This suggests that after arrival in the allocated place of residence there is some scope for endogenous self-selection through onward migration. However, it is likely that immigrants will predominantly search for job opportunities in the vicinity of their places of residence. In fact, the difficulties of searching for a job in a different locality arising from the legal provisions of the Assigned Place of Residence Act were acknowledged by the legislator and led to a further amendment of the law on 1 July 2000 that explicitly allowed for temporary

[8]This is corroborated in the commentarial statement of a related judgment by the Federal Constitutional Court in a case in which an ethnic German immigrant took legal action without avail against the restriction of her freedom of movement (BVerfG, 1 BvR 1266/00 vom 17.3.2004, Absatz-Nr. 1 - 56).

residence in alternative localities for the purpose of job search activities without loss of entitlements as long as it did not exceed 30 days.[9]

To sum up, through the introduction of the new legislation in 1996 the authorities implemented a system to allocate a particular group of immigrants exogenously with regard to their skill levels across different regions while at the same time providing for the necessary sanctions to ensure compliance with these allocation decisions. This framework can therefore be regarded as a natural experiment of immigration in which inflows are exogenous to local labour demand conditions.

3 Theory

3.1 Empirical Model

The empirical analysis in this paper is based on a model in which immigration impacts local labour markets by changing the relative supplies of different skill groups (compare Card, 2001). Assuming that in each labour market a competitive industry produces a single output good using a CES-type aggregate of skill-specific labour inputs as well as capital, relative wages and, by substituting into a labour supply function, relative employment rates will only depend on the relative supply of each skill group.[10] The equations for the effect on the employment/labour force and wage rates are then given by

$$\Delta \log \left(N_{jrt} / P_{jrt} \right) = v'_{jt} + v'_{rt} + \beta_1 \Delta \log f_{jrt} + \Delta v_{jrt} \tag{1}$$

[9] I do not explicitly take this change in regulations into account in the analysis since it was only valid for the last six months of the six-year period I cover and did not affect the initial allocation to a particular region.

[10] The key assumptions underlying this model are that capital and labour are separable in the local production function, that the elasticities of substitution across all skill groups are identical, that natives and immigrants are perfect substitutes within skill groups, and that the per-capita labour supply functions for the different skill groups have the same elasticity.

$$\Delta \log w_{jrt} = u'_{jt} + u'_{rt} + \beta_2 \Delta \log f_{jrt} + \Delta u_{jrt}, \tag{2}$$

where $\Delta \log f_{jrt} = \log(P_{jrt}/P_{rt}) - \log(P_{jrt-1}/P_{rt-1})$ denotes the percentage change in the fraction of the overall labour force in labour market r that falls into skill group j, and v'_{jt}, u'_{jt}, v'_{rt}, and u'_{rt} are interactions of skill group and year fixed effects and region and year fixed effects, respectively. Δv_{jrt} and Δu_{jrt} are unobserved error components that capture skill-, region- and year-specific productivity and demand shocks. For a detailed derivation of these equations see Appendix C.

As opposed to Card's study, which only uses one cross-section and thus estimates in levels, I am able to control for skill region specific fixed effects (which I difference out) and use variation in local skill shares over time to identify β_1 and β_2. This could potentially be important since otherwise any instrumental variable that is based on past labour market characteristics will be invalid if these characteristics are themselves correlated with unobserved skill region specific fixed effects.[11]

Equations 1 and 2 relate changes in the local employment and wage rates to changes in the relative factor shares in a locality. Any skill-specific local productivity and demand shocks in a given year are captured in the error component. If these shocks raise employment and wage rates in a particular skill group and at the same time attract more workers into that group, this will induce a positive correlation between the error terms Δv_{jrt} and Δu_{jrt} in Equations 1 and 2 and the change in the relative skill share $\Delta \log f_{jrt}$. In this case, OLS estimates of β_1 and β_2 will be upward biased.

To address this problem, I take advantage of the exogenous allocation of ethnic German

[11] If, as for the U.S. and Germany, immigration has historically been unskilled, then it is likely that any (un)skilled region fixed effect is correlated with the overall number of immigrants living in a locality: unskilled immigrants would have tended to move to those areas that are particularly attractive given their skill level. In a cross sectional analysis skill region fixed effects cannot explicitly be controlled for and are part of the unobserved error component. An instrument that is based on past immigrant concentrations will then be correlated with this error component, rendering it invalid.

immigrants to Germany's counties between 1996 and 2001. Specifically, I assume that their inflows are uncorrelated with any skill-specific productivity and demand shocks and can therefore serve as an instrument for the change in the relative factor shares $\Delta \log f_{jrt}$. I will provide evidence for the validity of this assumption in Section 5.4.

I construct my instrument, the skill-specific ethnic German inflow rate, by multiplying the overall inflow ΔI_{rt} into a particular locality with the nationwide fraction of ethnic German immigrants in each skill group where I distinguish skill groups either by educational attainment or by occupation. Let θ_{jt} denote this fraction and let ω_t denote the fraction of ethnic German immigrants that arrive in year t and are aged between 15 and 64. Since individual skills and age did not play a role in the allocation of ethnic Germans to local labour markets, one can expect the skill and age composition of the arriving ethnic German immigrants in each locality to be the same.[12] The predicted skill-specific inflow rate of working age immigrants into labour market r in year t that I use as an instrument for the change in the relative factor share is then given by

$$SP_{jrt} = \frac{\theta_{jt}\omega_t \Delta I_{rt}}{P_{jrt-2}},$$

where SP_{jrt} stands for the skill-specific supply-push component of ethnic German immigrant inflow ΔI_{rt}, and P_{jrt-2} is the overall labour force in skill group j in $t-2$. I use a lag of two years in the denominator in order to avoid any correlation with the skill-specific error terms Δv_{jrt} and Δu_{jrt} in Equations 1 and 2.[13]

[12] In the presence of a correlation in skills between immigrants and their family contacts already living in Germany, this assumption may not hold. However, since these families have typically been split up a long time ago and passed through significantly different educational systems, the correlation in skills is likely to be small. If the assumption of identical skill compositions of arriving ethnic Germans were invalid, this would be reflected in a weak first stage of the instrumental variable estimations.

[13] Using the skill-specific labour force of the previous year instead would increase the first stage correlation of the instrument with the endogenous variable $\Delta \log f_{jrt}$ but, in the presence of unobserved productivity and demand shocks, introduce a positive correlation of the instrument with the first differenced error terms Δv_{jrt} and Δu_{jrt} which would render the instrument invalid. For the skill-specific labour force of the previous year to be valid for the construction of the instrument would require that the employment/labour force rate evolves as a random walk, a requirement unlikely to hold for Germany (see Pischke and Velling, 1997, for a discussion of this issue).

Based on my data, the skill-specific labour force in a locality consists of all employed individuals plus all individuals receiving official unemployment compensation, either unemployment benefits (*Arbeitslosengeld*) or unemployment assistance (*Arbeitslosenhilfe*). During the period covered by this analysis, unemployed individuals receive unemployment benefits for the first 6 to 32 months dependent on the duration of their previous employment. Subsequently, they receive unemployment assistance which is means-tested and, in principle, indefinite. The data therefore provides a fairly good approximation of the actual labour force, in particular for men which are less likely to lose or quit their job without receiving some sort of unemployment compensation thereafter. A peculiarity arising from these data with respect to the empirical model, however, is that year to year changes in the local skill shares are driven by new individuals becoming employed in a given skill group. This is because in order to qualify for official unemployment compensation individuals first have to work for at least 12 months prior to becoming unemployed, so that new entrants into the labour force always "enter" my data set as employed individuals.[14] This has an important implication for the interpretation of the coefficients β_1 and β_2. These now measure how changes in the relative skill shares in a locality induced by additionally employed individuals affect average labour market outcomes. In the case of the employment/labour force rate, β_1 hence measures the direct displacement effect, that is, how many workers lose their job for every additional worker finding a job.

3.2 Source of Variation

An important issue in the context of this study is that, by design, the exogenous allocation of ethnic German immigrants over the entire German labour market ensures that the variation in the overall regional inflow rates is small. In fact, if the overall number of

[14] In the data, the recorded locality for an unemployed individual always corresponds to the locality of the previous employment spell. The only way the relative skill share in a locality can then change by additions to the number of unemployed from one year to the next is when an already eligible worker moves into a job in a new locality but then becomes unemployed before the cut-off date at which I calculate the relative skill shares.

immigrants allocated to each county was strictly proportional to the resident population, there would be no variation in the overall ethnic German immigrant inflow rate and simply regressing local labour market outcomes on the *overall* inflow rate, as done in many impact analyses (for instance Altonji and Card, 1991 or Pischke and Velling, 1997), would have been impossible. Moreover, if the allocation decision is based, as in the present case, to an overwhelming extent on family ties, the skill distribution of the newly arriving ethnic German immigrants is also going to be homogeneous across different regions. However, even with the same inflow rate and skill composition of the arriving immigrants in each region, the effect on the labour market outcomes of the resident population of a particular skill group will still differ dependent on the existing pre-migration skill distribution in each region. In particular, the percentage change in local skill share f_{jrt} after an inflow of immigrants that is homogenous across regions r relative to the resident population, $\frac{\Delta I_{rt}}{P_{rt-1}} = i_t$, and of which a constant share across regions of $v_{jrt} = v_{jt}$ is of skill j is given by

$$\%\Delta f_{jrt} = \frac{f_{jrt-1} + v_{jt} i_t}{f_{jrt-1}(1+i_t)} - 1, \tag{3}$$

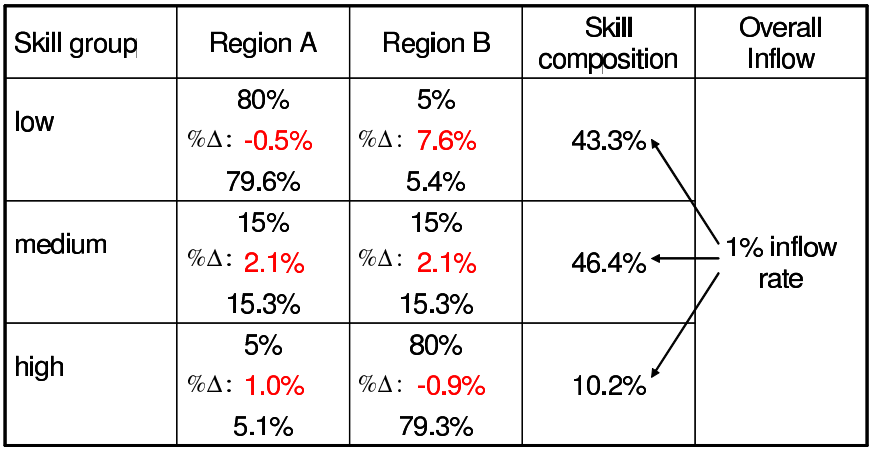
where, for simplicity, I assume that there is no growth in the local population for other reasons than immigration. The first derivative of this term with respect to the initial skill share f_{jrt-1} is then given by

$$-\frac{v_{jt} i_t}{f_{jrt-1}^2(1+i_t)} < 0,$$

so the larger the initial skill share, the smaller will be the percentage change in the relative skill supply induced by the skill-homogenous inflow of immigrants.

Differences in the skill composition before the immigrant inflows occur thus lead to differences in the relative changes of the skill shares and hence to differences in the responses of labour market outcomes. The variation I exploit in my estimations therefore arises

Figure 2: Source of variation



mainly from variation in the pre-existing skill compositions across different labour market regions rather than from a differential composition of the immigrating population.

Figure 2 illustrates this point. Suppose there are two regions, Region A and Region B, where Region A is a low skill region with 80% of the workforce being low-skilled, 15% medium-skilled, and 5% high-skilled while Region B is a high skill area with 5% low-, 15% medium-, and 80% high-skilled. Suppose skill is here measured by educational attainment. Now suppose there is a 1% inflow into each region of which 43% are low-skilled, 46% medium-skilled and 10% high-skilled. The values here reflect the corresponding skill shares in our immigrating population. Such an inflow will now lead to significantly different changes in relative skill shares in Regions A and B. While in Region A the share of low-skilled workers will decrease by -0.5%, it increases by 7.6% in Region B. Conversely, the inflow of high-skilled immigrants will lead to a 1% increase in the share of high-skilled individuals in Region A and a -0.9% reduction of the share in Region B. Given our model, it is the percentage changes in relative skill shares that are driving labour market outcomes and which provide the variation we use to identify the labour market impact of immigration.

4 Data Sources

4.1 Data on Ethnic German Immigrants

At the end of every year, the Federal Administration Department in Germany (*Bundesverwaltungsamt*) publishes information on the recent cohort of ethnic German immigrants in their series "*Jahresstatistik für Aussiedler*". These publications contain information recorded upon the immigrants' arrival in Germany; specifically on their countries of origin, age structure, last occupation, last labour force participation status, and religious affiliation. They also include the absolute numbers allocated to each of Germany's sixteen federal states. All the information provided is on the national level, apart from the age structure and religious affiliation, which are detailed for each state separately. Of particular importance for this analysis is the information on the last occupation in the country of origin since it provides a measure of the immigrants' skill levels that is exogenous to local demand conditions in Germany. I use this occupational information to calculate the fraction θ_{jt} of ethnic German immigrants in each occupation group, which I require for the construction of my instrumental variable.

I augment the aggregate information from the annual publications with data on the regional inflows of ethnic German immigrants. Since there is no information on the country of birth of an individual in my main data source on local labour market characteristics, these immigrants are not distinguishable from those Germans who were born in Germany (and to which I will henceforth refer as "native Germans"). Tracking where they actually settled is therefore not possible from these data. For that reason, I approached the responsible federal admission centres for each state directly, which due to the decentralised allocation process are separately responsible for recording the actual inflows. I was able to obtain the relevant information for each county in West Germany's ten federal states with the exception of Bavaria, where records were not kept at the required regional

level.[15] The period I cover is from 1996 to 2001 during which the Assigned Place of Residence Act was in effect. I focus on West Germany (excluding Berlin) since data on ethnic German inflows to the territory of what was formerly known as the German Democratic Republic are very fragmentary. Furthermore, local labour markets in that area have experienced fundamental changes after German unification in 1990 in their transition to market economies which are difficult to control for and may contaminate the results of this study.

4.2 German Microcensus

While the last occupation in the country of origin is reported upon arrival in Germany and published in the annual reports of the Federal Administration Department, there is no information on the immigrants' educational attainment. I use the German Microcensuses of 1999, 2001, and 2002 to obtain this information. In each Microcensus I am able to identify ethnic German immigrants as individuals with German citizenship that arrived in Germany in any particular year between 1996 and 2001.[16] For any given year of arrival there were between 94 and 274 individuals aged 15 to 64 with valid educational information. From these observations I calculate the fraction θ_{jt} of ethnic German immigrants in each education group, which again is used for the construction of my instrumental variable in the regressions based on education groups. Since I am interested in the immigrants' educational level upon arrival, I use the available information closest to the actual year of arrival. The skill shares for 1996, 1997 and 1998 are therefore taken from the 1999 Microcensus, the shares for 1999 and 2000 from the 2001 Microcensus, and the shares

[15] The other nine federal states or *Länder* in West Germany are Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, North Rhine-Westphalia, Hesse, Rhineland-Palatinate, Baden-Württemberg and Saarland.

[16] Unfortunately, there is no information in the Microcensuses on the country of origin so that some of the individuals I identify as ethnic Germans could in fact be German citizens immigrating from other, for instance Western European or North American countries. In an alternative data set, the European Social Survey 2003, which does include the necessary information, I am able to identify 33 individuals with German citizenship who were not born in Germany and who moved to Germany between 1993 and 2003. All 33 of these ethnic German immigrants came from typical source countries of *Aussiedlers*, mostly from Kazakhstan (14) and Russia (13). Although the sample is small, it indicates that the share of immigrating ethnic Germans from other regions is likely to be small.

for 2001 from the 2002 Microcensus.[17]

4.3 IAB Employment Subsample

I obtain data on the labour market outcomes of the resident population from the Employment Subsample 1975-2001 which is made available by the Institute for Employment Research (IAB). This administrative data set comprises a 2% subsample of all dependent employees subject to social security contributions in Germany. It includes all wage earners and salaried employees but excludes the self-employed, civil servants, and the military. It furthermore includes all unemployed who receive unemployment compensation.[18] The data is collected directly on the employer level by the Federal Institute of Employment and provides detailed employment histories of 460,000 individuals in West Germany and, after 1992, 110,000 in East Germany. For a detailed description of the data set see Bender et al. (2000). The basis of my analysis are all individuals aged 15 to 64. I construct the relative skill shares in the local labour force in each of West Germany's 204 labour market regions both by education level and occupation for each year between 1996 and 2001.

In the IAB data I am not able to distinguish ethnic German immigrants from native Germans so that part of the observed change in the employment/labour force rate and the log wages in a locality could be simply due to composition effects through newly entering immigrants. Since the ethnic German immigrants' labour market outcomes one year after arrival are substantially worse than they are for the resident population (Bauer and Zimmermann, 1997), their inclusion in the calculation of average labour market outcomes

[17]The 1999 Microcensus is the first Microcensus that asks German citizens for their year of arrival in Germany which is why I cannot use earlier Microcensuses for the years 1996 and 1997. Furthermore, the reference week in the German Microcensuses is usually the last week of April so that I cannot use the Microcensus in say 2001 to calculate the skill shares in 2001.

[18]In 2001, 77.2% of all workers in the German economy were covered by social security and 78% of unemployed individuals in West Germany received official unemployment compensation - mostly either unemployment benefits (*Arbeitslosengeld*) or unemployment assistance (*Arbeitslosenhilfe*) - and are hence recorded in the IAB data (Bundesagentur für Arbeit, 2004). The data set does not provide information on the out of labour force population and those individuals which are currently actively looking for a job but have not yet paid into the social security system.

would lead to a downward bias of the true change in labour market outcomes for the resident population. For that reason, I make use of the longitudinal dimension of my data set and restrict the sample to those individuals that were already observed in the data before 1996 when constructing the skill-group specific average employment/labour force rates and wages.[19]

These employment/labour force rates and wages are obtained by regressing separately for each year and skill group the individual level outcomes, either an employment indicator or log wages, on a set of observables, including a cubic of potential experience, a vector of region fixed effects, and a set of education (for the occupation-based regressions) and occupation (for the education-based regressions) group fixed effects. In addition, I include sixteen country/region of origin dummies as well as a gender dummy when I am pooling native Germans and resident foreign nationals as well as men and women to construct labour market outcomes for the overall population.[20] In each case, I use the estimated coefficients on the region dummies as the dependent variables in the regressions of Equations 1 and 2. They reflect the employment/labour force rate and average log wage in each locality, adjusted for observable differences in experience, gender, origin, and educational (occupational) composition within each occupation (education) group across local labour markets. All outcomes are constructed for the 31st of December of each year.[21]

For my analysis, the IAB sample has two major advantages compared to other data sources. First, since I am dealing with administrative data which is used to calculate

[19] Although this procedure effectively excludes all newly immigrating ethnic Germans from the calculation of average labour market outcomes, it also excludes all those individuals who are starting their first job between 1996 and 2001 or who were self-employed before 1996 and are now entering an employment that is subject to social security contributions.

[20] The countries and regions I distinguish are Turkey, former Yugoslavia, Italy, Greece, Poland, the former Soviet Union, Portugal, Romania, Western Europe, Central & Eastern Europe, Africa, Central & South America, North America, Asia, Australia & Oceania and Others.

[21] I chose the 31st of December to conform with the available data on annual inflows of ethnic German immigrants as well as the reference date used in the official population data of the German Statistical Office which I merged with the IAB data.

health, pension and unemployment insurance contributions, the precision of the data is high. In particular the wage data are unlikely to suffer from any measurement error or reporting bias typical in many survey data sets.[22] Second, the sample size is large and includes detailed regional identifiers. This is necessary because I look at different subgroups of individuals in Germany's local labour markets. Even with an annual sample size of 460,000 observations, cell sizes quickly become rather small when disaggregating the labour force by locality, gender, education levels and occupations.

4.4 Federal Statistical Office

Finally, I use county level population data provided by Germany's Federal Statistical Office to calculate overall ethnic German immigrant inflow rates into each county, which are needed in order to evaluate the effectiveness of the Assigned Place of Residence Act. From the population data, I also construct local growth rates of both the German and the foreign population, which I use to investigate whether there is evidence of out-migration in response to the inflow of ethnic German immigrants (see Section 6.2).

5 Descriptive Evidence

5.1 Definition of Skill Groups and Labour Market Regions

The theoretical model suggests that immigration affects relative labour market outcomes by changing the relative skill shares in the local economy. I differentiate skill groups in two ways. First, I use the reported educational attainment of an individual, distinguishing three different groups: low, intermediate and high. People with low education are individuals without an apprenticeship, people with intermediate education are individuals with an apprenticeship and people with high education are individuals with college education.

[22] Wage records in the IAB data sample are top coded at the social security contribution ceiling. I impute those wages by first estimating a tobit model and then adding a random error term to the predicted value of each censored observation ensuring that the imputed wage lies above the threshold (see Gartner, 2004 for details).

Apprenticeships are a crucial component of Germany's educational system and more than two thirds of all Germans have completed one in 2001. Individuals usually enter apprenticeships immediately after leaving school. They typically consist of two to four years on the job training with complementary class room teaching one day per week. In terms of future income, apprenticeships are a more important determinant than the actual number of years an individual went to school. For instance, the average daily wage of German individuals without an apprenticeship in West Germany in 2001 is €46.5 if they do not have A-levels, and only marginally higher at €47.1 if they do. For that reason, I choose them as the prime indicator of an individual's skill level in terms of educational attainment.

Second, as an alternative and to check the robustness of the empirical results, I define skill groups along five different occupation lines (see also Card, 2001): I. farmers, labourers and transport workers, II. operatives, craft workers, III. service workers, IV. managers, sales workers, and V. professional & technical workers. For the immigrant population these occupations refer to the last occupation in the country of origin. The motivation for this disaggregation by occupation is that the reported level of education an immigrant obtained in his or her country of origin does not necessarily correspond well to the corresponding level of education in the host country.[23] Natives and immigrants in the same occupation group might therefore better reflect comparable skill levels.[24]

Table 1 provides some descriptive statistics on the overall ethnic German population immigrating in each year between 1996 to 2001. In 1996, 177,751 ethnic German immi-

[23]However, because of their cultural links with Germany, ethnic German immigrants are presumably in a better position to appropriately respond to questions in the Microcensus on their educational attainment than, for instance, foreign nationals.

[24]Borjas (2003) defines skill groups in terms of education and work experience, arguing that individuals with similar education but different experience in the labour market are imperfect substitutes in the production process. Due to relatively small sample sizes in the German Microcensus from which I take the information on educational attainment and the unavailability of cross-tabulations of occupational attainment by age group, it is unfortunately not possible to extend my analysis in this direction and allow for imperfect substitutability across age groups. Similarly, since I cannot distinguish ethnic German immigrants from native Germans in my data, I am not able to allow for imperfect substitutability between natives and immigrants within the same skill group as suggested in two recent studies by Ottaviano and Peri (2006) and Manacorda et al. (2006) for the U.S. and the UK, respectively.

Table 1: Descriptive statistics of ethnic German immigrants, 1996 to 2001

	Year						Overall
	1996	1997	1998	1999	2000	2001	1996 - 2001
Overall inflow	177,751	134,419	103,080	104,916	95,615	98,484	714,265
Men	85,918	65,010	49,664	50,456	46,145	47,379	344,572
Women	91,833	69,409	53,416	54,460	49,470	51,105	369,693
Mean % inflow rate*	0.19	0.17	0.13	0.12	0.12	0.12	0.84
(standard deviation)	(0.10)	(0.08)	(0.05)	(0.05)	(0.05)	(0.04)	(0.33)
% Labour force	53.6	53.7	55.0	55.6	56.6	57.3	55.0
% Age < 15	27.6	26.2	25.5	24.2	23.3	22.6	25.3
% Age 15-64	65.9	66.5	67.8	69.0	70.1	71.1	68.0
% Age > 64	6.5	7.3	6.7	6.8	6.6	6.3	6.7
% Occupation I	28.3	28.9	27.3	27.5	28.4	26.1	27.9
% Occupation II	29.0	28.6	31.0	30.3	30.5	31.5	30.0
% Occupation III	18.7	18.3	17.9	17.7	18.4	18.7	18.3
% Occupation IV	4.4	4.8	4.7	5.5	5.3	4.8	4.9
% Occupation V	19.6	19.4	19.0	18.9	17.4	18.8	18.9
% Low education	47.2	48.8	36.3	43.6	34.4	45.3	43.3
% Intermediate education	43.8	42.9	49.3	46.1	53.1	46.4	46.4
% High education	9.0	8.3	14.4	10.2	12.5	8.4	10.2

Source: *Bundesverwaltungsamt*
* Mean inflow rate based on 148 West German labour market regions.
Note: The educational attainment composition is obtained from the German Microcensuses 1999, 2001 and 2002. Labour force participation and occupation refer to last activity in country of origin and is reported upon arrival.

grants came to Germany. This number gradually declined to 95,615 in 2000 and then increased again slightly to 98,484 in 2001. Overall, over the period 1996 to 2001, 714,265 ethnic German immigrants came to Germany, which corresponds to an average inflow rate relative to the resident population of 0.84% using the 148 West German labour market regions for which I was able to obtain the relevant data. From the descriptives on the age and occupational composition of the ethnic German immigrants we can see that the immigrant cohorts remain relatively homogenous over time. There is a slight increase in the labour force participation in the home country before immigration, which rises from 53.6% in 1996 to 57.3% in 2001. Furthermore, the immigrant cohorts became slightly older over time, with 22.6% being less than 15 years old, 71.1% of working-age 15 to 64, and 6.3% older than 64 in 2001. The structure of the occupational composition, which is reported upon arrival in Germany, did not change substantially over time. There is a slight decrease in the number of immigrants working in low skill occupation group I from

Table 2: Summary statistics for West German labour market regions. Means and standard deviations

	Year						Change
	1996	1997	1998	1999	2000	2001	1996 - 2001
Overall population	315,791	316,413	316,776	317,788	318,762	320,210	1.9%
	(382,216)	(382,306)	(382,297)	(383,852)	(386,969)	(388,474)	(2.6%)
Working-age pop. (15-64)	214,304	214,368	214,383	214,263	214,049	214,358	0.5%
	(266,845)	(266,338)	(265,945)	(265,956)	(266,289)	(266,984)	(2.9%)
Foreign immi. share (in %)	10.5	10.4	10.2	10.2	10.1	10.1	−0.3
	(4.2)	(4.0)	(4.0)	(4.0)	(4.0)	(3.9)	(1.1)
Labour market outcomes:							
Lf/pop rate	53.0	51.9	52.8	53.0	53.4	53.3	0.1
	(7.3)	(7.3)	(7.5)	(7.7)	(7.9)	(8.2)	(1.9)
Empl/pop rate	47.4	46.9	47.6	48.6	49.4	49.6	1.2
	(6.9)	(7.0)	(7.2)	(7.5)	(7.8)	(8.1)	(2.1)
Unempl/pop rate	5.6	5.0	5.2	4.3	4.1	3.8	−1.1
	(1.2)	(1.2)	(1.3)	(1.1)	(1.1)	(1.1)	(0.7)
Empl/lf rate	89.4	90.3	90.2	91.8	92.4	93.0	2.2
	(2.2)	(2.3)	(2.4)	(2.1)	(2.2)	(2.1)	(1.2)
Mean daily wage (in €)	75.1	74.7	75.3	76.1	76.1	76.7	1.7%
	(6.5)	(6.7)	(6.8)	(7.0)	(7.0)	(7.2)	(2.0%)
Socioeconomic characteristics:							
% Low education	25.1	24.9	24.7	24.6	24.4	24.0	−1.3
	(3.2)	(3.0)	(2.9)	(2.9)	(2.9)	(2.8)	(1.5)
% Intermediate education	67.8	68.0	67.5	67.2	67.2	67.2	−0.4
	(3.1)	(3.1)	(3.1)	(3.4)	(3.5)	(3.6)	(2.0)
% High education	7.1	7.0	7.9	8.2	8.4	8.8	1.7
	(3.1)	(3.2)	(3.4)	(3.6)	(3.7)	(3.9)	(1.0)
% Occupation I	18.8	18.5	18.2	17.9	17.6	17.0	−2.1
	(3.4)	(3.4)	(3.4)	(3.4)	(3.5)	(3.5)	(1.0)
% Occupation II	23.0	22.9	22.7	22.2	21.9	21.4	−1.8
	(4.9)	(5.0)	(5.1)	(5.2)	(5.3)	(5.4)	(1.2)
% Occupation III	33.4	34.0	33.9	34.5	35.1	35.9	3.0
	(3.7)	(3.8)	(3.8)	(3.8)	(3.9)	(4.0)	(1.4)
% Occupation IV	14.7	14.9	14.8	14.9	15.0	15.2	0.5
	(2.7)	(2.8)	(2.8)	(3.0)	(3.0)	(3.1)	(1.0)
% Occupation V	10.1	9.7	10.3	10.4	10.4	10.5	0.4
	(2.6)	(2.6)	(2.6)	(2.7)	(2.7)	(2.8)	(0.8)
% Female	51.2	51.2	51.2	51.2	51.2	51.1	−0.1
	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.1)
Mean age	38.2	38.3	38.4	38.5	38.6	38.7	0.7
	(0.9)	(0.9)	(0.8)	(0.8)	(0.8)	(0.7)	(0.5)

Source: IAB sample, Statistical Office
Notes: For the labour market outcomes and the socioeconomic characteristics I only consider the working-age population aged 15-64. Employment and unemployment refers to individuals subject to social security contributions. Basis of this table are West Germany's 204 labour market regions.

28.3% in 1996 to 26.1% in 2001 and a corresponding increase in occupation group II from 29.0% to 31.5%. There is, however, some variation in the educational attainment of the arriving immigrant cohorts. For instance the share of ethnic German immigrants with low education ranges from 34.4% in 2000 to 48.8% in 1997 and the share of those with high education from 8.3% in 1997 to 14.4% in 1998.

The primary regional unit in my analysis is the West German labour market region. These

regions are aggregates of counties which are the original regional units at which I observe ethnic German inflows. The aggregations take account of commuter flows so that labour market regions better reflect separate local labour markets. They comprise on average around 320,000 individuals (compared to around 225,000 for counties), although this number varies substantially ranging from 64,000 to 2.7 million. Table 2 provides some descriptive statistics of the labour market outcomes and socioeconomic characteristics of the population in West Germany's 204 labour market regions.

5.2 Labour Market Competition of Resident Workers and Immigrants

The theoretical model predicts that ethnic German immigrants only affect relative labour market outcomes if their inflow leads to changes in the relative supply of different labour inputs. This would require the ethnic German immigrant population to differ from the resident population with respect to their skill distribution.

Comparing the educational attainment of the ethnic German immigrants reported in Table 1 with the attainment of the resident population reported in Table 2 shows that more than 43% of the immigrants have a low education level, compared with only 25% of the resident population. On the other hand, 46% of the ethnic German immigrants have obtained an intermediate education, compared with about 67% of the resident population. The shares with high education are similar for both groups at around 10% and 8% respectively.

With regard to the occupational distribution, the differences are similarly pronounced. Close to 60% of the immigrants worked in low skill occupation groups I and II before coming to Germany, compared with only about 40% of the resident population. While they are less likely to have worked in the service ($\sim$ 18% vs. $\sim$ 34%) and, in particular, the commercial sector ($\sim$ 5% vs. $\sim$ 15%), a relatively large fraction previously worked in high-skill occupation group V ($\sim$ 19% vs. $\sim$ 10%), for instance as mathematicians,

engineers, and teachers.

A more systematic way of measuring the degree of dissimilarity in the occupational distributions is to compute the following index of congruence for any two groups k and l (see Welch, 1999):

$$C_{kl} = \frac{\sum_c (q_{kc} - \bar{q}_c)(q_{lc} - \bar{q}_c)/\bar{q}_c}{\sqrt{(\sum_c (q_{kc} - \bar{q}_c)^2/\bar{q}_c)(\sum_c (q_{lc} - \bar{q}_c)^2/\bar{q}_c)}}$$

where q_{hc} gives the fraction of group $h(h = k,l)$ in occupation c, and $\bar{q}_c$ gives the fraction of the entire labour force in that occupation. The index C_{kl} equals one if the two groups have identical occupational distributions, and minus one if they are clustered in completely different occupations. An index close to one therefore implies a high degree of competition between the two groups under consideration, a value close to minus one little competition in the labour market. Table 3 displays the occupational distribution for different subgroups of the native German population as well as the foreign nationals that live in Germany in 2001.[25] In the bottom row, I report the occupational composition of the cohorts of ethnic German immigrants that arrived between 1996 and 2001 as reported upon arrival and shown in the last column of Table 1. The rightmost column presents the corresponding values of the index of congruence C_{kl} between recent ethnic German immigrants and the various subgroups of the native German and foreign population.

The results show that ethnic German immigrants are most similar in their occupational distribution to native Germans with low education with a calculated index of 0.32. This index drops to -0.95 for Germans with intermediate education but increases again for

[25]Note that the corresponding fractions are computed using both employed and unemployed individuals, in the latter case using the last occupation they worked in which are imputed in the IAB data set. The implicit assumption is thus that individuals do not switch between occupations which is reasonable in the case of broadly defined occupation groups. Using both employed and unemployed individuals gives a better indication of the actual labour supply in each occupation group.

Table 3: Occupational distributions and index of congruence

2001	Fraction in occupation group					Index of
	I	II	III	IV	V	congruence
Native Germans						
Low education	24.7	27.8	33.3	10.5	3.6	0.32
Intermediate education	15.3	20.7	38.8	17.2	8.0	-0.95
High education	1.5	1.0	26.9	18.8	51.9	0.21
All	16.1	20.4	36.7	15.9	11.0	-0.63
Foreign Nationals						
Low education	33.1	37.0	24.0	4.6	13.3	0.57
Intermediate education	25.2	29.6	28.8	11.3	5.1	0.51
High education	2.9	2.3	26.5	16.1	52.3	0.26
All	27.4	31.9	27.3	7.8	5.5	0.63
Ethnic German immigrants	**27.9**	**30.0**	**18.3**	**4.9**	**18.9**	1.00

Source: IAB sample, *Bundesverwaltungsamt*
Notes: The occupation groups are I: farmers, labourers, transport workers; II: operatives, craft workers; III: service workers; IV: managers, sales workers; V: professional & technical workers. The occupational composition refers to last activity in country of origin of all ethnic German immigrants that arrived between 1996 and 2001.

highly educated Germans to 0.21. The index of congruence with respect to the overall native German population is -0.63, indicating the substantially different occupational composition compared to the immigrating ethnic Germans. The corresponding index for the resident foreign nationals in Germany is 0.63, which in turn means that these are quite similar in their occupational composition to the newly arriving ethnic German immigrants. Within the group of foreign nationals those with low and intermediate education levels are most similar with indices of 0.57 and 0.51 respectively. Based on these calculations, the immigrant inflows between 1996 and 2001 are likely to have exerted supply pressure on the labour markets of particularly the foreign nationals in Germany as well as the less educated native Germans. There is also some indication of increased supply pressure for the highly skilled native labour force. Due to initial occupational downgrading of the more highly skilled ethnic German immigrants, however, some of this pressure may have been shifted away towards the lesser skilled resident labour force (Bauer and Zimmermann, 1999).

To conclude, both the educational and occupational composition of the newly arriving

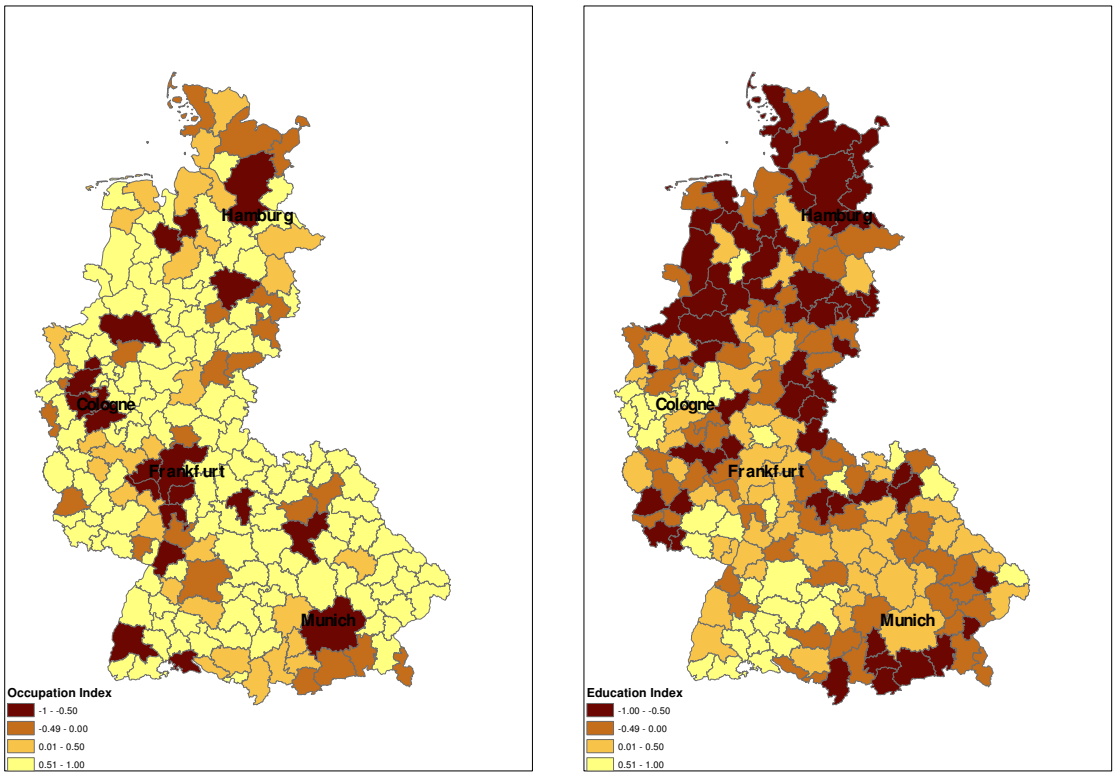
ethnic German immigrants differs substantially from the existing skill composition of, in particular, the native German population and will therefore have affected the relative factor supplies in the economy.

5.3 Variation in Existing Skill Compositions

As described in Section 3.2, the primary source of variation in my empirical analysis arises from differences in the existing skill composition of the labour force across local labour markets. As the summary statistics for West Germany's 204 labour market regions in Table 2 indicate, there is considerable variation in skill shares both in terms of occupations and educational attainment. To illustrate this point, I calculate the index of congruence as defined in the previous section between the existing skill composition in each locality at the end of 1995 and the skill attainment of the ethnic German immigrants. The map on the left of Figure 3 shows this index of congruence with respect to occupations for all West German labour market regions while the map on the right shows the corresponding index with respect to educational attainment. As before, the index ranges between minus one and plus one, the former signifying that the local labour force and the immigrants have entirely different skill compositions and the latter indicating identical skill compositions. Both maps underline the substantial variation in existing local skill compositions across West Germany and the consequential variation in differences relative to the skills of the arriving ethnic German immigrants. These differences across regions give rise to different labour market effects even if all regions are exposed to homogenous immigrant inflows in terms of relative size and skill composition.

To give an example, the lowest share of individuals with low education in a locality is 18.3% (county *Nordfriesland* in Schleswig-Holstein) while the highest share is 41.5% (county *Zollernalbkreis* in Baden-Württemberg). Using Equation 3 and given an average overall ethnic German inflow rate between 1996 and 2001 of $i = 0.84\%$ of which v=43.3% had only low education (compare Table 1), the corresponding percentage change in the

Figure 3: Index of congruence across West German labour markets



share of individuals with low education is then 0.04% for the region with the highest initial share, and 1.1% for the region with the lowest initial share. Similarly, for high skill individuals, the lowest share in my labour market regions is 1.9% (county *Cochem-Zell* in Rhineland-Palatinate) while the highest is 12.9% (area of *Darmstadt* and *Darmstadt-Dieburg* in Hesse). With 10.2% of the ethnic German immigrants being college educated, this leads to a percentage change in the corresponding skill share of -0.17% for the initially high-skill, and 3.6% for the initially low-skill local labour market.

The variation in existing skill shares with respect to occupation groups is similarly pronounced. For instance at the end of 1995, the share of individuals belonging to occupation group I ranges from 13.6% (county *Calw* in Baden-Württemberg) to 29.1% (county *Holzminden* in Lower Saxony) while the share belonging to high-skill occupation group V ranges from 3.0% (county *Cochem-Zell* in Rhineland-Palatinate) to 17.9% (county *Lev-*

erkusen in North Rhine-Westphalia). It is this variation in the existing skill compositions across German labour markets that identifies the effect of ethnic German inflows on local labour market outcomes.

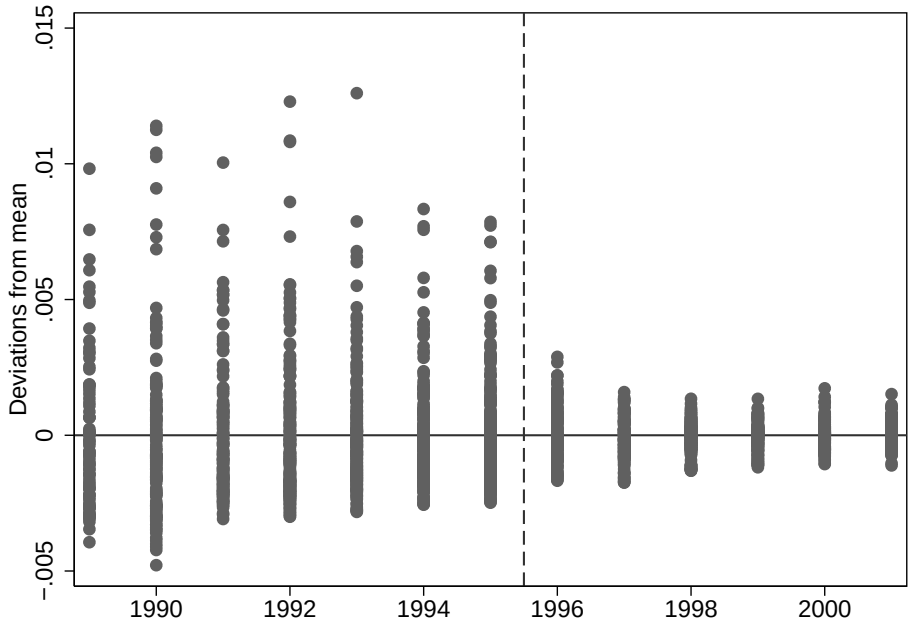
5.4 Exogeneity of Allocation

The validity of my instrumental variable based on the ethnic German immigrant inflows relies upon the effectiveness of the Assigned Place of Residence Act and the exogeneity of the immigrants' allocation by the authorities with regard to transitory local demand conditions. Since the main allocation criterion was the proximity of family members and labour market skills did not feature in any significant way in the allocation process, the exogeneity requirement is likely to be satisfied. In fact, if family ties were the only criterion by which immigrants would choose their place of residence themselves, one would not require the government allocation policy in order to maintain the exogeneity assumption with regard to local labour demand shocks. However, local labour market conditions are likely to have played a role in the choice of place of residence before the introduction of the new legislation in 1996, as suggested by Figure 4.

Figure 4 shows the variation of ethnic German immigrant inflow rates in all West German counties before the introduction of the new legislation in 1996 and for the counties where the law was implemented thereafter. There is a significant reduction in the variation of the regional inflow rates after the introduction of the new legislation. This reduction indicates that the new allocation policy has indeed been effective in altering the direction of ethnic German immigrant inflows and ensuring a more even distribution across Germany. It also points towards the existence of a few particularly attractive destinations before 1996.

There are several potential reasons for the remaining variation after 1996 shown in Figure 4. First, the quotas for each federal state and a large number of counties have not been adjusted to changes in their corresponding populations after they were originally set. In

Figure 4: Variation in the ethnic German immigrant inflow rate, 1989 to 2001



Notes: Values depicted are deviations from the mean ethnic German inflow rate in each year. The inflow rates are calculated as the number of allocated ethnic German immigrants divided by the overall population in the county at the end of the previous year. The sample size is, 85 for 1989, 145 for 1990/1991, 204 in 1992-1994, 230 in 1995, 122 in 1996 and 168 in 1997-2001. From 1996 onwards only counties in states that implemented the Assigned Place of Residence Act are depicted.

addition, when the state quotas were set in 1993, they were not exclusively based on the resident population but also on the strength of the economy of each state so that some states (and thus the counties they comprise) might receive higher relative inflows than others. I control for these differences in my empirical estimations by the inclusion of region fixed effects. Another reason for the observed differences in relative inflows are different allocation procedures. For instance, in North Rhine-Westphalia the geographical area of each county features as an additional factor in determining the number of immigrants allocated and in Lower Saxony some counties which received a disproportionate number of ethnic Germans in the early 1990s were exempted from additional allocations for some years after 1996.

Trying to achieve an even distribution while giving as much consideration as possible to the proximity of family members are two not always reconcilable objectives. In some

cases ethnic German immigrants could not be allocated to their desired destinations even if they had relatives living there because those regions had already met their quotas. In these cases they were typically allocated to an alternative region close by. This precedence of an even distribution over family ties could potentially be quite important for two reasons. First, if every arriving ethnic German immigrant was guaranteed to be allocated to the region where his or her relatives lived, then there would in theory be scope for a selective choice of the time of arrival in Germany in order to take advantage of particularly good local demand shocks. However, in practice, independent of the precedence of an even distribution, current labour market conditions did not seem to have played any significant role in determining an immigrant's time of arrival because the economic benefits of moving were typically not contingent upon getting a paid job in Germany upon arrival.[26] On the aggregate level, there is no evidence that ethnic German immigration is positively related to overall labour market conditions. On the contrary, as Tables 1 and 2 show, while both employment and wage rates in Germany increased steadily between 1996 and 2001, ethnic German inflows gradually decreased. To investigate this issue in more detail, I regress the annual inflow rates into each region on the employment/labour force rate and the wage level at the beginning of each year, including both year and region fixed effects. In the absence of county quotas, and if immigrants were certain about which area they would be allocated to and were timing their arrival based on the labour market situation in that area at the beginning of each year, one would expect to find a positive correlation between initial labour market conditions and immigrant inflows. Both coefficient estimates of these regressions are virtually zero and statistically not significant with t statistics of -0.03 and 0.58 respectively.[27] Whether the absence of any correlation is due to government authorities strictly adhering to the set quotas and not allowing relatively more immigrants to move into regions with particularly good current labour market conditions, or immigrants not timing their arrival accordingly cannot be directly deduced from these

[26] According the government authorities it seemed to be predominantly factors in the country of origin that determined the actual timing of immigration to Germany.

[27] The point estimate on the employment/labour force rate is $-0.71 \cdot 10^{-4}$ with a robust standard error of $24.4 \cdot 10^{-4}$ while the estimate on the average wage level is $0.19 \cdot 10^{-4}$ with a standard error of $0.33 \cdot 10^{-4}$.

results. To answer that question I would require information on the number of immigrants that arrived in Germany each year but were not allocated to their preferred destination. If these numbers were positively related to current labour market conditions, this would point towards a selective timing of immigration. What the results show, however, is that local labour market conditions at the beginning of a year did not affect the size of relative inflows into each area.[28] The second potential problem that could arise if there was no precedence of quotas over family ties is that, theoretically, relatives could move to those areas that are particularly attractive before the immigration of the ethnic German occurs and through this channel allow an endogenous self-selection of the immigrant. However, even in that case, as long as the selective migration of relatives is based on permanent rather than transitory features of the selected labour market region, I am able to control for such behaviour by including region fixed effects in the empirical estimations.

One way to investigate whether the allocation decision has indeed been exogenous with respect to individual skill characteristics as suggested by the overwhelming importance of family ties for the allocation decision is to compare the age distribution of the ethnic German immigrants that were allocated to each federal state. These distributions are recorded at the central admission centre and reported in Table 4. If immigrants were exogenously allocated with respect to their individual characteristics, one would not expect there to be significant differences in their age distribution across states. As shown in Table 4, the age distributions across states are indeed very similar. As a reference point, I show the standard deviation of each age group's share of the overall resident population across the same states at the end of 1995 in the last column. Apart from the 15 to 24 year-olds, the standard deviation of the age group shares of the allocated ethnic German immigrants is

[28] If relative labour market conditions for different skill groups lead to selective relative timing of arrival by these skill groups, then this could potentially be problematic. For example, if there are good conditions for low-skill workers in a locality relative to those for high-skill workers, this could lead to an advancement of immigration by low-skill workers and a postponement by high-skill workers, thus changing the composition (rather than the size) of the arriving immigrant labour force. For the construction of my instrumental variable I assume that the skill composition of the arriving ethnic German immigrants in each locality is identical.

Table 4: Age distribution of allocated ethnic German immigrants, 1996 to 2001

Age group	SH	HA	LS	BR	NW	HE	RP	BW	BA	SA	STDEV	STDEV all
0 - 14	25.9	24.2	26.4	26.1	25.9	25.8	25.6	25.0	25.0	24.8	0.7	1.2
15 - 24	18.7	19.7	19.2	18.9	19.3	18.6	19.1	18.9	19.0	18.9	0.3	0.3
25 - 34	15.3	15.0	14.9	15.3	14.9	15.3	15.0	14.8	14.9	15.3	0.2	0.7
35 - 44	18.2	17.8	18.0	17.5	17.7	17.8	17.4	17.8	17.7	17.9	0.2	0.5
45 - 55	9.1	10.1	8.8	9.2	9.0	8.9	9.7	9.5	9.5	9.8	0.4	0.6
55 - 64	6.4	7.1	6.6	6.8	6.6	6.7	6.6	7.0	7.2	7.0	0.3	0.4
> 64	6.4	6.2	6.2	6.3	6.6	6.8	6.6	7.1	6.7	6.3	0.3	0.8

Notes: West Germany's 10 federal states are: Schleswig-Holstein (SH), Hamburg (HA), Lower Saxony (LS), Bremen (BR), North Rhine-Westphalia (NW), Hesse (HE), Rhineland-Palatinate (RP), Baden-Württemberg (BW), Bavaria (BA) and Saarland (SA).

substantially lower than the corresponding standard deviation in the overall population in all age groups. In particular the shares of the groups aged 25 to 34 and 35 to 44, which represent a large part of the working population and are therefore most relevant for this analysis, are very similar across states. A regression of the age group shares of the immigrant population allocated to each state between 1996 and 2001 on the existing share at the end of 1995 and a set of age group fixed effects gives an estimate of -0.03 with a robust standard error of 0.12.[29] Hence there is no evidence that for instance young ethnic German immigrants have been allocated to states that are generally more attractive to young people. Overall the figures suggest that there has been an exogenous allocation of ethnic German immigrants to each federal state with respect to their individual characteristics. Since the allocation to each state follows similar administrative processes and decision criteria as the subsequent allocation to different counties, the results in Table 4 can be regarded as indicative of an exogenous allocation within states to different counties.

[29] Similarly, regressing annual age group shares on existing age group shares of the resident population as well as interactions of age group and year fixed effects gives a statistically not significant estimate of -0.01 with a robust standard error of 0.07.

6 Empirical Results

6.1 Employment and Wage Effects

Turning to the estimation results, Table 5 presents estimates of the effect of changes in skill-specific local labour force shares on the employment/labour force rate of the resident population. I estimate the empirical model in Equation 1 first by OLS and then using the predicted skill-specific ethnic German inflow rate as described in Section 3.1 to instrument the potentially endogenous change of the skill shares in a locality. I report results for skill groups based on occupations in the upper panel and for skill groups based on educational attainment in the lower panel. The dependent variable in each regression is the regression-adjusted employment/labour force rate of the local labour force, thus controlling for differences in individual characteristics across labour markets. The estimates in columns (1) and (2) are based on all 148 West German labour market regions for which data on ethnic German inflows are available while in columns (3) and (4) the sample is restricted to those 112 regions that formally implemented the Assigned Place of Residence Act. The reason why the inclusion of labour market regions in states that have not formally implemented the legislation could be of interest is that even in those states the main criterion for the actual allocations were family ties, in which case the immigrant inflows would also be exogenous to unobserved labour demand shocks and provide additional observations for the estimations. However, endogenous allocations by the authorities as well as self-selection by immigrants within these states continues to be a possibility, so that the results from this specification are likely to remain upward biased.

Looking at the OLS results for all individuals reported in the first row in columns (1) and (3) of the upper panel first, we see a significant negative effect of an increase in the relative occupation share in a locality on the overall employment/labour force rate. The estimated coefficients of -0.125 and -0.126 imply that a 10% increase in the relative occupation share induced by additionally employed individuals reduces the employment/labour force

Table 5: Impact of changes in relative factor shares on the employment/labour force rate

	All regions		Restricted regions	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Occupation groups				
All	-0.125***	-0.026	-0.126***	-0.353**
	(.011)	(.306)	(.013)	(.168)
		[1.44]		[3.13]
All unweighted	-0.120***	0.127	-0.121***	-0.374**
	(.012)	(.451)	(.012)	(.189)
		[1.38]		[2.98]
All aged 25-54	-0.118***	0.109	-0.122***	-0.211
	(.011)	(.264)	(.012)	(.150)
		[1.80]		[3.17]
Germans only	-0.125***	-0.090	-0.122***	-0.327**
	(.011)	(.222)	(.012)	(.155)
		[1.84]		[3.40]
Observations	4440	4440	3185	3185
Education groups				
All	-0.069***	-0.381*	-0.074***	-0.482*
	(.017)	(.198)	(.019)	(.288)
		[2.94]		[2.66]
All unweighted	-0.070***	-0.348	-0.065***	-0.248*
	(.015)	(.212)	(.018)	(.132)
		[2.95]		[3.21]
All aged 25-54	-0.065***	-0.234	-0.067***	-0.416
	(.020)	(.235)	(.020)	(.258)
		[2.49]		[2.74]
Germans only	-0.079***	-0.313*	-0.083***	-0.425
	(.018)	(.181)	(.019)	(.267)
		[3.24]		[2.58]
Observations	2664	2664	1911	1911

Notes: Entries are the estimated coefficients on the change in the log factor shares $\Delta \log f_{jrt}$. The dependent variable is the annual change in the skill-specific employment/labour force rate. All estimations include five occupation and three education groups respectively. Columns 1 and 2 use all 148 West German labour market regions for which data is available, columns 3 and 4 only those 112 that actually implemented the law (see Table B-1 in Appendix B). Employment/labour force rates are based on individuals already in the data at the end of 1995. Additional covariates are a full set of interactions of skill and year fixed effects as well as region and year fixed effects. Employment/labour force rates are adjusted for differences in individual specific characteristics across labour markets. Robust standard errors are reported in parentheses and are clustered at the skill-specific regional level. For the IV estimates, the t-stat of the instrument from the first stage regression is reported in square brackets. Regressions are weighted by the inverse of the standard errors of the region fixed effects taken from the regressions to obtain adjusted outcomes. A (*) denotes statistical significance at the 10% level, a (**) at the 5% level and a (***) at the 1% level.

rate of the resident population by 1.25 and 1.26 percentage points respectively.[30]

[30]Note that in order to facilitate the calculation of regression-adjusted employment/labour force rates I use the employment/labour force rate in levels in my estimations rather than in logs as suggested by the theoretical model in Section 3.1. One can translate the coefficients in my tables for the effects on the employment/labour force rate into estimates of β_1 by dividing them by the average employment/labour

In the presence of unobserved transitory local demand shocks, the OLS estimates of Equation 1 will be upward biased since such shocks attract workers into a particular skill group while at the same time improving employment opportunities. I therefore instrument the changes in the relative skill shares with the occupation-specific ethnic German inflow rate. The corresponding estimates are reported in column (2) and (4). While the coefficient for the specification based on all labour market regions is small and statistically not significant due to a weak first stage with a t statistic for the instrument of only 1.44, restricting the sample to those regions that did formally implement the legislation increases the strength of the instrument and reduces the estimate to -0.353, which is significant at the 5% level (column 4). Since, as explained in Section 3.1, ethnic German immigrants can only appear in the data and hence enter the numerator of the relative local skill share by becoming employed, the estimated coefficients can be directly interpreted as a displacement effect: for every 10 ethnic German immigrants finding employment, 3.5 resident workers accordingly lose their job (or do not find one when they otherwise would have). The increase in magnitude of this estimate by a factor of around 3 compared to the OLS results points towards the existence of unobserved skill-specific local demand shocks that attract workers into the labour force as well as lead to favourable changes in local labour market outcomes.

The first row of the lower panel of Table 5 reports results for the same regression but this time after defining skill groups according to the educational attainment of an individual. While the OLS results in columns (1) and (3) suggest that an increase in the relative skill share through additionally employed individuals by 10% reduces the employment/labour force rate of the resident labour force by 0.69 and 0.74 percentage points respectively, this effect increases by a factor of 5.5 and 6.5 respectively, to 3.81 and 4.82 percentage points once I instrument for the potentially endogenous change in the relative skill

force rates of all individuals (0.91).

shares. Although only marginally significant at the 10% level, the point estimates of the IV regressions in column (2) and (4) suggest a similar magnitude as the one found when distinguishing between different occupation groups. Moreover, the fact that the IV estimates increase in magnitude when moving from all 148 regions to the restricted sample of 112 regions indicates that, in the former case, there may be some positive correlation remaining between the ethnic German inflows and unobserved demand shocks in those areas where the law has not been implemented so that the estimated coefficient continues to be upward biased. The implied displacement effects of 3.81 and 4.82 workers for every 10 ethnic Germans finding employment seem relatively large. However, since, based on information from the German Microcensus, only between 30% and 40% of working age ethnic German immigrants find a job in the first year after arrival, and absolute inflows on the local level have been relatively moderate, the actual number of displaced native German and foreign workers has been quite small.[31]

The remaining rows of Table 5 show estimates of β_1 for a number of alternative specifications in order to test the robustness of the results. In the second row of each panel, I report the unweighted regression results for both the OLS and IV estimations. All estimates are similar in magnitude to their counterparts in the weighted regressions apart from the IV result based on education groups for the restricted set of regions reported in column (4) which is somewhat smaller with a point estimate of -0.248. Since the data have some shortcomings in terms of capturing movements into and out of the labour force, I estimate my model separately for individuals aged 25 to 54 for which these movements are less of an option to adjust to changing labour market conditions. The corresponding results are reported in the third row of each panel. Although statistically not significant, the point estimates indicate a slightly smaller magnitude than the one found when using all individuals as reported in the first row of each panel. Finally, I investigate whether there are

[31]Multiplying the estimated coefficients by the share of immigrants that find employment within the first year of arrival will provide an estimate of how a general inflow of immigrants into the labour force, whether employed or unemployed, affects labour market outcomes.

different effects for the native German population compared to foreign nationals living in Germany which make up about 10% of the labour force. Due to the limited sample size for the latter group in my region/skill cells, estimating separately for them is not viable. However, I can estimate separately for native Germans and compare the results with those obtained when using all individuals to get at least an indication of whether the effect on foreign nationals is likely to be larger or smaller than the one on Germans. The last row of each panel in Table 5 reports the results for the effect on the employment/labour force rate of the native German population only. Compared to the estimates for the overall population reported in the first row, the estimated effects tend to be smaller both in the regressions based on occupations and the ones based on educational attainment. In the first case, using the restricted set of labour market regions leads to a significant estimate of -0.327 (column 4) compared to -0.353 when using the entire population, both Germans and foreign immigrants. Similarly, the estimate based on education groups decreases from -0.482 for the overall population to -0.425 for the German population, although this estimate is not statistically significant at conventional levels.

Turning towards the impact of changes in relative skill shares on wages, the upper panel in Table 6 reports the results for the coefficient β_2 in Equation 2 when, as before, skill groups are defined by occupation, whereas the lower panel reports the results when they are defined by education. The OLS estimates of β_2 for the wages of all individuals reported in the first row of Table 6 in column (1) are -0.049 for the occupation and -0.058 for the education regressions. These imply that a 10% increase in the relative skill share in a locality through additionally employed individuals decreases relative wages by 0.49% and 0.58% respectively. The IV results on the other hand do not show any negative effect of ethnic German immigrant inflows on the average wage rate both in the specification based on all 148 labour market regions and the one using only those 112 regions that implemented the Assigned Place of Residence Act. All estimates are statistically not significant and in most cases close to zero. The point estimates in the preferred specification in column (4)

Table 6: Impact of changes in relative factor shares on log daily wages

	All regions		Restricted regions	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Occupation groups				
All	-0.049***	-0.174	-0.068***	-0.120
	(.014)	(.562)	(.015)	(.188)
		[1.14]		[2.69]
All unweighted	-0.042***	0.457	-0.061***	-0.028
	(.015)	(.637)	(.015)	(.182)
		[1.38]		[2.98]
All aged 25-54	-0.053***	-0.641	-0.069***	-0.277
	(.016)	(.584)	(.016)	(.214)
		[1.62]		[2.71]
Germans only	-0.048***	-0.143	-0.066***	-0.197
	(.014)	(.474)	(.015)	(.192)
		[1.33]		[2.85]
Observations	4440	4440	3185	3185
Education groups				
All	-0.058**	0.198	-0.060***	0.301
	(.026)	(.133)	(.022)	(.316)
		[3.53]		[2.08]
All unweighted	-0.043**	0.380*	-0.071***	0.084
	(.021)	(.209)	(.021)	(.130)
		[2.95]		[3.21]
All aged 25-54	-0.045	-0.019	-0.054**	0.151
	(.028)	(.244)	(.022)	(.254)
		[2.59]		[2.33]
Germans only	-0.046*	0.298**	-0.059***	0.350
	(.025)	(.115)	(.021)	(.329)
		[4.54]		[2.03]
Observations	2664	2664	1911	1911

Notes: Entries are the estimated coefficients on the change in the log factor shares $\Delta \log f_{jrt}$. The dependent variable is the annual change in the skill-specific average log daily wage of all full-time employees. All estimations include five occupation and three education groups respectively. Columns 1 and 2 use all 148 West German labour market regions for which data is available, columns 3 and 4 only those 112 that actually implemented the law (see Table B-1 in Appendix B). Average log wages are based on individuals already in the data at the end of 1995. Additional covariates are a full set of interactions of skill and year fixed effects as well as region and year fixed effects. Average log wages are adjusted for differences in individual specific characteristics across labour markets. Robust standard errors are reported in parentheses and are clustered at the skill-specific regional level. For the IV estimates, the t-stat of the instrument from the first stage regression is reported in square brackets. Regressions are weighted by the inverse of the standard errors of the city fixed effects taken from the regressions to obtain adjusted outcomes. A (*) denotes statistical significance at the 10% level, a (**) at the 5% level and a (***) at the 1% level.

are -0.120 with a standard error of 0.188 in the occupation regression and 0.301 with a standard error of 0.316 in the education regression.

The IV estimates of most of the additional specifications that I estimate and report in Table 6 are not precisely estimated and inconclusive regarding the effect of ethnic German immigrant inflows on relative wages. While the point estimates tend to be negative in the regressions based on occupation groups, they tend to be positive in the education based regressions. However, the only cases in which they are statistically significant are the unweighted specification and the specification for native Germans only based on all 148 regions available (column 2) with estimates of 0.380 and 0.298 respectively. These positive effects are driven by a large positive impact on wages of German women whereas the effect on men is very small in magnitude and not significant (see Table D-2 in Appendix D). As I pointed out before, there remains scope for endogenous self-selection of immigrants in those regions in which the Assigned Place of Residence Act was not implemented, which could in principle also lead to a positive coefficient. When I restrict the sample to the preferred set of 112 regions, the estimates for the education based regressions remain positive but become statistically not significant.

The fact that I do not find any evidence of negative wage effects may be explained by Germany's relatively inflexible labour market and, in particular, strong unions and strict labour market regulations. Although in decline, union coverage is still high at 68% in 2000 (OECD, 2004).[32] In addition, wages in Germany are to a large extent set by sector-level collective wage agreements, leaving little room for wage adjustments on the regional level. The overall scope for short-term adjustments in the wage structure in Germany in response to immigrant inflows is therefore limited. This may also explain why I find relatively large adjustments in relative employment levels in my estimations: with rigid wages and at least some degree of substitutability between the resident workforce and newly ar-

[32]For comparison, the corresponding figure for the U.S. is 14%.

riving immigrants in the production process, an increase in labour supply through immigration leads to an increase in unemployment of the resident population unless it induces a sufficiently large increase in labour demand. However, as Pischke and Krueger (1998) point out, constraints and rigidities on the product market are relatively pronounced in Germany, impacting precisely this demand side of the labour market. For instance, it is much more difficult to start up a new business in Germany than it is in the U.S. which contributes to the economy's sluggishness in creating additional jobs when its population expands. In fact, total employment in Germany increased by only 1.4% between 1991 and 2001 while the working age population increased by 4.7% (of which around 46% was due to ethnic German immigrants and 45% due to immigration of foreign nationals).[33] This explanation is also supported by the results of a cross-country study carried out by Angrist and Kugler (2003). Analysing the impact of immigrants on native employment rates in eighteen European countries, the authors not only find evidence of a substantial displacement of native workers by immigrants, ranging from 35 to 83 native job losses for every 100 immigrants in the labour force, but also some clear indication that this effect is exacerbated by rigidities on the product market, such as high business entry costs, and reduced flexibility on the labour market, for instance through employment protection, union coverage, and minimum wages.

As pointed out in Section 3.2, the main source of variation I exploit in the empirical estimations are differences in the existing skill compositions across local labour markets. One concern in this context is that my results may be driven by unobserved trends in skill region specific labour market outcomes that are correlated with the initial skill share in a locality. For instance, if for some reason regions with a small initial share of a particular skill group tend to experience faster declining employment and wage rates than regions with a large initial share, then even if there was no effect of an immigrant inflow on labour market outcomes, the empirical estimates would still show a negative effect. This is be-

[33] Source: Statistical Office and own calculation.

cause, as described in Section 3.2, the lower the initial share of a particular skill group in a locality, the larger will be the percentage change in this share induced by the inflow of ethnic German immigrants. The observed negative correlation between the percentage change in the relative skill share and changes in labour market outcomes will in this case, however, be entirely driven by the underlying correlation between the initial skill share and future changes in labour market outcomes.

To investigate this issue, I estimate a model relating changes in labour market outcomes directly to the initial skill shares f_{jrt-2} in a locality. I use the skill share lagged by two periods to mimic as closely as possible my previous estimations in which I also used the skill-specific labour force lagged by two periods to construct the instrumental variable. The two models for the change in the employment/labour force and wage rate, respectively, are then given by

$$\Delta(N_{jrt}/P_{jrt}) = a_{jt} + a_{rt} + \delta_1 f_{jrt-2} + a_{jrt}$$

$$\Delta \log w_{jrt} = b_{jt} + b_{rt} + \delta_2 f_{jrt-2} + b_{jrt},$$

where a_{jt}, b_{jt}, a_{rt}, and b_{rt} are, as in the regression models in Equations 1 and 2, interactions of skill group and year fixed effects and region and year fixed effects respectively.

To minimise the influence of any other compounding factors and isolate the effect of initial skill shares, I estimate these models for the period 1985 to 1987. This is a period of little immigration to Germany which, at the same time, is sufficiently long after the strong recession of 1981/82. A significant correlation between the initial skill share f_{jrt-2} and changes in labour market outcomes would point towards unobserved skill region specific trends that are not accounted for in the model set out in Section 3.1.

Table 7: Impact of initial skill shares on labour market outcomes, 1985 to 1987

	$\Delta(N_{jrt}/P_{jrt})$		$\Delta \log w_{jrt}$	
Independent variable	Occupation	Education	Occupation	Education
Initial skill share	0.011	-0.003	-0.005	-0.014
	(.011)	(.016)	(.016)	(.020)
Obs.	1480	888	1480	888
R^2	0.81	0.76	0.70	0.82

Notes: Entries are the estimated coefficients on the local skill share lagged by two periods, f_{jrt-2}. The dependent variable is either the annual change in the employment/labour force rate or the annual change in log daily wages for the period 1985 to 1987. All estimations include five occupation and three education groups, respectively, and are estimated using West Germany's 148 labour market regions. Additional covariates are a full set of interactions of skill and year fixed effects as well as region and year fixed effects. Standard errors are robust and clustered at the skill-specific regional level. Employment and wage rates are adjusted for differences in individual specific characteristics across labour markets (see text). Regressions are weighted by the inverse of the standard errors of the region fixed effects taken from the regressions to obtain adjusted outcomes. A (*) denotes statistical significance at the 10% level, a (**) at the 5% level and a (***) at the 1% level.

Table 7 reports the estimates for δ_1 and δ_2 separately for the regressions based on occupation (columns 1 and 3) and education groups (column 2 and 4). All of the estimated coefficients on the initial skill share are statistically not significant and close to zero, indicating that the initial skill share is not systematically related to future changes in these labour market outcomes. For the corresponding results for men and women see Table D-3 in Appendix D. Apart from the effect on women's wages in the occupation regression, all estimated gender-specific coefficients are also not significant. Based on these results, I conclude that unobserved long-term trends correlated with the initial skill shares in a locality are unlikely to be driving the results of the empirical estimations.

6.2 Migratory Responses

Since the empirical analysis in this paper is based on local labour markets, it is vital to investigate whether there is evidence for migratory responses of the resident population to the inflows of ethnic German immigrants. By dissipating the effect of immigration across the entire economy, one would in that case underestimate the magnitude of the parameters of interest β_1 and β_2 (see, for instance, Borjas, 2006). Due to Germany's relatively inflexible labour market, one would a priori not expect large migration flows in response

Table 8: Migratory response of native Germans and foreign nationals to inflows of ethnic German immigrants

	Counties		Labour Market Regions	
Independent variable	German	Foreign	German	Foreign
Ethnic German inflow rate	1.05	-0.01	1.01	0.08
	(.19)	(.17)	(.24)	(.25)
Obs.	1380	1380	888	888
R^2	0.48	0.19	0.42	0.18

Notes: Entries are the estimated coefficients on the ethnic German immigrant inflow rate in models where the dependent variable is either the annual growth rate of the German or the foreign local population in either West Germany's 230 counties or 148 labour market regions for which I have information on the annual ethnic German inflows between 1996 and 2001. All estimations include a full set of region and year fixed effects.

to increased immigration and previous results seem to confirm this claim (e.g. Pischke and Velling, 1997). The comparatively generous social security system, with particularly high and long-lasting unemployment benefits, typically counteracts the incentive to move to a different location in the face of adverse labour market conditions.[34]

To formally investigate this issue, I regress the annual growth rate of the German and foreign population on the annual immigrant inflow rates, including both year and region fixed effects, the latter to allow for region-specific population growth trends. I estimate at the county as well as the labour market region level. In the absence of migratory responses of the resident population to the immigrant inflows, every additional ethnic German immigrant moving into a particular county should increase the overall German population (which includes the ethnic German immigrants) of that county by one while the number of foreign nationals should remain unchanged. Out-migration of the resident German and foreign population, on the other hand, would be reflected by coefficient estimates of less than one and less than zero, respectively. The results from these regressions are shown in Table 8. As we can see in columns (1) and (3), there is no evidence of native German out-migration that could dissipate any labour market effects across the economy. Both

[34]During the 1980s, for instance, the regional disparities of unemployment rates in West Germany widened substantially while internal migration decreased (see Bauer et al., 2005).

estimates are very close to one. Moreover, there is also no evidence that the immigrants move to areas that are particularly attractive destinations for native Germans, in which case the coefficient estimate would be greater than one.[35] This finding supports the claim that because of their exogenous allocation to particular counties ethnic German immigrants did not self-select into booming local labour markets.

Columns (2) and (4) of Table 8 report the results when I regress the annual growth rate of foreign nationals in a locality on the ethnic German immigrant inflow rate. As before, there is no evidence of out-migration of foreign nationals in response to these inflows which would be reflected by a negative coefficient estimate. Equally important, both for counties and labour market regions, there is also no indication of a positive relationship between the flows of ethnic German immigrants and foreign nationals. Both coefficients are close to zero. Given that foreign nationals are to a large extent free to choose their place of residence and likely to move to those areas where labour market conditions are best, one could expect a similar settlement pattern from ethnic German immigrants if they did indeed choose their places of residence endogenously. In that case the estimates in Table 8 should show a positive correlation.

Since in the empirical model on which this analysis is based, changes in relative factor shares are determining the relative wage structure and employment rates, it is instructive to investigate whether there is evidence of skill-specific out-migration in response to the inflow of ethnic German immigrants. Following Card and DiNardo (2000), I relate the annual change in the overall log skill share of a specific skill group in a locality to the predicted relative immigrant inflow rate for that skill group:

$$\Delta \log(P_{jr}/P_r) = a + b(\Delta I_{jr}/P_{jr_{-1}} - \Delta I_r/P_{r_{-1}}) + u_{jr},$$

[35] Particularly attractive destinations are in this context regions that experience annual increases in their German population that go beyond their long-term trends.

Table 9: Skill-specific migratory response to inflows of ethnic German immigrants

	Counties		Labour Market Regions	
Independent variable	Occupation	Education	Occupation	Education
Relative inflow rate	1.30	1.65*	1.17	1.74*
	(.34)	(.39)	(.42)	(.45)
Obs.	6900	4140	4440	2664
R^2	0.21	0.29	0.30	0.40

Notes: Entries are the estimated coefficients on the relative skill-specific ethnic German immigrant inflow rate. The dependent variable is the annual change in the log skill share in either West Germany's 230 counties or 148 labour market regions for which I have information on the annual ethnic German inflows between 1996 and 2001. All estimations include five occupation and three education groups respectively. Additional covariates are a full set of interactions of skill and year fixed effects as well as region and year fixed effects. Robust standard errors are reported in parentheses and are clustered at the skill-specific regional level. Regressions are weighted by the overall skill-specific labour force in each region. A (*) denotes that the parameter is statistically different from 1 at the 10%, a (**) at the 5% and a (***) at the 1% significance level.

where $\Delta I_{jr}/P_{jr_{-1}}$ is the predicted skill-specific inflow rate of ethnic German immigrants with skill j in region r and $\Delta I_r/P_{r_{-1}}$ is the overall inflow rate. If the migratory response of the resident population fully offsets the skill-specific inflow of immigrants, then the relative inflow rate will have no effect on the overall skill share and the coefficient b will be zero. By contrast, in the absence of a differential migratory response of the resident population in a specific skill group to inflows of ethnic German immigrants into the same group, the coefficient b will be one. Table 9 shows the results for the parameter b for both the specification based on occupation groups and the specification based on education groups. As before, I estimate at the county as well as the labour market region level. The results show that there is no indication for any selective out-migration of the resident population that could offset the changes in relative factor shares induced by the immigrant arrival. All parameter estimates are larger than 1, with point estimates of 1.30 and 1.17 for the occupation-based regressions and 1.65 and 1.74 for the education-based regressions. If at all, there is some evidence that the skill-specific inflow of immigrants leads to an increase in the relative growth of the corresponding resident population, although only in the education-based regressions is b statistically different from 1 and that only at the 10% level.

To sum up, overall the results in Table 8 and Table 9 show that there is little evidence of any out-migration of the resident population, both overall and skill-specific, in response to ethnic German immigrant inflows. It is therefore unlikely that out-migration has mitigated the effect the immigrant inflow has had on the regional wage structure and relative employment rates.

7 Conclusion

The arrival of ethnic German immigrants and their distribution across local labour markets by the administration offers a unique natural experiment to investigate the impact of immigration on labour market outcomes. In this paper, I analyse how these inflows have affected the employment/labour force rates and relative wages of the resident population in Germany between 1996 and 2001.

The empirical results show that shifts in the relative supply of different skill groups in a locality systematically affect the employment/labour force rate of the resident population. Like previous studies, I find evidence that unobserved skill-specific demand shocks lead to biased OLS estimates of the effect of these relative supply shifts. Instrumenting them with the ethnic German inflow rate leads to substantially larger estimates by a factor of 3 to 7. The estimated short-run effects on the overall employment/labour force rate are relatively stable for both skill definitions, occupations and educational attainment, pointing towards a displacement effect of around 0.4 or 4 unemployed resident workers for every 10 immigrants that find a job. I do not find conclusive evidence of any detrimental effect on relative wages. When estimating the empirical model for the native German population alone, excluding resident foreign nationals from the sample, the estimates for the effect on the employment/labour force rate become smaller in magnitude, suggesting that resident foreign nationals may be more affected by ethnic German immigrant inflows

than the native German population.

While the absence of significant wage effects of immigration is consistent with most of the existing evidence for Germany, the conclusion that immigrant inflows into a local labour market have a detrimental effect on the employment/labour force rate stands in contrast to a number of other studies for Germany, for instance Pischke and Velling (1997) or Bonin (2005). Both these studies, however, cover a different period, the former the years 1985 to 1989, and the latter the years 1975 to 1997, so that the results are not necessarily comparable. In addition, and in contrast to my analysis, the study by Pischke and Velling, related in that it also uses spatial correlations to identify the immigrant impact, identifies a medium-run effect of immigration by looking at changes over a four-year period. The longer time period allows more scope for labour market adjustments through compensatory population flows as well as changes in the industry structure and output mix of the local economy, both channels which would tend to reduce the effect on relative local labour market outcomes. The fact that German labour markets adjust to immigrant inflows through changes in employment rather than wages is potentially due to Germany's institutional setting in which strong unions allow relatively little wage flexibility, at least at the regional level and in the short run. The relatively large magnitude of the displacement effect in turn points towards constraints on the product market that do not allow for sufficiently large labour demand responses to absorb the additional labour supply.

Because of the importance of the resident labour force's skill composition as a source of variation, I investigate whether initial relative skill shares have an independent effect on future changes in labour market outcomes that could be driving the results but do not find any indication for this. I also do not find evidence of any correlation between the population growth rates of native Germans or foreign nationals and ethnic German immigration. While the absence of a positive correlation can be seen as evidence for the effectiveness of the allocation policy in preventing ethnic German immigrants to move to particularly

attractive labour markets, the absence of a negative correlation suggests that there is no systematic out-migration of either native Germans or foreign nationals in response to the immigrant inflows. This last result also holds when I look at skill-specific out-migration. My estimates of the labour market impacts of immigration are therefore unlikely to be underestimated as a result of unaccounted compensating migration flows.

Apart from estimating the short-run labour market effects of immigration in Germany, this study also emphasises the importance of the existing structure of a labour market in determining the effect of an immigrant inflow using spatial correlations. An identical relative inflow of immigrants into two regions will have substantially different impacts on local labour market outcomes if these regions differ in terms of their existing skill mix. In the context of a governmental allocation policy such as the one described in this paper, an even distribution in terms of numbers of immigrants relative to the existing population does therefore not necessarily lead to an even distribution of their labour market effects across regions.

While this study has focussed on the impact of an exogenous inflow of immigrants on relative labour market outcomes, an interesting avenue to pursue in the future could be to look at changes in absolute terms. The arrival of new immigrants will typically lead to a redistribution in an economy with a net positive effect on national income accruing to the resident population, the immigrant surplus, as long as the immigrants differ from the resident population in terms of their skills and lower their wages (Borjas, 1995). In theory, the more different the immigrants are from the existing workforce, the larger should be the immigrant surplus they give rise to in a region. The allocation policy described in this paper offers a good framework for studying this theory. As opposed to cross-country studies, the major advantage of the German context is that both the actual immigrant inflows and the existing institutional settings are homogenous across regions, making it easier to isolate the mechanism by which immigrant inflows lead to immigrant surpluses.

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Appendix A

Sample Description

All data on the local labour force is based on the IAB Employment Subsample 1975-2001. This data set contains complete employment histories of 2% of all employees subject to social security contributions in Germany, which translates into approximately 460,000 observations per year for West Germany. For each year, I collect the relevant information at the cut-off date of 31 December. I delete all individuals that are marginally employed (*geringfügig beschäftigt*, *pers_gr*=109, 209, 110, 202, 210) from the sample since these are only recorded from 1999 onwards. I also delete observations that indicate a parallel employment spell (*level2*$\neq$0). I include only men and women aged 15 to 64. I impute missing or unknown values for occupation, educational attainment and location of an individual with the most recent information from previous spells of the same individual, if available. Occupations are aggregated to five groups based on the American SF-3 Occupation Table. The aggregation key can be obtained upon request. Education levels are aggregated to three groups: "low" for individuals "without completed education" (*bild*=0), "without A-levels and without vocational training" (*bild*=1), or "with A-levels but without vocational training" (*bild*=3); "intermediate" for individuals "without A-levels but with vocational training" (*bild*=2) or "with A-levels and with vocational training" (*bild*=4); and "high" for individuals "with (technical) college degree" (*bild*=5, 6). Potential experience, which is used in the regressions to obtain adjusted labour market outcomes, is calculated as current year minus year of birth minus age at the end of educational/vocational training. The average age for each education level is set at 15 for individuals "without completed education", 16 for those "without A-levels and without vocational training", 19 for those "without A-levels but with vocational training" or "with A-levels but without vocational training", 22 for those "with A-levels and with vocational training", and 25 for those "with (technical) college degree" or unknown or missing values (which, based on their average wage rate, seem most similar to college educated individuals). Foreign nationals are aggregated to sixteen groups according to their countries or regions of citizenship:

Turkey, former Yugoslavia, Italy, Greece, Poland, the former Soviet Union, Portugal, Romania, Western Europe, Central & Eastern Europe, Africa, Central & South America, North America, Asia, Australia & Oceania, and Others. Individuals are considered unemployed if they are benefit receivers (*typ1*=6). For the construction of average wages I only consider individuals that are working full-time (*stib*<5). All wages are converted into real wages in Euros at constant 1995 prices using the German CPI for all private households. Wage records that are right censored at the social security contribution ceiling are imputed using a method developed by Gartner (2004). I aggregate the 326 West German counties (excluding Berlin) to 204 labour market regions using an aggregation key provided by the IAB.

Appendix B

Institutional Background

Table B-1: West Germany's states and their implementation of the Assigned Place of Residence Act

	No. of counties	No. of labour market regions	State quota in %	Actual quota 1996-2001	Law implemented	Date of implementation	In unrestricted sample	In restricted sample
Schleswig-Holstein	15	7	3.3	3.4	yes	1.3.1996	yes	yes
Hamburg	1	1	2.1	2.1	yes	1.3.1996	yes	yes
Lower Saxony	46	35	9.2	8.2	yes	7.4.1997	yes	yes, from 1997
Bremen	2	0	0.9	0.9	yes	1.3.1996	yes	yes
North Rhine-Westphalia	54	36	21.8	21.6	yes	1.3.1996	yes	yes
Hesse	26	16	7.2	7.2	yes	1.1.2002	yes	no
Rhineland Palatinate	36	21	4.7	4.6	no	-	yes	no
Baden-Württemberg	44	29	12.3	12.1	yes	1.3.1996	yes	yes
Bavaria	96	55	14.4	14.3	no	-	no	no
Saarland	6	4	1.4	1.4	yes	11.3.1996	yes	yes
Overall	**326**	**204**	**77**.3	**75**.8	**8/10**	**-**	**9/10**	**7/10**

Notes: The labour market region in Hamburg also comprises three counties that are situated in Schleswig-Holstein and one county that is situated in Lower Saxony. Because of the dominance of Hamburg's and Schleswig-Holstein's counties, this labour market region is already used from 1996 onwards when these two states adopted the Assigned Place of Residence Act. There are two labour market regions in Lower Saxony that each comprise one of Bremen's counties. Because each labour market region here consists of one county from Lower Saxony and one county from Bremen, I conservatively include these labour market regions only from 1997 onwards when Lower Saxony implemented the new legislation. Finally, there is one labour market region in Baden-Württemberg that comprises one of Bavaria's counties. Because this labour market region consists of two counties from Baden-Württemberg and only one from Bavaria, I include it from 1996 onwards.

Appendix C

The Empirical Model

The empirical analysis in this paper is based on a theoretical model derived by Card (2001) in which immigration impacts local labour markets by changing the relative supplies of different skill groups. Suppose that a single output good Y is produced in labour market region r in a given year t with a production function

$$Y_{rt} = F(K_{rt}, L_{rt}),$$

where K_{rt} are non-labour inputs and L_{rt} is a nested CES production function of different skill groups j that are imperfect substitutes:

$$L_{rt} = \left(\sum_{j} (e_{jrt} N_{jrt})^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)}.$$

Here N_{jrt} is the number of individuals with skill level j employed in region r at time t and σ is the elasticity of substitution between the different skill groups. e_{jrt} reflect region- and skill-specific productivity levels. If the wage rate of skill group j in region r at time t is now given by w_{jrt} and the selling price of output from region r in year t by q_{rt}, equating the marginal product of a skill group with its real product wage will lead to the following expression:

$$\log N_{jrt} = \theta_{rt} + (\sigma - 1) \log e_{jrt} - \sigma \log w_{jrt}, \tag{C-1}$$

where $\theta_{rt} = \sigma \log [q_{rt} F_L(K_{rt}, L_{rt}) L_{rt}^{1/\sigma}]$ is a region- and time-specific component shared by all skill groups. Let P_{jrt} be the labour force of individuals in skill group j in labour market region r in year t and assume a log-linear labour supply function

$$\log (N_{jrt} / P_{jrt}) = \varepsilon \log w_{jrt} \tag{C-2}$$

with $\varepsilon > 0$. Then using Equations C-1 and C-2, I can obtain the following expressions for the employment/labour force and average wage rate of skill group j in region r at time t:

$$\log(N_{jrt}/P_{jrt}) = \varepsilon/(\varepsilon+\sigma)\{(\theta_{rt} - \log P_{rt}) + (\sigma-1)\log e_{jrt} - \log(P_{jrt}/P_{rt})\},$$

$$\log w_{jrt} = 1/(\varepsilon+\sigma)\{(\theta_{rt} - \log P_{rt}) + (\sigma-1)\log e_{jrt} - \log(P_{jrt}/P_{rt})\},$$

where P_{rt} is the overall labour force in labour market region r at time t.[36] Both local wages and employment rates are determined by three factors: a common region- and time-specific component, a skill-, region- and time-specific productivity component, and the relative labour force shares of the different skill groups. If I decompose the unobserved productivity component into four parts

$$\log e_{jrt} = e_{jr} + e_{jt} + e_{rt} + e'_{jrt},$$

where e_{jr} represents skill- and region-specific effects, e_{jt} is a skill- and time-specific effect, e_{rt} is a region- and time-specific effect, and e'_{jrt} is a skill-, region- and time-specific effect, I can obtain two regression models for the employment and wage rates:

$$\log(N_{jrt}/P_{jrt}) = v_{jr} + v_{jt} + v_{rt} + \beta_1 \log f_{jrt} + v_{jrt},$$

$$\log w_{jrt} = u_{jr} + u_{jt} + u_{rt} + \beta_2 \log f_{jrt} + u_{jrt},$$

where $f_{jrt} = P_{jrt}/P_{rt}$ denotes the fraction of the overall labour force in labour market r at time t that falls into skill group j. Finally, taking first differences provides the set of

[36] I use the labour force rather than the working age population for P_{jrt} and P_{rt}. I am therefore not able to capture responses through entries to or exits from the labour force which, while less an issue for men, may be problematic when looking at female labour market outcomes.

equations that are the basis of the empirical analysis in this paper:

$$\Delta \log (N_{jrt}/P_{jrt}) = v'_{jt} + v'_{rt} + \beta_1 \Delta \log f_{jrt} + \Delta v_{jrt},$$

$$\Delta \log w_{jrt} = u'_{jt} + u'_{rt} + \beta_2 \Delta \log f_{jrt} + \Delta u_{jrt},$$

where v'_{jt}, u'_{jt}, v'_{rt}, and u'_{rt} are interactions of skill and year fixed effects and region and year fixed effects, respectively, and Δv_{jrt} and Δu_{jrt} are unobserved error components that depend on the productivity terms e'_{jrt} and e'_{jrt-1}.

Appendix D

Tables

Table D-1: Impact of changes in relative factor shares on the employment/labour force rate by gender

	Men				Women			
	All regions		Restricted regions		All regions		Restricted regions	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Occupation groups								
All	-0.117***	-0.281	-0.121***	-0.369*	-0.130***	0.186	-0.121***	-0.283
	(.014)	(.862)	(.017)	(.218)	(.020)	(.314)	(.023)	(.324)
		[0.76]		[2.90]		[3.43]		[2.94]
All unweighted	-0.120***	0.118	-0.130***	-0.370*	-0.137***	0.782	-0.109***	-0.072
	(.014)	(.463)	(.017)	(.200)	(.030)	(1.711)	(.025)	(.388)
		[1.38]		[2.98]		[1.33]		[2.98]
All aged 25-54	-0.108***	-0.317	-0.119***	-0.305*	-0.128***	0.282	-0.116***	-0.315
	(.014)	(.396)	(.016)	(.158)	(.022)	(.441)	(.023)	(.413)
		[1.70]		[3.69]		[2.98]		[2.53]
Germans only	-0.127***	-0.083	-0.131***	-0.375*	-0.118***	-0.129	-0.109***	-0.169
	(.014)	(.400)	(.017)	(.206)	(.021)	(.322)	(.022)	(.298)
		[1.41]		[3.29]		[3.31]		[3.56]
Observations	4440	4440	3185	3185	4436	4439	3185	3185
Education groups								
All	-0.035**	-0.262**	-0.043*	-0.395	-0.130***	-0.283	-0.137***	-0.630
	(.014)	(.119)	(.022)	(.251)	(.039)	(.737)	(.036)	(.652)
		[4.61]		[2.24]	[1.78]		[2.31]	
All unweighted	-0.030**	-0.233	-0.036*	-0.224	-0.158***	-0.750	-0.114***	-0.241
	(.012)	(.163)	(.019)	(.144)	(.051)	(.605)	(.036)	(.292)
		[2.95]		[3.21]	[2.52]		[3.21]	
All aged 25-54	-0.026*	-0.135*	-0.026	-0.405	-0.126***	-0.274	-0.141***	-0.601
	(.014)	(.075)	(.021)	(.262)	(.046)	(.740)	(.037)	(.554)
		[4.77]		[2.15]	[1.86]		[2.75]	
Germans only	-0.039***	-0.209	-0.036*	-0.224	-0.161***	0.429	-0.114***	-0.241
	(.015)	(.136)	(.019)	(.144)	(.048)	(1.547)	(.036)	(.292)
		[3.99]		[3.21]		[1.33]		[3.21]
Observations	2664	2664	1911	1911	2660	2660	1911	1911

Notes: see Table 5.

Table D-2: Impact of changes in relative factor shares on log daily wages by gender

	Men				Women			
	All regions		Restricted regions		All regions		Restricted regions	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Occupation groups								
All	-0.041***	-0.754	-0.042**	0.100	-0.096**	-0.165	-0.153***	-0.883
	(.015)	(1.216)	(.017)	(.265)	(.037)	(.649)	(.038)	(.652)
		[0.73]		[2.11]		[3.09]		[2.85]
All unweighted	-0.029*	-0.235	-0.032**	0.045	-0.108**	-0.776	-0.164***	-1.289*
	(.016)	(.424)	(.016)	(.217)	(.049)	(3.055)	(.051)	(.767)
		[1.38]		[2.98]		[1.43]		[2.98]
All aged 25-54	-0.031**	-1.033	-0.029*	-0.231	-0.134***	-0.837	-0.188***	-0.968
	(.015)	(1.054)	(.016)	(.222)	(.041)	(.655)	(.041)	(.707)
		[1.21]		[2.78]		[2.71]		[2.62]
Germans only	-0.029*	-0.445	-0.029*	-0.024	-0.091**	-0.595	-0.145***	-1.365*
	(.015)	(.545)	(.017)	(.233)	(.039)	(.907)	(.041)	(.729)
		[1.25]		[2.51]		[2.49]		[2.92]
Observations	4440	4440	3185	3185	4431	4431	3185	3185
Education groups								
All	-0.031	0.026	-0.040	0.137	-0.065	1.585	-0.047	0.539
	(.030)	(.092)	(.027)	(.278)	(.046)	(1.273)	(.060)	(.662)
		[4.94]		[2.35]		[2.02]		[2.13]
All unweighted	-0.032	0.064	-0.055**	0.032	-0.087*	1.704**	-0.076	0.368
	(.024)	(.133)	(.026)	(.150)	(.048)	(.803)	(.055)	(.327)
		[2.95]		[3.21]		[2.57]		[3.23]
All aged 25-54	-0.018	0.007	-0.028	0.033	-0.035	0.010	-0.075	0.267
	(.033)	(.109)	(.027)	(.308)	(.056)	(.892)	(.072)	(.789)
		[4.26]		[2.29]		[1.51]		[2.14]
Germans only	-0.035	0.066	-0.055**	0.032	-0.061	1.318**	-0.076	0.368
	(.029)	(.101)	(.026)	(.150)	(.049)	(.639)	(.055)	(.327)
		[4.75]		[3.21]		[2.77]		[3.23]
Observations	2664	2664	1911	1911	2646	2653	1907	1907

Notes: see Table 6.

Table D-3: Impact of initial skill shares on labour market outcomes by gender, 1985 to 1987

	$\Delta(N_{jrt}/P_{jrt})$		$\Delta \log w_{jrt}$	
Independent variable	Occupation	Education	Occupation	Education
Men				
Initial skill share	0.017	-0.014	0.017	0.010
	(.015)	(.021)	(.020)	(.020)
Observations	1480	888	1480	888
R^2	0.68	0.64	0.72	0.84
Women				
Initial skill share	0.021	0.008	-0.082**	-0.100
	(.024)	(.023)	(.039)	(.061)
Observations	1478	886	1476	876
R^2	0.86	0.68	0.68	0.99

Notes: see Table 7.