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by

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Abstract

I study the impact of East-West internal migration in Germany after the fall of the Berlin Wall on wages and unemployment rates in West German local labor markets. I use a novel strategy to control for the endogeneity of migrants' destination choice: characteristics of the source region are instruments for observed migration flows. Consistent with earlier work, I find no significant effect of migration on West German residents as a whole. However, I do find evidence of important distributional effects. Migration led to relatively worse employment outcomes for the least-educated workers, for blue-collar workers, for men and for foreign nationals. I also find that workers producing "non-traded" goods and services (i.e., output consumed within the local market) benefited from migration. This is consistent with the hypothesis that migrants' own demand offsets the effects of their increase in labor supply.

JEL Codes: J10, J20, J61

1 Introduction

Immigration is a hotly debated topic in much of the developed world. It is a central issue in policy discussions over the eastward expansion of the European Union. Arguably, it was concerns over migrating "Polish plumbers" that caused French voters to reject the European Constitution in 2005. In the United States, policy makers have struggled for years with the question of whether to liberalize immigration policy with Mexico.

The intensity of these debates reflects a lack of consensus concerning the economic effects of immigrants on the host country. One widespread view is that immigrants compete with native workers for jobs, driving wages down and unemployment rates up. Countering this is the view that immigrants mainly perform the jobs that natives are unwilling to, and that this, in addition to immigrants' demand for goods and services, leads to net employment gains for natives.

Empirical studies of immigration's effect on the labor market outcomes of natives generally find little or no negative impact.[1] The standard empirical approach is to study *spatial correlation*, i.e., to what extent variations across local labor markets in the magnitude of the migratory shock are correlated with variations in employment outcomes for natives. However, because migrants might go to a particular labor market based on unobservable determinants of local labor demand, estimates based on observed migration flows might suffer from an omitted variables bias, as noted by Borjas (1994, 2003). To address the endogenous nature of migrants' locational choices, authors typically use either an instrumental variables

[1] Studies for the U.S. include Altonji and Card (1991), Borjas (2003), Card (1990, 1991), and Lalonde and Topel (1991). Non-U.S. studies include Carrington and de Lima (1996), Dustmann et al. (2005), Friedberg (2001), Pischke and Velling (1997), and Winter-Ebmer and Zweimüller (1996, 1999). Surveys include Borjas (1994, 1999) and Friedberg and Hunt (1995).

– e.g., Altonji and Card (1991) – or a natural experiment – e.g., Card (1990) – approach.

In this paper, I exploit detailed German data and a new identification strategy to estimate the effect of migration on natives. My strategy combines elements of both the natural experiment and instrumental variables approaches. I treat the fall of the Berlin Wall and subsequent mass migration from East Germany as an exogenous event that produced a large labor supply shock in the West. I use variation in East German migration over time (1991-1997) across different West German local labor markets to identify the migration effect. To address possible bias in my estimates due to the endogeneity of migrants' locational choices, I instrument migration flows with distance to, and labor market conditions in, the *sending* regions in East Germany. This is a novel contribution to this literature. Previous work has used lagged information about migrant stocks or economic conditions in the region *receiving* migration to instrument for observed migration to that region. However, the assumption that this information is uncorrelated with later employment outcomes is a strong one, as these authors generally concede. In contrast, my migration instruments are more plausibly exogenous to the employment outcomes I study.

Consistent with earlier work, I find no significant effect of migration on either wages or unemployment rates for West German residents as a whole. However, I find great variation in the effects when disaggregating the results by characteristics such as education, skill level, gender and nationality. My results suggest that migration led to relatively worse employment outcomes for the least-educated workers, for blue collar workers, for men and for foreign nationals. Overall, these results suggest that, while immigration may be benign with respect to *aggregate*

labor market outcomes, it has important distributional effects.

One group that appears to benefit from migration is workers in occupations producing non-traded goods and services, i.e., goods and services that are consumed within the local labor market. A one percent increase in population due to migration reduces unemployment in these occupations by 0.5 percentage points relative to occupations producing traded goods and services. Under specific assumptions regarding labor demand elasticities, this result can be interpreted as a rough lower bound for the isolated effect of migrants' own demand on natives' employment outcomes. Although it is evident that migrants, as consumers, must have some positive effect on employment through their own demand, the empirical literature has historically paid little attention to isolating these beneficial effects. Curiously, work of this nature has seemed to focus exclusively on the beneficial effects on the migrants' *home* countries or regions, in the form of remittances.[2] There is little existing evidence directed at the question, "What do migrants contribute to the host country?"[3]

Finally, I find that migration increased the daily wages of part-time employees, possibly indicating that employers responded to increased demand by making more intensive use of their existing part-time workforce. In Germany, where workers have strong employment protections, employers might be reluctant to increase the size of the workforce due to the expected firing costs associated with new hires, as suggested by Lazear (1990). Increasing hours, rather than employment, would avoid this problem.

[2] A very incomplete list includes Funkhouser (1995), Lucas and Stark (1985), Merkle and Zimmermann (1992) and Rozelle et al. (1999).

[3] One exception is Mishan and Needleman (1966), who study the effect of immigration on excess aggregate demand and inflation.

The plan of the paper is as follows: Section 2 discusses related literature and provides background on the East German migration phenomenon. Section 3 describes the empirical approach, Section 4 the data and how I construct the migration instrument, and Section 5 the results. Section 6 concludes.

2 Background

2.1 Related Literature

Previous literature has modeled the effect of migration on labor market outcomes in two main ways. One approach is to start with a production function in which different types of workers, for example immigrants and natives, are substitutes. From this, a system of demand equations can be derived and elasticities of substitution estimated. This is the approach in Lalonde and Topel (1991). One shortcoming of such an approach is that it is based on a partial equilibrium model and therefore disregards the effect on labor demand of immigrants' own incremental demand for goods and services. Altonji and Card (1991) incorporate this effect into a model where the two labor inputs are skilled and unskilled workers, which gives the following comparative statics result for the effect of an increase in the supply of foreign labor:

$$\Delta \log w_u = B_u \frac{\Delta I}{P}, \tag{1}$$

where ΔI is immigration, P is population, w_u is the wage rate for unskilled workers, and B_u is a function of (a) the supply and demand elasticities for both types of labor, (b) the relative skill distributions of migrants and natives and (c) the share of local output exported to other markets. Substituting this expression into a

labor supply curve produces an analogous relation for unemployment. Altonji and Card point out that their model assumes that (a) the local labor market clears and (b) barriers to wage adjustment would strengthen the employment effects and weaken the wage effects of migration. In principle, the choice of skilled versus unskilled workers as the two labor inputs in the Altonji and Card model is arbitrary, and equation (1) could just as well apply to any category of workers for which immigrants are potential substitutes. Subject to this caveat, my estimation is based on (1).

Estimation is complicated by the fact that migrants' locational choices are endogenous. All else equal, migrants choose to locate in regions where labor demand is strong due to factors that are unobservable to the econometrician. If not controlled for, this would produce an upward bias in the estimates of migration's effect on wages and a downward bias in the estimates of migration's effect on unemployment rates. Bartel (1989) has shown that an important determinant of an immigrant's location choice is the relative population of his or her ethnic group at the destination. This has motivated other authors to instrument migration flows with lagged measures of the migrant population. For example, Altonji and Card (1991) instrument their measure of migration – the change in the foreigner share of the population – with its starting level. Variations on this identification strategy are used in Card (2001), Dustmann et al. (2005), Pischke and Velling (1997), and Winter-Ebmer and Zweimüller (1999). However, the identifying assumption that baseline levels of migrants are uncorrelated with labor demand in later periods is a fairly strong one. For example, a region with growing labor demand would attract a growing number of immigrants. Baseline levels of immigrants at any time would predict current-period immigration, even if the immigrants were simply following

labor demand. Therefore, instrumenting migration flows with baseline population measures might not remove the endogenous component of migration. Most of the authors cited above acknowledge the limitations of this strategy.[4]

Another approach to overcoming the endogeneity problem is to find natural experiments in which the migration flow is plausibly exogenous to the labor market outcomes under study. This is the approach initiated by Card (1990) in his study of the effect of the Mariel Boatlift on the Miami labor market and taken in subsequent work by Carrington and de Lima (1996), Friedberg (2001), and Hunt (1992). Still, to the extent that these authors rely on spatial variation in migration to identify their coefficients, they must find instruments for migrants' choices of the destination labor market.[5] Card (1990) implicitly uses distance as his instrument (Miami is the closest major U.S. city to Cuba and thus absorbed most of the immigration from the Boatlift). Hunt (1992) uses average temperatures in different regions in France (French nationals repatriating from Algeria tended to settle where the climate was most similar to Algeria's). Carrington and de Lima (1996) rely mainly on comparisons with France and Spain in examining the effect of return migration from Africa to Portugal in the 1970s. The implicit migration instrument here is the set of linguistic, cultural and legal barriers that prevented Portuguese *ritornados* from settling in Spain or France. In general, the natural experiments literature suggests that migration has limited, if any, impact

[4] In addition to or in place of immigrant stocks, some of the papers cited above use lagged values of employment outcomes in the receiving region as instruments for migration. The identifying assumptions behind such an approach would seem to be equally problematic.

[5] Friedberg (2001) is unique in focusing on labor market outcomes within occupational groups rather than within regional units. This is motivated by the observation that it is difficult for workers to change occupations, but relatively easy for them to change locations, particularly in the small country she studies, Israel. She argues that labor supply shocks are therefore much less likely to be dissipated across occupations than across regions.

on natives.

Borjas (1994, 2003) has criticized the spatial correlation approach on two grounds: (a) immigrant flows to specific regions are not exogenous and (b) their effects on native workers are masked by equilibrating responses of domestic migration and capital flows (factor price equalization). Borjas (2003) studies the variation in supply shifts across education-experience groups in the United States, treating the entire country as the relevant labor market. He concludes that a 10 percent increase in supply reduces wages by 3 to 4 percent. To make his point about attenuation due to factor price equalization in estimates based on local labor markets, he performs a parallel, state-level analysis and finds that the estimated elasticities are substantially lower.

2.2 East German Migration

With the fall of the Berlin Wall on November 9, 1989, two German systems offering distinctly different degrees of economic opportunity suddenly and unexpectedly came into intimate contact. From 1989-92, 870,000 easterners – 10 percent of the East German labor force – migrated to West Germany. After, that domestic migration stabilized at a rate of about 140,000-180,000 per year (Owen Smith 1994, pp. 266-7). This migration represented a large, exogenous shock to the West German labor supply.

That the fall of the Wall was unexpected in West Germany is clear from contemporary news reports. Less than 18 months beforehand, leaders of Germany's ruling CDU party circulated a document significantly downgrading the aim of reunifying East and West Germany (Marsh 1988a). The opposition SPD was

even more committed to a Two Germanies policy. In August, 1988, Egon Bahr, the party's East-West strategist stated, "I must ask whether the whole hypocrisy (about reunification) should not come to an end (Marsh 1988b)." Less than six months before the Wall fell, the *New York Times* reported the results of a poll of West Germans showing that 95 percent of those questioned believed the Wall would be gone in 100 years, but almost 70 percent thought it would still be there in the year 2000 (Schmemann 1989).

Because the states of the former East Germany were rapidly incorporated into the Federal Republic of Germany, this internal migration is extraordinarily well documented. I am able to observe actual, annual, county-level population flows from eastern to western Germany over a seven-year period. Because the flows are measured at county level, I can measure employment effects in well-defined local labor markets, which is critical to this type of analysis. Because the flows are annual, I can observe year-on-year changes, before the effects of longer-term equilibrating factor movements are felt. Because the flows are actually observed in a disaggregated manner, rather than inferred from highly aggregated statistics, I know with great precision where the migrants come from.[6] I can therefore exploit a novel set of instruments – local economic conditions at the migration *source* – which predict migration but are exogenous to labor market outcomes at the destination.

[6]Much existing work does not measure immigration directly but rather uses changes in an ethnic group's population share as the measure of immigration. This approach generally permits no inference about the immigrants' immediate origins. For example, it generally cannot distinguish between immigrants recently arriving from abroad and members of the same ethnic group arriving from within the country.

3 Empirical Specification and Identification

Following Altonji and Card (1991) (equation 1 above), I estimate the following:

$$\Delta z_{jkt} = \alpha_1 m_{jt} + \sum_{k=2}^{K} \alpha_k I_k m_{jt} + \beta \Delta x_{jt} + \Delta \varepsilon_{jkt}, \tag{2}$$

where z_{jt} is a measure of labor market performance, m_{jt} is net inmigration from East Germany divided by the total population at time $t-1$, x_{jt} are other determinants of labor market outcomes and k indexes a particular worker category defined by age, skill, etc. I_k is the indicator variable for category k.

To address the possible correlation between m_{jt} and $\Delta \varepsilon_{jkt}$ in equation (2), I use a measure of predicted migration as an instrument for m_{jt}. I obtain predicted migration from a regression of migration from East German regions to West German labor markets. The explanatory variables are labor market indicators for the East German region, distance between the two regions, and interactions. In contrast to previous authors, who instrument for migration with information about the receiving region, my identification rests on using information about conditions *external* to the receiving region, which are more plausibly exogenous to the employment outcomes I study. The identifying assumption is that growth in labor demand in a West German labor market is uncorrelated with distance to, and labor market conditions in, any East German region.[7] I describe the construction of the instrument in more detail below.

My estimation strategy addresses both objections raised by Borjas (1994, 2003). First, by instrumenting the migration variable, I address concerns about the endo-

[7] One might be concerned that this assumption might be violated by correlated labor demand shocks across the former East-West border. I address this concern below.

geneity of migrants' choice of one labor market over another. Second, my analysis is based on year-on-year differences in the employment measures. There is some evidence in the literature that the equilibrating movements suggested by Borjas take much longer than a year. Using European data, Decressin and Fatás (1994) find that deviations in unemployment and labor force participation due to regional labor market disturbances are not dissipated for four years. In particular, about 98 percent of the adjustment in the unemployment rate occurs in the second and third years after the shock. Blanchard and Katz (1992) find even greater persistence of deviations in unemployment, labor force participation and wages in response to state-level demand shocks in the U.S.

4 Data

4.1 Geography

My geographic unit of analysis – a West German "regional labor market" (*Arbeitsmarktregion*) – is defined in Eckey and Klemmer (1991).[8] They describe a mapping of counties to labor markets based on an algorithm that minimizes commuter flows. I use the definitions current in 1991, under which the 327 West German counties were partitioned into 166 regional labor markets. These were the standard labor market definitions used in German regional policymaking during the period I study.

[8] I use the terms "local" and "regional" labor market interchangeably below.

4.2 Migration

The county-level migration matrix (*Kreiswanderungsmatrix*) was provided by the German Federal Statistics Office and covers the years 1991–1997. All residents of Germany, whether citizens or not, are required by law to register their address with the local authorities; these registrations constitute the basis for the migration data. Therefore, the data can be viewed as a census, rather than a sample, of internal migration in Germany. As the name suggests, the matrix provides annual migration flows between all county pairs in Germany.[9] East German states were included in the matrix for the first time in 1991.

I must account for two unusual aspects of German internal migration during this period. The first is the ambiguous status of Berlin. Politically, Berlin was simultaneously part of both West and East Germany, so it is hard to determine to what extent migration between Berlin and West Germany constitutes "East-West migration." For this reason, I exclude Berlin as a source of East German migration. This does not substantially affect my results.

The second aspect is migration from other sources. In the 1990s, significant numbers of "resettlers" (ethnic Germans whose ancestors had emigrated to Eastern Europe centuries earlier) exercised their right of return to Germany. In 1991-1992, 453,000 of them arrived from abroad (Owen Smith 1994). Upon arrival in Germany, they were assigned to one of a handful of processing centers distributed throughout Germany, where they were registered as residents of the center's town. Once their status as resettlers was confirmed, they were allocated to other parts

[9] The matrix does not include flows between counties in the same state (*Bundesland*), but since all East-West migration crossed state boundaries, this poses no problem for the present analysis.

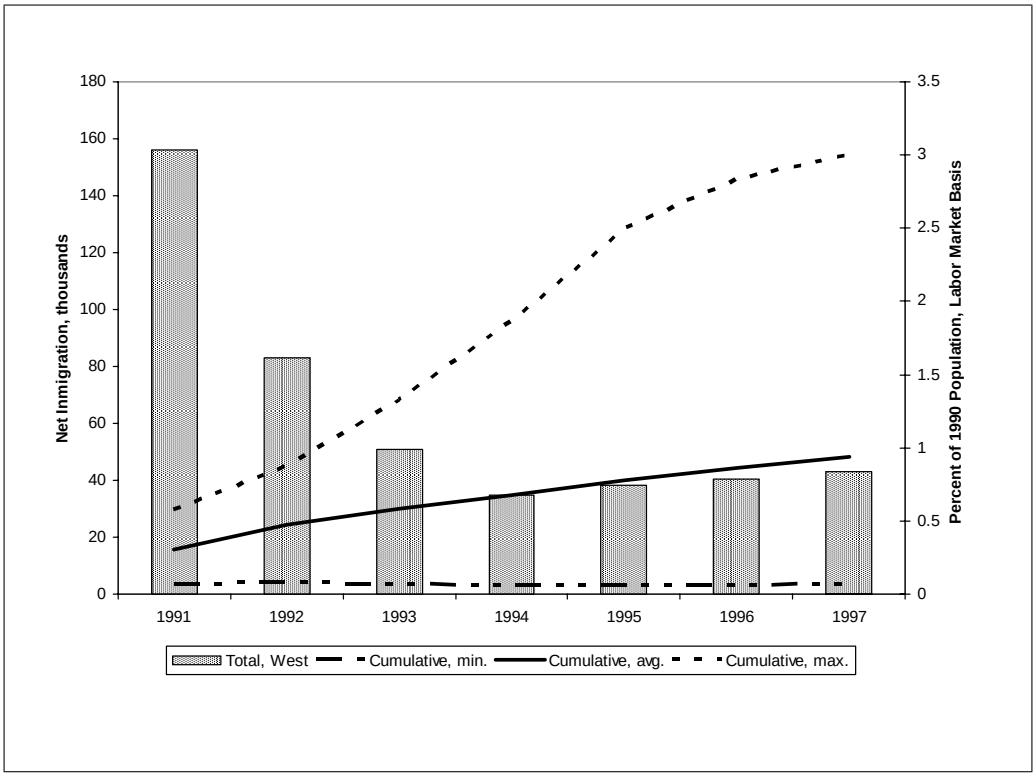

Figure 1: East German Migration to West Germany, 1991-1997
Aggregate figures (columns, left axis) are reported for all labor markets studied. Relative figures (lines, right axis) are based on observations at the level of the local labor market.

of Germany according to a formula designed to equalize the burden on the states. They thus appear as internal migrants leaving the processing center's county. I have identified five West German towns that had resettler processing centers in the 1990s.[10] Their counties show anomalous migration patterns: an unusually high number of migrants from foreign sources, and often a net outflow of migrants to East Germany, presumably due to the allocation process. The labor markets including these towns are excluded from the analysis.

Figure 1 shows the migration pattern over time in the labor markets I study. In 1991, nearly 160,000 net migrants came from East Germany to the West German

[10] They are Friedland, Bramsche, Empfingen, Rastatt and Hamm.

labor markets I study. This number decayed rapidly, but began moving upward again toward the end of the sample period. Interestingly, after 1994, the net inflow to West Germany as a whole (including the labor markets omitted from my analysis) was *lower* than that depicted in Figure 1, vividly demonstrating the distortions that the resettler processing centers introduce. Relative to 1990, net inmigration from East Germany increased the population of the average labor market by nearly 0.5 percent in the first two years, and another 0.5 percent in the next five.

4.3 West German Labor Market Data

The data on West German labor market outcomes comes from the anonymized IAB Regional Sample 1975-2001 (IABS-R01). This data set is a two percent sample of all employees registered in the German social security system, augmented with periods of public assistance. The sample is drawn from the Employees and Assistance Recipients History (BLH) of the Institute for Employment Research (IAB) of the German Federal Employment Agency (*Bundesagentur für Arbeit*). The IABS-R01 can be acquired from the Central Archive for Empirical Social Research (Cologne). The IAB bears no responsibility for the use of the data in this article.

The IABS-R01 represents about 80 percent of all workers in West Germany. Omitted from the employment statistics from which it is drawn are civil servants, those in marginal employment, students enrolled in higher education, the self-employed and family members working in a family business (Bender et al. 2000). For each person selected into the sample, the IABS-R01 contains a complete history

of that person's interactions with the social security system. This includes (a) the starting date, ending date, and average daily wage for each period of employment requiring social security reporting and (b) the starting date and ending date of each period of benefits from the social security system.[11]

The regional unit in the IABS-R01 is the census region, which may contain several counties. I map the census regions to the local labor markets defined in Eckey and Klemmer (1991) and discussed above. Unfortunately, neither the county-to-census-region mapping nor the county-to-labor-market mapping is a refinement of the other. In other words, different counties in the same local labor market may belong to different census regions and vice-versa. To make the two mapping schemes compatible, I aggregate some of the local labor markets, thereby decreasing the count from 166 to 146. I further drop five labor markets because they contain the resettler processing centers discussed above. Thus, there are 141 regional units in my analysis.

I use data for the years 1990-1997. I modify the supplied data in three ways. First, I eliminate records for trainees. Second, I remove persons whose employment record shows that their first employment experience was in East Germany.[12] Finally, I eliminate duplicate records for overlapping employment spells, retaining only the spell identified as the individual's primary employment.[13]

From this modified data, I compute annual measures of employment outcomes

[11] An employment period generally does not exceed a year, since employers typically file year-end reports. Therefore, the average wage reported is closely identified with a calendar year, which is necessary for my analysis.

[12] "Natives" are then, for the purposes of this paper, all residents of West Germany except those of East German origin. I distinguish between German and foreign nationals in some of the results reported below.

[13] The IABS-R01 artificially subdivides spells so that all overlapping spells have the same starting and ending dates. Therefore, removing secondary spells does not affect the continuity of an individual's employment history.

for each labor market as the average of twelve monthly values. The monthly values are computed for the 15th of each month. The wage is the median daily wage of the employed. I choose the median, rather than the mean, because it is unaffected by the top- and bottom-coding of the wage variable in the underlying data.[14,15] The "unemployment rate" is the percentage of benefits recipients in the sample. I choose this measure of unemployment because the IABS-R01 contains only information about an individual's interactions with the social security system. Periods where the individual is neither in a job requiring social security contributions nor receiving benefits from the system have no associated records.[16] Rather than make subjective inferences about the nature of these gaps to construct a more traditional unemployment measure, I have opted for the less traditional, but unambiguous, measure based on benefits receipt. In Appendix B, I discuss how my coefficient estimates are likely to compare with those that I would obtain using a more standard measure of unemployment.

In addition to information about wages and employment status, the IABS-R01 provides a variety of personal characteristics. I use this information to compare employment outcomes for different categories of workers and to construct controls for changes in the composition of the local labor market. I categorize this information as follows:

[14] These limit values correspond to the upper and lower limits of pay subject to social security assessments. The upper (lower) limit ranged from 213.65 DM (15.50 DM) in 1991 to 269.54 DM (20.10 DM) in 1997 (Alda and Herrlinger 2005).

[15] The wage data also includes some zero values. These can arise, for example, in cases of maternity leave, extended illness, or sabbatical. These values are excluded from the calculation of the median wage.

[16] A gap in an individual's employment history can arise when an unemployed individual chooses not to apply for benefits or fails to qualify, and also if the person is not seeking work or has employment not subject to social security reporting. These gaps comprise about 6.5 percent of the days that could possibly be observed.

- educational attainment: no vocational training, middle school (*Volks-, Haupt-, Realschule*) with vocational training, high school (*Abitur*), and higher education (*Fachhochschule, Hochschule*);[17,18]
- age: under 20, 20-25, 25-35, 35-45, 45-55, and 55-62;
- gender;
- nationality: German or foreign;
- skill group: unskilled, skilled (including master craftsmen and foremen), and white collar;
- full- versus part-time;
- branch of industry: agriculture, industrial goods, consumer durable goods, foodstuffs, heavy construction, light construction, distribution, retailing, transportation/communication, business services, personal services, social services 1 (e.g., education, hospitals), social services 2 (e.g., sanitation, nonprofit institutions), and local administration/social security.

Table 1 summarizes the variables used in the analysis. The control variables for the personal characteristics listed above are measured as the fraction of workers in each category at labor market level. Within each group, one category is not reported; it is completely determined by the other categories since the fractions

[17] I use the imputed education (*Bildung*) variable "IP4" described in Drews (2006), which follows a method developed by Fitzenberger et al. (2005) to correct for certain employers' failure to report this information reliably.

[18] The category "no vocational training" includes dropouts but consists almost exclusively of middle school graduates without further vocational training. Dropouts represent 0.03% of the overall sample.

Table 1: Summary Statistics

		Levels				First Differences			
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Log daily wage	987	4.866	0.082	4.615	5.100	0.031	0.022	-0.057	0.094
Unemployment rate (percent)	987	8.607	2.547	2.780	17.620	0.543	1.093	-2.930	5.080
Migration (percent of population)	987	0.131	0.114	-0.133	0.765				
Predicted migration	987	0.200	0.232	-0.106	1.479				
Share without vocational training	987	0.169	0.037	0.073	0.349	-0.006	0.005	-0.023	0.013
Share with middle school and vocational training	987	0.736	0.043	0.596	0.845	0.002	0.006	-0.021	0.022
Share with high school	987	0.040	0.016	0.009	0.101	0.003	0.003	-0.006	0.016
Share under 20	987	0.016	0.007	0.003	0.051	-0.003	0.005	-0.020	0.012
Share 20-25	987	0.114	0.026	0.061	0.217	-0.009	0.007	-0.039	0.023
Share 25-35	987	0.307	0.021	0.249	0.374	-0.000	0.009	-0.032	0.039
Share 35-45	987	0.274	0.022	0.199	0.351	0.007	0.008	-0.023	0.035
Share 45-55	987	0.219	0.022	0.136	0.280	-0.001	0.008	-0.035	0.028
Share male	987	0.582	0.032	0.479	0.690	-0.001	0.006	-0.021	0.022
Share German nationality	987	0.923	0.037	0.815	0.990	-0.002	0.005	-0.031	0.016
Share unskilled laborers	987	0.281	0.043	0.179	0.445	-0.003	0.007	-0.028	0.024
Share skilled laborers	987	0.299	0.042	0.172	0.430	-0.002	0.006	-0.022	0.021
Full-time share of employed	987	0.866	0.023	0.785	0.924	-0.005	0.005	-0.024	0.015
Share agriculture	987	0.023	0.017	0.005	0.161	-0.000	0.002	-0.017	0.008
Share industrial goods	987	0.253	0.089	0.056	0.539	-0.004	0.007	-0.030	0.019
Share consumer durable goods	987	0.089	0.053	0.020	0.329	-0.002	0.004	-0.028	0.019
Share foodstuffs	987	0.039	0.020	0.010	0.164	-0.000	0.003	-0.022	0.017
Share heavy construction	987	0.058	0.019	0.023	0.169	-0.000	0.003	-0.015	0.011
Share light construction	987	0.030	0.007	0.013	0.064	0.000	0.002	-0.017	0.021
Share distribution	987	0.051	0.020	0.006	0.190	0.000	0.004	-0.018	0.019
Share retailing	987	0.081	0.017	0.038	0.155	0.001	0.004	-0.042	0.041
Share transportation, communication	987	0.039	0.015	0.006	0.100	0.000	0.003	-0.011	0.015
Share business services	987	0.083	0.029	0.037	0.206	0.002	0.004	-0.016	0.023
Share personal services	987	0.044	0.018	0.016	0.121	0.000	0.003	-0.017	0.015
Share social services 1	987	0.098	0.031	0.036	0.248	0.002	0.004	-0.018	0.019
Share social services 2	987	0.043	0.013	0.011	0.101	0.002	0.003	-0.010	0.014

See text for variable definitions. For each set of control variables, e.g. age, one category is omitted. Since values within each group must sum to one, the omitted category is completely determined by the others.

Table 2: Distribution of Worker Characteristics by Origin

	E. Germans, E. Germany	**E. Germans, W. Germany**	**W. Germans, W. Germany**	**Foreigners, W. Germany**
No vocational training	6.8	12.9	17.0	54.1
Middle school w/ vocational training	78.8	74.8	71.5	39.0
High school	3.2	3.4	4.0	2.5
Higher education	11.2	8.9	7.6	4.4
Unskilled	15.4	27.6	21.6	59.4
Skilled	38.7	29.7	27.3	22.6
Salaried	45.9	42.7	51.1	18.0
Male	51.1	59.5	57.6	67.5
Female	48.9	40.5	42.4	32.5
Average age	39.5	35.1	39.2	37.5
Average daily wage	101.6	126.0	142.2	125.1

Statistics computed for records valid on June 15, 1994.

must sum to one. With the exception of full- versus part-time status, which applies only to employed persons, the data on personal characteristics are computed irrespective of employment status.

Table 2 shows how East German migrants compared with other groups on several dimensions of personal characteristics on June 15, 1994 – about the midpoint of my sample period. Migrant East Germans were low on the skill distribution relative to those who stayed behind. In terms of educational attainment, migrants were similar to West Germans; the chief difference was a greater tendency for migrant middle school graduates to have vocational training. In terms of skill groups, migrants were more likely than West Germans to be in blue-collar occupations, especially unskilled occupations. Migrants were younger and more likely to be male than either East Germans who stayed behind or West Germans. On observable characteristics, migrants are more similar to West Germans than to foreigners in West Germany. However, in terms of wages, migrants are more similar to foreigners, even though the latter were far less educated and skilled than West

Germans. Thus, although East Germans' skills and education were nominally similar to West Germans', the actual quality of their skills and education was either low by West German standards or perceived as such by West German employers. The observed difference in daily wages between West Germans and East German migrants likely understates the wage gap, because East Germans were more likely to work in full-time jobs.

The issue of full- vs. part-time employees deserves some discussion here. For most of the results reported below, I do not distinguish between these two categories of employment. This is because the main question I am interested in is: How well does the labor market absorb an exogenous increase in supply? Whether migration causes a worker to enter unemployment from a full- or a part-time position, she is still unemployed. Similarly, whether migration causes a worker's wage rate or his hours to go down, he is still earning less. Excluding one category of employment from the analysis would seem to ignore an important margin of adjustment in the labor market. While differences across the full- and part-time margins are interesting in their own right (and I explore one such difference briefly below), they are not the focus of this paper.

4.4 Instruments

As explained above, the locational choices of migrants are likely to be endogenous. Therefore, I use a measure of predicted migration as an instrument for the raw migration data. Predicted migration comes from a regression in which the unit of analysis is a pairing of one West German labor market and one East German labor market. The latter has no definition analogous to that in Eckey and Klemmer

(1991). Instead, I use the "employment office district," which is an administrative territory of the German Federal Employment Agency. Mapping the county-level migration data to the East German employment office districts is not straightforward. I discuss the complications and how I deal with them in Appendix A.

In the regression, the dependent variable is the net percentage of the East German region's population that migrated to the West German region. (The German Federal Statistics Office provided annual, county-level population data, which I used to normalize migration flows.) Explanatory variables are distance, labor market indicators for the East German region, and interactions.

The distance between two regions is measured as the driving distance between the county seats (*Kreishauptstädte*) of the largest constituent counties. I obtained this data from *www.mapquest.de* in April and May, 2005. Each labor market indicator is the squared ratio of (a) the unemployment rate or the share of the employed work force in government-sponsored make-work schemes to (b) the corresponding aggregate value for East Germany. These are based on information provided by the German Federal Employment Agency.[19] Table 3 reports summary statistics for the variables used to construct the instruments. Table 4 contains the regression results.

For each year, the regression produces 25 predicted population fractions migrating to each West German local labor market. I convert these fractions to predicted flows by multiplying by the respective populations of the 25 East German source regions. Then I sum these to obtain a single measure of predicted net East German migration to each West German labor market. Finally, I normalize

[19]Data are reported by the agency for each of 35 employment office districts. I recalculate the statistics for the 25 reconstituted districts discussed in Appendix A.

Table 3: Data for Migration Instrument

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Relative outmigration	24675	0.003	0.009	-0.129	0.297
Distance (km)	24675	471.2	162.8	29.5	1048
Unemployment index	24675	1.120	0.303	0.426	2.066
Make-work index	24675	1.565	1.069	0.155	5.503

The unit of analysis is the pairing of an East German employment office district with a West German labor market (25 x 141 x 7 years). Relative outmigration is the percentage of the East German region's population migrating to the West German region in a given year. Distance is the driving distance between the county seats of the largest counties in each region in the pairing. The unemployment index is the squared ratio of the East German region's unemployment rate to the aggregate value for East Germany. The make-work index is the analogous statistic for the share of the employed workforce in government-subsidized jobs.

Table 4: Migration Instrument: Predicted Migration Regression

Distance	-0.002***
	(0.000)
Distance squared	0.000***
	(0.000)
Unemployment index	1.265***
	(0.192)
Unemployment index x 50-100 km	-0.398**
	(0.200)
Unemployment index x 100-250 km	-1.064***
	(.186)
Unemployment index x 250-500 km	-1.357***
	(0.189)
Unemployment index x over 500 km	-1.370***
	(0.191)
Make-work index	-0.016
	(0.011)
Number of observations	24675
R-squared	0.142

Coefficients from OLS regressions; coefficients and standard errors multiplied by 100. The dependent variable is relative outmigration. See the notes to Table 3 for further description of the variables and unit of analysis.

this value by the labor market's population in the previous year. This statistic is the instrument for observed net inmigration to that labor market. Summary statistics are given in Table 1.

5 Results

Using the instruments described above, I estimate marginal effects of migration using two-stage least squares. The dependent variable is the first difference of either log median wage or the unemployment rate (in percent). The explanatory variable is net inmigration from East Germany per hundred labor market population. I include year dummies to capture general time trends for West Germany. To control for changes in workforce composition, I include measures of the distribution of the workforce by each the characteristics discussed above.

The reported marginal effect on wages is therefore the percent change in wages per percent increase in the labor market's population due to East German migration. The reported marginal effect on the unemployment rate is the percentage point change in the unemployment rate per percent increase in the labor market's population. In the discussion below, I omit repeated reference to the denominator and report the marginal effects simply as "an x percent change in wages" or "a y percentage point change in unemployment."

Because I make heavy use of interactions between the migration variable and indicator variables for different worker categories, I adopt two naming conventions to simplify the discussion. I refer to the "absolute effect" when discussing the marginal effect of migration on a particular worker category. This is the sum of (a) the coefficient on the uninteracted migration variable and (b) the coefficient on that

category's interaction term. I refer to the coefficient on a category's interaction term as the "relative effect" with respect to the omitted category. Most of the tables report individual regression coefficients only. Therefore, the relative effects and their statistical significance are evident from the tables. However, the discussion alternates between relative and absolute effects. As a guide to the reader, whenever I discuss the absolute effects in the text, I also provide their standard errors in the form "$(s = value)$."

5.1 Aggregate Labor Market Outcomes

Table 5 contains the results for aggregate wages and unemployment rates. I find no significant effect of migration on either outcome. Both the OLS (column 1) and instrumental variables (column 2) estimates of the effect of migration on wages are positive, although they are not statistically significant. Results for the unemployment rate in columns 4 and 5 show positive effects of migration, although the estimates are not significant. Column 4 also shows the bias produced by using uninstrumented measures of migration. Endogeneity of migration would cause the estimate of the marginal effect on unemployment to be biased downward, as it appears to be in comparison with the estimate in column 5 (although the comparison is perhaps uninformative because the standard errors are so large).

In columns 3 and 6, I control for distance from the labor market to the East German border. There are two reasons to think that estimates of the marginal impact of migration might be different for West German labor markets closer to the border. The first is that, prior to reunification, firms located in the Zonal Border Area – a strip of West German land within approximately 40 kilometers of the

Table 5: Labor Market Effects of Migration, Pooled Data

	Dependent Variable: Log Wage		
	OLS	**IV**	**IV**
	(1)	**(2)**	**(3)**
Migration	0.003	0.006	0.022
	(0.003)	(0.006)	(0.015)
Migration x 10th Distance Percentile			-0.016*
			(0.009)
Migration x 10th-25th Distance Percentile			-0.010
			(0.009)
Migration x 25th-50th Distance Percentile			-0.002
			(0.007)
	Unemployment Rate		
	OLS	**IV**	**IV**
	(4)	**(5)**	**(6)**
Migration	-0.289	0.077	0.351
	(0.209)	(0.439)	(1.108)
Migration x 10th Distance Percentile			0.324
			(0.669)
Migration x 10th-25th Distance Percentile			-0.587
			(0.660)
Migration x 25th-50th Distance Percentile			-0.710
			(0.520)

Instrumental variables estimates computed by two-stage least squares. The unit of analysis is a West German local labor market (N=141). The total number of observations in each regression is 987. The dependent variable is in first differences. Unemployment and employment/population rates are measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted distance category is the 50th to 100th distance percentile. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

border – were eligible for significant investment subsidies to prevent the depopulation of this then-isolated part of Germany (Federal Republic of Germany 1990). Portions of the Zonal Border Area remained eligible for these subsides long after reunification. Receipt of these subsidies was tied to specific employment pledges. Both because of the subsidies and because of the underlying labor market conditions that motivated the subsidies, these labor markets might have a qualitatively different response to changes in the labor supply.

Distance to the border might also matter if there are correlated local labor demand shocks across the border. This is a potentially more serious problem, as it would violate the identifying assumption of exogeneity of my instruments to West German local labor market outcomes. To understand how correlated demand shocks might influence the results, consider two regions – E(ast) and W(est) – that experience a common negative shock to labor demand. The negative shock in Region E would be measured as an increase in unemployment, which would produce an increase in predicted migration to Region W. Thus, an increase in predicted migration to Region W would be associated with a decrease in wages there (from the negative demand shock), biasing estimates of the wage effect of migration downward. For unemployment, the bias would be upward. Note that one should expect any correlations – and therefore the magnitude of this bias – to attenuate with distance.

In column 3, there is some indication that the estimated effect of migration on wages increases as one gets closer to the border, consistent with correlated labor demand shocks. However, the interaction terms for distances above the tenth percentile (about 80 kilometers) are not significant. This could mean that demand shocks are correlated only close to the border. Alternatively, since the

tenth distance percentile fully contains the Zonal Border Area, these results might be due to that region's unique labor market dynamics. In column 6, there is no strong indication that the estimated effect of migration on unemployment varies with distance to the border.

In summary, I find no effect of migration on wages or unemployment. There is slight evidence that the marginal effects in the region closest to the border (the tenth distance percentile) are systematically different from those for more distant West German labor markets. This may be due to distorted hiring incentives in the Zonal Border Area or cross-border correlation in unobservable shocks to labor demand. Therefore, I control for the tenth distance percentile in all results discussed below.

5.2 Disaggregated Labor Market Outcomes

In this section, I study variations in outcomes across different categories of employees. I apply the same migratory shock to all worker categories within a labor market, without regard to the distribution of workers by category in either the native population or the migrant population. It would clearly be preferable to take the approach used in Card (2001) and measure category-specific shocks. However, this requires information about the characteristics of the migrants. Although Table 2 would seem to suggest that this information is available, the data there come from the IABS-R01, not the migration matrix. The former is a small sample and picks up East Germans only in 1992, while the latter is effectively a census and begins in 1991. Therefore, I settle for the more precise but undifferentiated measure of the migratory shock.

In the results below, I report only instrumental variables estimates. Since the emphasis is on relative outcomes across different worker categories, comparisons to OLS estimates would seem to be of little value, as there is no clear concept of a directional bias. To address concerns that the results might be influenced by proximity to the border, due either to correlated labor demand shocks or to the Zonal Border Area, I report and discuss estimates that include migration interacted with an indicator if a labor market is within the tenth percentile of distance to the border. These specifications allow the average marginal effect to differ for this category, but not the relative effects across categories. The marginal effects I discuss are those for the omitted category, or labor markets beyond the tenth distance percentile.

5.2.1 Effects of Migration by Educational Attainment

Table 6 contains the results for the effect of migration on wages and unemployment rates by educational attainment. The omitted category is middle school with no vocational training, the lowest attainment category. Column 2 shows that the impact of migration on wages varies little with education. Only for the middle school with vocational training group is the relative effect (a 1.5 percent decrease) significant. However, this coefficient is statistically indistinguishable from the interaction terms for the other categories.

Results for the unemployment rate in column 4 show a somewhat greater impact of migration. Migration increased unemployment for the least educated workers by 1.6 percentage points. For high school graduates, migration reduced the unemployment rate by 1.8 percentage points in relative terms and 3.3 percentage points in absolute terms ($s = 1.4$). The other categories showed declines in their

Table 6: Labor Market Effects of Migration, by Education

	Dependent Variable			
	Log Wage		Unemployment Rate	
	(1)	(2)	(3)	(4)
Migration	-0.010	-0.002	1.481*	1.579**
	(0.015)	(0.017)	(0.774)	(0.719)
Migration x Middle School w/ Training	0.015**	0.015**	-1.755***	-1.755***
	(0.006)	(0.006)	(0.307)	(0.307)
Migration x High School	0.021	0.021	-4.918***	-4.918***
	(0.014)	(0.014)	(0.992)	(0.992)
Migration x Higher Education	0.005	0.005	-2.593***	-2.593***
	(0.014)	(0.014)	(0.545)	(0.545)
Migration x 10th Distance Percentile		-0.016		0.206
		(0.012)		(0.737)
Number of observations	3948	3948	3948	3948

Coefficients from instrumental variables (two-stage least squares) regressions. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted education category is no vocational training. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

Table 7: Labor Market Effects of Migration, by Skill Group

	Dependent Variable			
	Log Wage		Unemployment Rate	
	(1)	(2)	(3)	(4)
Migration	0.001	0.004	1.373**	0.498
	(0.006)	(0.006)	(0.567)	(0.524)
Migration x Skilled	0.003	0.003	-0.415	-0.415
	(0.003)	(0.003)	(0.327)	(0.327)
Migration x Salaried	0.024***	0.024***	-2.874***	-2.874***
	(0.004)	(0.004)	(0.328)	(0.328)
Migration x 10th Distance Percentile		-0.010**		1.194***
		(0.004)		(0.316)
Number of observations	2961	2961	2961	2961

Coefficients from instrumental variables (two-stage least squares) regressions. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted skill group is unskilled workers. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

unemployment rates that were significant in relative but not absolute terms. The relative effects for the middle school with vocational training and higher education categories are not significantly different from one another.

Overall, the unemployment results broadly support the conclusion that migration made the more educated workers better off and the least educated workers worse off.

5.2.2 Effects of Migration by Skill Group

Table 7 contains the results for the effect of migration on wages and unemployment rates by skill group. The omitted category is unskilled workers. Column 2 shows that migration increased wages by 0.3 percent for skilled and 2.4 percent for salaried employees relative to unskilled employees. Only for the white collar

workers was the absolute effect – a 2.8 percent increase – significant ($s = 0.6$). Results for unemployment in column 4 mirror the wage results. Skilled and salaried employees experienced relative declines of 0.4 and 2.9 percentage points, respectively (although only the latter effect is significant). In absolute terms, migration decreased the unemployment rate for white collar workers by 2.4 percentage points ($s = 0.5$). Overall, the results indicate that migration benefited more-skilled employees, especially salaried workers.

One question that has long interested economists is the degree to which different types of labor are substitutes for one another.[20] Grossman (1982) first investigated this question with respect to natives and immigrants. The present analysis is relevant to the substitutability of workers across many different categories. Recall from Table 2 that East German migrants working in West Germany in 1994 were disproportionately in blue-collar occupations. One possible interpretation for these results is then that East Germans are subsitutes for West Germans, but that blue-collar workers are complements for salaried workers.

5.2.3 Effects of Migration by Gender

Table 8 contains the results for the effect of migration on wages and unemployment rates by gender. The omitted category is males. Column 2 shows that migration increased wages for women by 1.3 percent in absolute terms ($s = 0.7$), while producing a negative – but not statistically significant – effect on male wages. The unemployment results in column 4 mirror this result. The unemployment rate for women decreased by 1.7 percentage points in absolute terms ($s = 0.5$), while that for men increased, but not significantly so. These results suggest that women were

[20] See Hamermesh and Grant (1979) for a survey of early work.

Table 8: Labor Market Effects of Migration, by Gender

	Log Wage		**Unemployment Rate**	
	(1)	**(2)**	**(3)**	**(4)**
Migration	-0.011**	-0.007	1.272***	0.453
	(0.006)	(0.006)	(0.443)	(0.434)
Migration x Female	0.020***	0.020***	-2.157***	-2.157***
	(0.004)	(0.004)	(0.266)	(0.266)
Migration x 10th Distance Percentile		-0.008*		0.950***
		(0.004)		(0.283)
Number of observations	1974	1974	1974	1974

Coefficients from instrumental variables (two-stage least squares) regressions. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted gender is males. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

relatively better off as a result of migration. Recall from Table 2 that East German migrants working in West Germany in 1994 were disproportionately male. If men and women work in jobs that are complementary inputs, then a relative increase in the supply of male workers might be expected to improve employment outcomes for women.

Another possibility is suggested by Tables 9 and 10. Table 9 shows the female share of West German employment for selected occupations. Women constitute less than one third of employment in a variety of manufacturing occupations, and in many cases less than one tenth. In contrast, women account for a substantial share of employment in services such as retail sales, nursing, social work, child care and hospitality. Table 10 shows similar data by industry. Women account for substantially less than half of employment in manufacturing industries such as industrial and consumer durable goods production, while they account for over two-thirds of employment in retailing and social services. The occupations and

Table 9: Female Share of West German Employment by Occupation, 1990-97

Occupation	**Percent Female**
Chemical Production	22.5
Plastics Manufacturing	31.5
Iron and Steel Production	4.1
Metalwork and Mechanical	5.8
Engineering	6.7
Retail Sales	78.8
Nursing	85.9
Social Work	73.3
Kindergarten, Childcare	96.9
Hospitality	65.4

Source: IABS-R01. Selected occupations. Percentage of spells of paid employment in each category over the indicated period.

Table 10: Female Share of West German Employment by Industry, 1990-97

Industry	**Percent Female**
Agriculture	17.4
Industrial Goods	22.0
Consumer Durable Goods	37.6
Foodstuffs	46.4
Heavy Construction	7.0
Light Construction	14.6
Distribution	36.0
Retailing	67.0
Transportation, Communication	32.1
Business Services	49.6
Personal Services	59.3
Social Services 1	73.0
Social Services 2	68.9
Local Administration	51.9

Source: IABS-R01. Percentage of spells of paid employment in each category over the indicated period. Social Services 1 = old-age homes, hospitals, educational institutions; Social Services 2 = sanitation, non-profit organizations.

Table 11: Labor Market Effects of Migration, by Full- vs. Part-Time

	Dependent Variable: Log Wage	
	(1)	**(2)**
Migration	0.020	0.023*
	(0.014)	(0.012)
Migration x Full-Time	-0.027***	-0.027***
	(0.007)	(0.007)
Migration x 10th Distance Percentile		-0.006
		(0.011)
Number of observations	1974	1974

Coefficients from instrumental variables (two-stage least squares) regressions. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted job category is part time. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

industries that employ more women are also those that tend to sell into distinct local markets. The effect of migrants' incremental demand for things like retail goods, education and health care might more than offset the effect of their incremental labor supply and lead to net employment gains in these occupations and industries. I investigate this hypothesis below.

5.2.4 Effects of Migration by Full- versus Part-Time Employees

Table 11 contains the results for the effect of migration on wages by full- versus part-time employees. The omitted category is part-time employees. Column 2 shows that migration increased the wages of part-time employees by 2.3 percent while decreasing wages by a not-significant 0.4 percent ($s = 0.8$) for full-time employees. This may reflect changes in hours for the two groups, as the wage

data in the IABS-R01 are daily, not hourly. This result is consistent with Lazear's (1990) model of job security and employment. The net employment effects of migration include migrants' shock to product demand. In the Lazear model, firms will not hire workers under moderate labor demand shocks if expected firing costs are high. As documented in Goerke and Pannenberg (2005), German workers have many legal protections that make dismissal costly for firms. However, one way in which firms can fill their demand for labor without hiring is to use already-employed part-time labor more intensively. This would show up as an increase in the daily wages of part-time workers.

5.2.5 Effects of Migration by Nationality

Generally, as discussed above, the "natives" referred to in this paper's title are workers in West Germany who are not of East German origin. Thus, they include workers of all other nationalities. In this section, I compare relative employment outcomes of West Germans and foreign nationals. Table 12 contains the results. The omitted category is German nationals. Column 2 shows that migration decreased the wages of foreigners by 6.0 percent ($s = 2.0$) and increased wages of natives by 3.4 percent. Column 4 shows that migration decreased the unemployment rate of German nationals by 2.7 percentage points. Relative to Germans, foreigners saw their unemployment rate increase by 1.4 percent, although this effect is not significant at conventionally acceptable levels. Overall, these results suggest that migration harmed foreigners but benefited Germans. Recall from Table 2 that the average wages of foreigners and East Germans working in West Germany in 1994 were almost identical. This might indicate that East Germans were mainly in competition with foreigners for jobs. If foreigners and West Germans are

Table 12: Labor Market Effects of Migration, by Nationality

	Dependent Variable			
	Log Wage		Unemployment Rate	
	(1)	(2)	(3)	(4)
Migration	0.038***	0.039***	-2.542**	-2.726*
	(0.013)	(0.015)	(1.178)	(1.406)
Migration x Foreigners	-0.099***	-0.099***	1.402	1.402
	(0.011)	(0.011)	(1.132)	(1.132)
Migration x 10th Distance Percentile		-0.011		-0.665
		(0.011)		(1.353)
Number of observations	1974	1974	1974	1974

Coefficients from instrumental variables (two-stage least squares) regressions. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted nationality is Germans. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

complements in production, then these results might indicate that East Germans, by increasing the supply of low-skilled labor, increased demand for occupations populated mainly by West Germans, improving their employment outcomes.

5.3 Employment Effects of Migrants' Own Demand

An important premise of Altonji and Card's (1991) analysis is that migrants affect local labor markets in two ways: (a) by increasing labor supply and (b) by increasing demand for locally produced goods and services. The relative importance of the second effect depends on the degree to which local production is exported, or, equivalently, the degree to which labor and product markets overlap. For example, the supply of hairstylists and the demand for their services are both confined to the same geographic region. Thus, the observed effects of migration on this profession are the net effects of offsetting supply- and demand-side components. In contrast,

workers in most manufactured goods industries produce not only for their local market but also for national or even international markets. In the extreme case, where demand is global, the demand-side effects of migration into a specific local labor market will be negligible, and the observed effects on employment will be due solely to the supply-side effects.

In other words, we can think of jobs as being tied to the production of goods and services that are either "traded" beyond the boundaries of the local labor market or "non-traded," in the sense that production and consumption take place within the same local labor market. The foregoing discussion suggests that migration might have important distributional consequences across this margin, since workers in the non-traded sector benefit from migration's demand-side effects, while workers in the traded sector do not.

Furthermore, comparing these two categories of workers allows us to estimate, in a rough way, the magnitude of these demand-side effects. The thought experiment is the following: if labor demand elasticities are the same in both sectors and migrants and natives work in these sectors in the same proportions, then the supply-side effects on native wages will be the same in both sectors. Relative outcomes for workers in the non-traded sector will be due only to differences in the demand-side effects.

Estimates are likely to suffer from an attenuation bias for two reasons. First, I am unable with my data to differentiate perfectly between the traded and non-traded sectors. In the extreme, this measurement error would cause estimates of the relative effects for the non-traded sector to converge to zero. Second, workers may be mobile across sectors. Equilibrating worker flows would also tend to obscure differences in outcomes attributable to migration.

In the results below, I classify workers in two different ways: by occupation and industry. Both are informative if the results are interpreted simply as the distributional consequences of migration for different categories of workers. For the alternative interpretation – the isolated demand-side effects of migration – the occupational categorization is preferred. First, the occupational categories are much more refined in my data, which allows a more precise sorting into traded and non-traded categories. Second, inter-occupation mobility is probably lower than inter-industry mobility, especially given the rather broad industry categorizations in my data. Both of these mitigate concerns about attenuation bias in the estimates.

5.3.1 Effects of Migration by Occupation

The IABS-R01 contains 130 different occupations, which I subjectively classified as belonging to either the traded or non-traded sector. This classification is detailed in Table 13. Table 14 contains the results for the effect of migration on wages and unemployment rates for the two sectors thus defined. The traded sector is the omitted category.

Column 2 of Table 14 shows that migration's effect on wages did not vary significantly across the traded and non-traded sectors, although the sign of the relative effect on wages in the latter is positive. Column 4 shows that migration produced a relative decrease of 0.5 percentage points in the unemployment rate for workers in the non-traded sector. The absolute effect of migration was a 0.7 percentage point decrease ($s = 0.4$). Overall, these results are consistent with the hypothesis that migrants' own demand for goods and services ameliorates any negative impact from their increase to labor supply.

Table 13: Categorization of Occupations by Traded and Non-Traded Sectors

Non-Traded Goods and Services		Traded Goods and Services			
Code	**Occupation**	**Code**	**Occupation**	**Code**	**Occupation**
43	Baker	1	Agricultural Occupations	59	Worker in Goods Sorting or Inspecting
44	Butcher	2	Assistant in Agriculture	60	Packer
45	Cook	3	Gardener	61	Worker in Goods Staging
47	Mason	4	Landscape Architect, Florist	62	Heavy Machine Operator
48	Concrete Worker	5	Miner	63	Mechanical, Automotive Engineer
49	Carpenter	6	Stonecutter	64	Electrical Engineer
50	Roofer	7	Glassblower	65	Architect, Architectural Engineer
52	Construction Assistant	8	Chemical Manufacturing Worker	66	Mining Engineer
53	Earthmoving Worker	9	Rubber Manufacturing Worker	67	Other Engineer
54	Plasterer, Tile Layer, Glazier	10	Plastics Manufacturing Worker	68	Chemist, Chemical Engineer
57	Painter	11	Paper Manufacturing Worker	69	Mechanical Technician
76	Wholesale and Retail Clerk	12	Printer	70	Electrical Technician
78	Pharmacy Assistant	13	Woodworker	71	Mining Technician
80	Bank Clerk	14	Metal Smelting Worker	72	Other Technician
81	Insurance Clerk	15	Metal Casting Worker	73	Master Craftsman
83	Tourism Worker, Real Estate Agent	16	Metal Sheet or Wire Worker	74	Laboratory Assistant
109	Doctor, Pharmacist	17	Lathe Operator	75	Technical Drawer
110	Physical Therapist	18	Machinist	77	Salesperson
111	Nurse, Orderly, Midwife	19	Metal Grinder	79	Traveling Saleseperson
112	Medical Assistant	20	Metal Polisher, Engraver	82	Logistics Clerk
113	Dietician, Pharmacy Technician	21	Welder, Pipefitter	84	Rail Operator
114	Medical Office Worker	22	Welder, Pipefitter	85	Railway Conductor
115	Social Worker	23	Welder, Pipefitter	86	Truck Driver
116	Social Worker	24	Welder, Pipefitter	87	Sailor
117	Kindergarten Teacher	25	Welder, Pipefitter	88	Postal, Radio, Telephone Worker
118	Teacher/Professor	26	Welder, Pipefitter	89	Postal Distribution Worker
119	Teacher (middle school)	27	Welder, Pipefitter	90	Warehouse Manager
121	Hairstylist	28	Automotive Mechanic	91	Materials Handling Operator
122	Innkeeper, Restaurateur	29	Agricultural, Airplane Mechanic	92	Stevedore, Warehouse Worker
123	Waiter	30	Watchmaker	93	Senior Manager
124	Other Hospitality Worker	31	Tool Maker	94	Consultant, Public Accountant
125	Housekeeper	32	Musical Instrument Maker	95	Elected Official, Public Administrator
126	Launderer, Dry Cleaner	33	Electrician (Installation)	96	Estimator
127	Room Cleaner	34	Radio Installation	97	Accountant
128	Window, Building Cleaner	35	Electronic Device Builder	98	Cashier
129	Street Cleaner, Garbage Collector	36	Electronic Device Assembler	99	Information Technology Worker
		37	Other Assembler	100	Office Worker
		38	Metal Worker, other	101	Stenographer
		39	Weaver	102	Data Entry Worker
		40	Embroiderer	103	Office Assistant
		41	Tailor	104	Public Safety Worker
		42	Shoemaker, Leather Worker	105	Security Guard
		46	Food (Manufacturing) Worker	106	Servant (Household or Business)
		51	Civil Engineering Worker	107	Publicist, Translator, Librarian
		55	Interior Decorator	108	Artist
		56	Cabinet Maker	120	Scientist
		58	Glass, Ceramic Decorator	130	Trainee, Undefined Occupation

Source: Institut für Arbeitsmarkt und Berufsforschung. Author's own translations. Most codes cover multiple occupations; those listed are representative.

Table 14: Labor Market Effects of Migration, Traded vs. Non-Traded Sectors

	Dependent Variable			
	Log Wage		Unemployment Rate	
	(1)	(2)	(3)	(4)
Migration	0.003	0.010*	0.478	-0.247
	(0.005)	(0.005)	(0.430)	(0.434)
Migration x Non-Traded Sector	0.004	0.004	-0.471**	-0.471**
	(0.005)	(0.005)	(0.226)	(0.227)
Migration x 10th Distance Percentile		-0.010**		0.616**
		(0.004)		(0.296)
Number of observations	1974	1974	1974	1974

Coefficients from instrumental variables (two-stage least squares) regressions. Definitions of "traded" and "non-traded" sectors are based on author's subjective assignment of occupational classifications, reported in a separate table. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted locus of demand category is "non-local" jobs. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01.

Note that the decline in unemployment observed in the non-traded sector is not just a relative decline, but also an *absolute* decline. Migration lowered the unemployment rate in this sector. One possible explanation is that migrants were less likely than natives to work in the non-traded sector. For example, consider the extreme case in which no immigrants seek jobs in this sector. Then their demand for non-traded goods adds to demand for native labor, but there is no offsetting competition for natives' jobs. There would be only beneficial employment effects for natives in the non-traded sector. However, the data do not seem consistent with this hypothesis. In 1992, 23.0 percent of natives' spells were identified with occupations in the non-traded sector, versus 22.4 percent for East German migrants. Natives were only slightly overrepresented in the non-traded sector in 1992. Furthermore, 1992 is the only year in which this was true. In every year thereafter, migrants' spells were *more* likely to be identified with the non-traded sector, by

steadily increasing margins (from 0.8 percentage points in 1993 to 2.7 percentage points in 1998). The data seem more consistent with the hypothesis that East Germans *increased* the relative supply of labor in the non-traded sector.[21]

5.3.2 Effects of Migration by Branch of Industry

Because the branch of industry in the IABS-R01 data is not as finely differentiated as is the occupation, constructing an industry analog to the "non-traded" variable discussed above is problematic. Therefore, I look for broad patterns across 14 industry branches that might support the results in the foregoing section. Table 15 contains these results. I do not report individual regression coefficients (relative effects). Discussing effects measured relative to an arbitrarily omitted industry category is not particularly informative. Rather, I report the absolute effect for each industry, which is the sum of the coefficients of the uninteracted migration term and the interaction term for that industry. The results are consistent with the hypothesis that migration produces relative employment gains for workers in the non-traded sectors. In the wage results in column 2, the effect of migration was significant only in five industries. Of these, the only positive effect was a 2.1 percent increase in heavy construction. Whether this industry properly belongs in the traded or non-traded sector is not clear. In addition to agriculture, absolute wage decreases were registered in light construction, transportation/communication and business services. Apart from light construction, there is not a clear case for placing these industries in the non-traded sector.

[21] Note that these statistics are based on both employment *and* unemployment spells, so they approximate as closely as possible the composition of the labor supply. This is only an approximation, because the occupation of an unemployed worker may be the occupation in which he was last employed, but not the occupation in which he is seeking work.

Table 15: Marginal Effects of Migration, by Branch of Industry

	Dependent Variable			
	Log Wage		Unemployment Rate	
	(1)	(2)	(3)	(4)
Agriculture	-0.036**	-0.031*	1.880**	0.936
	(0.016)	(0.017)	(0.758)	(0.832)
Industrial Goods	-0.012*	-0.007	1.327**	0.382
	(0.006)	(0.007)	(0.514)	(0.566)
Consumer Durable Goods	0.006	0.011	1.009	0.065
	(0.008)	(0.009)	(0.625)	(0.703)
Foodstuffs	-0.004	0.001	0.379	-0.565
	(0.012)	(0.013)	(0.809)	(0.845)
Heavy Construction	0.015**	0.020***	2.998***	2.053***
	(0.006)	(0.007)	(0.674)	(0.687)
Light Construction	-0.021***	-0.016*	1.553**	0.609
	(0.008)	(0.009)	(0.747)	(0.775)
Distribution	-0.018*	-0.013	-0.188	-1.132
	(0.011)	(0.011)	(0.772)	(0.794)
Retailing	0.011	0.017	-0.772	-1.716**
	(0.013)	(0.014)	(0.788)	(0.797)
Transportation, Communication	-0.033**	-0.028**	1.819**	0.875
	(0.013)	(0.014)	(0.764)	(0.775)
Business Services	-0.046***	-0.041***	0.015	-0.930
	(0.010)	(0.010)	(0.526)	(0.564)
Personal Services	-0.004	0.001	0.359	-0.585
	(0.014)	(0.015)	(0.745)	(0.784)
Social Services 1	0.004	0.009	-1.363***	-2.308***
	(0.009)	(0.009)	(0.509)	(0.572)
Social Services 2	-0.026	-0.021	-1.415**	-2.360***
	(0.017)	(0.018)	(0.666)	(0.735)
Local Administration	0.007	0.012	-0.557	-1.502**
	(0.008)	(0.008)	(0.520)	(0.604)
Control for 10th Distance Percentile	No	Yes	No	Yes
Number of observations	13818	13818	13818	13818

Sums of coefficients from instrumental variables (two-stage least squares) regressions. The unit of analysis is a West German local labor market (N=141). The dependent variable is in first differences. The unemployment rate is measured in percentage points. Migration is net inmigration from East Germany, expressed as a percentage of the labor market's population at the beginning of the year and instrumented as described in the text. The omitted distance category is the 50th to 100th percentile of distance to the East German border. All regressions include controls (first differences) for the distribution of age, education, gender, nationality, skill group, full- vs. part-time employees, and branch of industry. See text for details. Robust standard errors (clustering on labor markets) in parentheses. Significance levels are * 0.10, ** 0.05, *** 0.01. Social Services 1 = old-age homes, hospitals, educational institutions; Social Services 2 = sanitation, non-profit institutions.

The results for unemployment in column 4 are more suggestive. Again, there are five industries registering statistically significant absolute effects. Of these, just one – heavy construction – shows a positive effect (which is hard to reconcile with the positive wage effect for this industry). The industries showing significant declines in the unemployment rate are retailing, local administration, and two types of social services. Of all the industries, these most clearly belong to the non-traded sector. The fact that migration lowers unemployment in all of them is consistent with beneficial employment effects from migrants' own demand.

6 Conclusion

I estimate the effect of migration on natives' wages and unemployment rates. I exploit rich German data and a new identification strategy that uses characteristics of the migration *source* as instruments for natives' endogenous destination choices. This endogeneity problem is one of the major criticisms leveled at the spatial correlation approach in migration analysis, and authors of previous studies generally concede the limitations of their own solutions to this problem. Another criticism of the spatial correlation approach is that markets are not isolated. Therefore, factor mobility will cause an attenuation bias in estimates of migration's effect on local labor markets. Because I have annual data, I can observe short-term responses that are relatively free of this bias in comparison with studies using a longer time scale.

Consistent with earlier work, I find no significant effect of migration on either wages or unemployment rates for West German residents as a whole. However, I find great variation in the effects when disaggregating the results by charac-

teristics such as education, skill level, gender and nationality. My results suggest that migration led to relatively worse employment outcomes for the least-educated workers, for blue-collar workers, for men and for foreign nationals. Overall, these results suggest that, while immigration may be benign with respect to *aggregate* labor market outcomes, it has important distributional effects.

I also find that, relative to occupations tied to traded goods and services, unemployment in occupations tied to non-traded goods and services declined by 0.5 percentage points in response to a one percent increase in population. Under certain (admittedly restrictive) assumptions, this result can be interpreted as a rough lower bound for the isolated effect of migrants' own demand on natives' employment outcomes. Although it is evident that migrants, as consumers, must have some positive effect on employment through their own demand, the empirical literature has historically paid little attention to isolating these beneficial effects.

Finally, I find that migration increased the daily wages of part-time employees, possibly indicating that employers responded to increased demand by making more intensive use of their existing part-time workforce. This might arise from employers' desire to avoid the expected firing costs associated with new hires.

Overall, the evidence suggests that both sides of the immigration debate have valid arguments. On the one hand, migration seems to worsen employment outcomes among groups that are generally regarded to be most vulnerable in the labor market: the least educated, manual laborers and foreigners. Generally, relative employment outcomes are worst for the groups in which East Germans are disproportionately represented, which suggests that the migrants are substitutes for these categories of workers. On the other hand, there is also some evidence that immigrants do stimulate labor demand due to their demand for goods and

services.

This then suggests two possible mechanisms for the relative employment gains observed for some categories of workers: that they are complements to East German labor, and that they work in occupations that benefit disproportionately from migrants' consumer demand. One avenue for future research would be to distinguish between these two mechanisms.

One technical limitation of the present analysis is that the IABS-R01 provides no information about the long-term unemployed or workers who are neither employed nor receiving benefits payments. Therefore, my measure of unemployment differs from traditional measures and does not readily permit direct comparison of my results with other work based on other definitions of unemployment. More globally, in comparing employment outcomes for different categories of workers, it would be preferable to measure category-specific shocks as in Card (2001). However, my data do not permit this. On the other hand, this shortcoming is balanced by the novel identification strategy that the data do make possible.

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A Treatment of East German Regions

Mapping the counties in my data to employment office districts is complicated by two factors. First, East German counties were redefined several times throughout my sample period. By the end of the period, the number of counties had been reduced to its current value of 113. To obtain geographic entities that are consistent throughout my sample period and compatible with other data sources, I map counties to the post-redistricting definitions. Although redistricting was mainly a fusion of small counties into larger ones, there were ample exceptions, so the mapping process is imprecise.

For some states (Brandenburg, Mecklenburg-Vorpommern, Thüringen), I was able to obtain detailed cross-reference tables showing the composition of counties by town code before and after redistricting. For these states the mapping rule was

as follows: for each old county–new county pair, I calculated the percentage of the old county's towns redistricted into the new county. If that percentage weakly exceeded 20 percent, I mapped the old county to the new. If an old county was assigned in this way to multiple new counties, I combined the new counties to remove the split.

For the remaining states (Sachsen, Sachsen-Anhalt), I used information from their entries in the online encyclopedia Wikipedia (http://de.wikipedia.org/wiki/Sachsen, http://de.wikipedia.org/wiki/Sachsen-Anhalt). These entries describe the current county structure and each county's redistricting history. If the history indicated that an old county was redistricted into multiple new counties, I combined the new counties to remove the split. Since Wikipedia is based on voluntary entries provided by the general public, I did the following informal accuracy check. I compared the Wikipedia entries for Brandenburg, Mecklenburg-Vorpommern, and Thüringen with my own data. I found that Wikipedia did not always exhaustively list the old counties contained in the new counties. However, in these cases, the omitted counties were generally the same ones that fell below the 20 percent threshold discussed above. I have no strong reason to believe that the mapping based on Wikipedia is significantly less precise than the one based on the detailed cross-reference tables.

The second complication is that the employment office district structure and county structure do not perfectly coincide, so again there is a loss of precision in assigning counties to employment office districts. I use a variation of the "naive" mapping scheme described by Arntz and Wilke (2005). They propose various assignment rules based on the intersection areas formed by overlaying digitized maps of Germany subdivided by county and employment office, and they provide a link

to their file of map intersections. Using their data, I mapped the counties (post-redistricting definitions) to the employment office district with which they had the largest intersection. Of 113 counties, only 7 had less than 90 percent overlap with their assigned district. In each of these cases, the county seat (*Kreishauptstadt*) was correctly assigned. Assuming the county seat is the economic center of the county, these counties' population and migration statistics should thus be matched with the relevant labor market data. Arntz and Wilke test the robustness of their various mapping rules by performing an unemployment duration analysis for West Germany in the years 1975-1997. They find that the results are highly robust with respect to the merging scheme applied. It should be noted here that their unit of analysis – the employment office – is more detailed than mine – the employment office district. Also, their analysis does not include East Germany. I leave it to the reader to judge the relevance of their results as indicators of the robustness of my mapping scheme.

After mapping each of the 113 Eastern counties to an employment office district, I aggregated employment office districts so that each of the county clusters resulting from my redistricting-related mapping was assigned to only one district. This aggregation reduced the 35 employment office districts to 26 clusters. Eliminating Berlin, for reasons discussed above, produces the 25 regions I use.

B Relationship of Coefficient Estimates to Those Based on Standard Unemployment Measures

Because the IABS-R01 does not include all employed persons in Germany, and because it does not contain information about the status of persons who are neither working in a job requiring social security reporting nor receiving benefits payments, my measure of the unemployment rate (defined below) differs from standard measures. This complicates comparison of my results with work based on these other measures. Effectively, this is an issue of missing data. In this section, I derive rough estimates of the likely magnitude and direction of any resulting bias in my coefficient estimates.

Let e be the number of employed persons observed in the IABS-R01 on a given date and r be the number of benefits recipients observed. Then my measure of the unemployment rate is

$$u^* = \frac{r}{e+r}.$$

Let $p_o = e + r$ be the observed "workforce" and p_u be the unobserved workforce. We can think of p_u as either the number of people regularly appearing in the IABS-R01 but with gaps in their records on the date of observation or as the total workforce not covered by the IABS-R01. Let μ be the traditionally-defined unemployment rate in p_u. Then the overall unemployment rate consistent with that definition is

$$u = \alpha u^* + (1-\alpha)\mu,$$

where

$$\alpha = \frac{p_o}{p_o + p_u}.$$

Assume that u^* and μ are related as follows:

$$\mu = k + \gamma u^* + \varepsilon.$$

Then

$$\Delta u = [\alpha + \gamma(1 - \alpha)]\, \Delta u^* + \eta,$$

where $\eta = (1 - \alpha)\Delta\varepsilon$. If I observed u perfectly, in a one-variable least squares estimation I would estimate the marginal effect of migration on unemployment as

$$\beta = \frac{\text{cov}(\Delta u, m)}{\text{var } m}.$$

Since I don't observe u perfectly, what I actually estimate is

$$\beta^* = \frac{\text{cov}(\Delta u^*, m)}{\text{var } m}.$$

Because $\text{cov}(ax, y) = a\ \text{cov}(x, y)$, $\beta = [\alpha + \gamma(1 - \alpha)]\, \beta^*$. We can now consider several different possibilities for γ:

1. $\gamma > 1$: β^* gives an attenuated estimate of β.

2. $\gamma = 1$ (u^* and μ are perfectly correlated): β^* is unbiased. In other words, if the observed data in the IABS-R01 are representative of the broader labor market, the missing data poses no problem for the analysis.

3. $\gamma \in [0, 1)$: β^* is inflated by at most $\frac{1}{\alpha}$. Note that this occurs when $\gamma = 0$, which describes the case when the measured unemployment rate is uncorrelated with the unemployment rate in the unobserved population.

4. $\gamma < 0$ (u^* and μ are negatively correlated): β^* is severely inflated and may even have the wrong sign.

The last case seems highly unlikely. Therefore, if β^* overstates the marginal effect of migration on unemployment at all, it does so by a factor of at most $\frac{1}{\alpha}$. If we take the relevant population to be persons regularly appearing in the IABS-R01, then $\alpha = 0.935$ and my estimates are inflated by at most approximately 7 percent. If we take the relevant population to be the West German workforce, then $\alpha \approx 0.748$ (80 percent occupational coverage of the IABS-R01 deflated for gaps within the IABS-R01[22]) and my estimates are inflated by at most approximately 34 percent.

[22]Note that this involves some double counting, as some of the gaps in the IABS-R01 may be due to transitions into occupations it does not cover.

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