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## Can Role Models Enhance Gender Equality on the Labor Market? Evidence from the Post-Unification Migration Experiment

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# CAN ROLE MODELS ENHANCE GENDER EQUALITY ON THE LABOR MARKET? EVIDENCE FROM THE POST-UNIFICATION MIGRATION EXPERIMENT\*

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## Abstract

The paper uses the natural experiment of German unification to study the role of labor supply behavior in explaining occupational segregation by sex. Analyzing a panel of regional labor market data constructed from administrative records, we observe that inflows of East German migrants with distinct labor market attitudes significantly reduced gender imbalance within occupations in West Germany. But also West German women enter male dominated jobs more frequently in local labor markets with a larger employment share of East German women. This spillover-effect, which we interpret as a role model effect, holds controlling for endogenous location choices of East-West migrants.

**Keywords:** Occupational Segregation, Female Labor Supply, Quasi-Natural Experiment

**JEL Classification:** J16, J61, R23

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# 1 Introduction

Occupational segregation by sex is an unwanted feature of labor markets for a number of reasons. First of all, the fact that a certain part of the population is excluded from, or at least has difficulties to obtain access to, a certain range of occupations may yield labor market rigidity, and therefore reduce the ability of an economy to adjust to change. Second, occupational segregation is wasteful of human resources. If it drives education choices, certain abilities in the population might remain undeveloped. Finally, it may be directly detrimental to women. It supports perpetuation of gender stereotypes, which may have an adverse affect on many economic and social variables, e.g. poverty and income inequality (Macpherson and Hirsch, 1995).

While the adverse labor market consequences of occupational segregation appear quite important, there is rather scarce empirical evidence on the factors explaining occupational segregation. This paper focuses on one potential supply side determinant of occupational segregation, namely that occupation choices follow established gender stereotypes or role models— in economic terms, the objective or subjective net costs of a female (male) to enter a certain occupation might be the smaller the larger the share of female (male) co-workers already occupied in this occupation.<sup>1</sup>

In order to study this potential channel empirically, our empirical strategy exploits the large inflows of East German workers on the West German labor market following unification. East-West migration has created a rather peculiar labor supply shock: East Germans are endowed with with labor market labor market attitudes and histories facilitating entry in male dominated jobs.

In particular, while as a result of industry structure occupational segregation by sex on the post-unification East German labor market exceeds that in West Germany,

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<sup>1</sup>See Anker (1997) for an overview of the literature explaining occupational segregation by sex, which distinguishes between labor supply and labor demand related factors.

it appears that the occupation structure of the selected group of East-West migrants on the whole more closely resembles that of West German men than that of West German women. Clearly, if the East German migrants could maintain this pattern on the West German labor market, occupational segregation by gender would decline.

However, in this paper we are after an additional spill over effect. Does the labor supply shock from East Germany change occupational structure by gender of West Germans? If there is a role model effect, one would expect that the occupational segregation declines in the West German population, too. We hypothesize that the role model effect would be especially marked for West German women, given that the labor market related behavioral preferences between East and West Germans exhibit stronger differences for women than for men (Bonin and Euwals, 1998).

In order to identify such a spill over effect, we can rely on regional variation: Local employment shares of East Germans in West Germany vary quite substantially across West Germany. This, first of all allows controlling for a range of macro economic factors that drive occupational segregation (e.g. the industrial structure). Moreover, the regional approach allows controlling endogenous labor supply changes by using distance of moves as an instrument.

Note that a spill over effect is conceptually different from an alternative labor supply side explanation, which relies on the hypothesis that women generally have a special preference for certain job characteristics that makes them cluster in certain occupations. For example, women may prefer occupations that make it easier to work flexible hours, or to interrupt work around birth.

Furthermore, it is distinct from labor demand side explanations, which rely on the hypothesis that employers prefer to hire male and female workers for specific occupations. In part, this may be a reflection of specific job requirements, like education and experience, meeting gender-specific worker characteristics. However, another possible reason is -

statistical - discrimination. If there are average differences in productivity, skills etc. of men and women, and if there are search and information costs associated with hiring and promotion decisions, employers have a rationale to discriminate against women. This requires that sustaining differences between male and female workers costs less than identifying suitable individual workers.

Thus, our paper complements the empirical literature that has focused on the the discrimination hypothesis. For example, Gill (1989) focuses on the discrimination hypothesis and compares the probability that an individual will choose an occupation and the probability that an individual will be hired for a desired job. His results suggest that occupational segregation by ethnic race can be attributed to discrimination by employers. Beller (1982) provides an indirect test that discrimination impacts occupational segregation, by showing evidence that enforcement of equal opportunity programs boosts women's probability to be employed in a male occupation relative to men's probability. Reilly et al. (2006) explore establishment level data. Their results strongly suggest that both supply and demand aspects must be considered in explaining gender segregation, but that discrimination effects are not substantial.

The remainder of the paper is structured as follows. Section 2 introduces our measures of occupational segregation and discusses how labor supply shocks in general might affect the degree of segregation. Section 3 describes the specific East-West labor migrant supply. Section 4 surveys our data and provides some descriptive statistics. Section 5 presents our estimation results. Section 6 concludes.

## 2 The Anatomy of Occupational Segregation

The most basic summarizing measure of occupational segregation by gender is the Karmel and MacLachlan index.<sup>2</sup> It is generally defined as follows:

$$I = \frac{1}{L} \sum_k \left| (l_k^f - l^f) L_k \right| \quad (1)$$

where  $L_k$  is total employment in occupation  $k$  and  $L = \sum_k L_k$  equals total employment. Further  $l_k^f$  represents the share of females among total employment in occupation  $k$ , and  $l^f$  the share of females among total employment across all occupations  $k$ . In different terms, if  $L_k^f$  and  $L_k^m$  denote the number of females respectively males employed in occupation  $k$ , it holds that  $l_k^f = \frac{L_k^f}{L_k^f + L_k^m}$  and  $l^f = \frac{\sum_k L_k^f}{\sum_k L_k^f + L_k^m}$ .

The interpretation of the index is as follows: it represents the percentage share of females employed that one would need to reallocate to different occupations in order to achieve a situation without occupational segregation. This requires that women and men are equally distributed among occupations: in each occupation, the share of man and women relative to total employment of man and women must be the same.

In order to discuss the properties of this index, it is therefore useful to manipulate notation by introducing  $p_k^i$  to represent the share of women (men) employed in occupation  $k$  among all women (men) employed:  $p_k^i = \frac{L_k^i}{L^i}$ . In addition, we will write  $L^i = \sum L_k^i$ , with  $i = f, m$ . Obviously,  $L = L^f + L^m$  and  $\sum_k p_k^i = 1$ . One can show that equation (1) is equivalent to:

$$I = \frac{1}{L} \sum_k \left| \left( p_k^f L^f - \left( p_k^f L^f + p_k^m L^m \right) \frac{L^f}{L^f + L^m} \right) \right|, \quad (2)$$

and a series of quite straightforward manipulations leads to:

$$I = \frac{L^f L^m}{(L^f + L^m)^2} \sum_k \left| \left( p_k^f - p_k^m \right) \right| \quad (3)$$

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<sup>2</sup>See Kalter (2000) for a survey of segregation indices.

Equation (3) first shows that the segregation index approaches a value of zero, if either the share of women (men) among total employed approaches zero, or if the distribution of female and male employment across occupations is identical, which means that  $p_k^f = p_k^m$ ,  $\forall k$ . Second, one can derive the marginal response to an inflow of  $L^f$  and  $L^m$ , respectively. As the problem is symmetrical, we focus on  $\frac{\partial I}{\partial L^m}$ . As  $\sum_k \left| \left( p_k^f - p_k^m \right) \right|$  is a positive constant with respect to  $L^m$ , it is sufficient to investigate the sign of

$$R = \frac{L^f L^m}{(L^f + L^m)^2} \quad (4)$$

It holds that:

$$\frac{\partial R}{\partial L^f} = \frac{L^f(L^f + L^m)^2 - 2L^f L^m(L^f + L^m)}{(L^f + L^m)^4} \quad (5)$$

As the denominator is positive, the sign of the marginal derivative hinges on the numerator, which can be easily manipulated as follows:

$$\begin{aligned} L^f(L^f + L^m)^2 - 2L^f L^m(L^f + L^m) &> 0 \\ [(L^f)^2 - (L^m)^2] &> 0 \\ L^f &> L^m \end{aligned}$$

Thus, an empirically testable hypothesis is that everything else equal (in particular constant distribution of the male employed across occupations ( $p_k^m$ )), the segregation index will increase (decline) as  $L^m$  increases, if the ratio  $\frac{L^f}{L^m}$  is greater (smaller) than unity. Likewise, the response of the segregation index to an increase in  $L^f$  is positive (negative), if the ratio  $\frac{L^f}{L^m}$  is smaller (greater) than unity.

In other words, while the index is size invariant to the overall number of the population, it is not as regards the size of the male and female sub-populations. This may be seen as a disadvantage complicating the empirical analysis. Therefore, for most of the analysis, we will use a variant of the indicator, the so-called dissimilarity index,

$$I^D = \frac{1}{2} \sum_k \left| \left( p_k^f - p_k^m \right) \right| . \quad (6)$$

The dissimilarity index  $I^D \in [0, 1]$ , by omitting the population weighting of equation (3), has a number of useful properties. It is both size and composition invariant, and it also satisfies the principle of organization equivalence.

Furthermore, it allows a useful decomposition of changes in occupational segregation over time. If  $t_0$  refers to a base year, one can benchmark any change over the period  $dt = t - t_0$  as follows:

$$I_{dt}^D = I_t^D - I_{t_0}^D = O_{dt}^D - G_{dt}^D \quad (7)$$

where  $O_{dt}^D$  is the annual change of the segregation measure keeping the initial gender composition within occupations constant, and  $G_{dt}^D$  is the annual change of the segregation measure keeping the initial occupation structure constant. In other words, the former term is the change in the dissimilarity index due to changes in occupational segregation across occupations, whereas the latter term refers to the change in the dissimilarity index due to within-occupation changes in the male-female employment ratio.

### 3 East-West Labor Migration Since Unification

Since re-unification, 1.5 million people left eastern Germany and mainly moved to western Germany (Mai 2006). In particular, net migration from eastern to western Germany peaked around re-unification and has been dropping markedly until the mid 1990s, a trend that has been associated with a rapid wage convergence in the early 1990s (Hunt, 2000). Since the mid 1990s, however, the pace of economic recovery of eastern Germany has been slowing down and east-west migration has again started to rise (Heiland, 2004). At the same time, there have been migration flows within western and eastern Germany, with the rural regions experiencing net migration losses.

The massive outflow in the East is mirrored by substantial labor supply changes in the West. Our principle measure for the labor supply shock will be the share of workers of



East German origin among all workers in a regional labor market. The following Tables provide some descriptive statistics on the shock variable. Obviously, the size of the shock varies systematically with distance from the former boarder, in line with expected migration costs.

Table 1: Share of female employees with east German origin in west German regions by proximity to the border

Year	all regions				border	non-border
	Mean	Std. Dev.	Min.	Max.	Mean	Mean
1992	0.16	0.14	0.0	0.57	0.40	0.12
1993	0.39	0.27	0.0	1.25	0.94	0.30
1994	0.56	0.35	0.0	1.74	1.27	0.45
1995	0.72	0.50	0.0	2.40	1.75	0.55
1996	0.88	0.62	0.0	3.48	2.10	0.69
1997	1.03	0.77	0.0	4.38	2.54	0.79
1998	1.17	0.84	0.11	4.68	2.82	0.91
1999	1.31	0.87	0.23	4.86	2.98	1.04
2000	1.51	1.02	0.30	5.10	3.51	1.20
2001	1.73	1.10	0.43	5.69	3.83	1.40
2002	1.92	1.15	0.53	6.20	3.99	1.60
2003	2.03	1.26	0.12	6.78	4.30	1.68
2004	2.13	1.29	0.33	6.20	4.43	1.77

Apart from the reallocation of population, a main feature of these migration flows was their selectivity with regard to age, gender and education. In the main focus of recent research was the selectivity of migration flows with respect to the education and qualification of the migrants and a corresponding brain drain from eastern to western Germany (Hunt, 2004; Brücker and Trübswetter, 2004; Arntz, 2009). Due to gender-selective migration, the sex ratio in most eastern regions has dramatically increased, while some urban regions in western Germany were able to disproportionately attract women and show a surplus of young women. The intensity of this process and its result are without comparison in Europe. Even regions along the arctic circle in North Sweden and Finland which have been suffering from a disproportionate migration to the cities

Table 2: Share of male employees with east German origin in west German regions by proximity to the border

Year	all regions				border	non-border
	Mean	Std. Dev.	Min.	Max.	Mean	Mean
1992	0.35	0.29	0.00	1.69	0.86	0.27
1993	0.55	0.43	0.05	2.23	1.34	0.43
1994	0.68	0.54	0.12	3.39	1.70	0.53
1995	0.82	0.63	0.19	3.58	2.06	0.63
1996	0.93	0.69	0.25	3.73	2.28	0.72
1997	1.07	0.78	0.22	4.39	2.55	0.84
1998	1.24	0.89	0.30	5.29	2.98	0.97
1999	1.46	0.98	0.40	5.32	3.38	1.16
2000	1.74	1.15	0.47	6.65	3.94	1.40
2001	2.03	1.26	0.58	6.38	4.24	1.69
2002	2.23	1.35	0.50	7.21	4.64	1.86
2003	2.31	1.36	0.56	7.56	4.71	1.94
2004	2.41	1.38	0.52	7.82	4.81	2.03

among young women for a long time do not reach sex ratios as high as the ones that can be found in eastern Germany (Kröhnert and Klingholz 2007).

In an attempt to find an explanation for the selectivity of east-west migration with respect to gender, Schneider and Kubis (2007) examine the relevance of labor market factors, educational reasons, family reasons and amenities in shaping the destination decisions of young men and women. For most of these factors, however, they cannot establish any gender-specific differences. Both young women and young men tend to migrate from eastern to western Germany and from rural to urban regions with good apprenticeship and work opportunities. However, Kubis and Schneider (2007), and Mai (2006) identify gender differences concerning the level of migration.

Apparently, young women in Germany exhibit much higher migration rates than their male counterparts. Among those aged 18 to 25, nearly twice as many young females moved between regions. Hence, while the underlying reasons for these different migration

levels among men and women still remain a puzzle, it cannot be stressed enough that the resulting regional imbalance within Germany is a historically unique situation that is without precedent among current industrialized countries.

Table 3: OLS estimates (p-value) of female share in current occupation for women in western Germany 1995-2004

	A	B	C	D
<i>Individual level covariates</i>				
East German origin	-1.906*** (0.00)	-1.330*** (0.00)	-1.345*** (0.00)	-0.621** (0.04)
Age		-0.773*** (0.00)	-0.776*** (0.00)	-0.789*** (0.00)
Age <sup>2</sup>		0.010*** (0.00)	0.010*** (0.00)	0.010*** (0.00)
Vocational training		8.525*** (0.00)	8.467*** (0.00)	8.534*** (0.00)
Tertiary education		-8.829*** (0.00)	-8.814*** (0.00)	-8.425*** (0.00)
Apprenticeship		8.615*** (0.00)	8.530*** (0.00)	8.501*** (0.00)
Parttime		9.085*** (0.00)	9.042*** (0.00)	8.935*** (0.00)
Months not employed		0.022*** (0.00)	0.022*** (0.00)	0.023*** (0.00)
Receipt of UB		-0.561*** (0.00)	-0.665*** (0.00)	-0.586*** (0.00)
Work experience after 1990		0.025*** (0.00)	0.025*** (0.00)	0.024*** (0.00)
Tenure		0.061*** (0.00)	0.060*** (0.00)	0.061*** (0.00)
Regionally mobile				-2.321*** (0.00)
<i>Regional level covariates</i>				
Population			0.001*** (0.00)	0.001*** (0.00)
Pop. density			-0.038** (0.04)	-0.033* (0.08)
log(GDP)			-1.418*** (0.00)	-1.587*** (0.00)
Unemployment			0.166*** (0.00)	0.164*** (0.00)
Foreigners			0.103*** (0.01)	0.112*** (0.00)
High-skilled			-0.139*** (0.00)	-0.137*** (0.00)
Female high-skilled			0.016 (0.25)	0.017 (0.21)
Services			-0.127 (0.43)	-0.076 (0.64)
Male jobs			-0.374*** (0.00)	-0.370*** (0.00)
Constant	67.252*** (0.00)	70.946*** (0.00)	103.408*** (0.00)	105.321*** (0.00)
Year dummies	yes	yes	yes	yes
R <sup>2</sup>	0.001	0.077	0.079	0.081
Number of obs.	449913	449913	449913	449913

Table 4: OLS estimates of female share in current occupation for men in western Germany 1995-2004

	A	B	C	D
<i>Individual level covariates</i>				
East German origin	-8.579*** (0.00)	-6.955*** (0.00)	-6.878*** (0.00)	-7.574*** (0.00)
Age		0.452*** (0.00)	0.394*** (0.00)	0.362*** (0.00)
Age <sup>2</sup>		-0.007*** (0.00)	-0.006*** (0.00)	-0.006*** (0.00)
Vocational training		1.171*** (0.00)	1.256*** (0.00)	1.144*** (0.00)
Tertiary education		3.754*** (0.00)	3.028*** (0.00)	2.633*** (0.00)
Apprenticeship		4.512*** (0.00)	4.703*** (0.00)	4.689*** (0.00)
Parttime		18.853*** (0.00)	18.452*** (0.00)	18.526*** (0.00)
Months not employed		0.056*** (0.00)	0.054*** (0.00)	0.050*** (0.00)
Receipt of UB		-5.227*** (0.00)	-4.529*** (0.00)	-4.436*** (0.00)
Work experience after 1990		-0.067*** (0.00)	-0.064*** (0.00)	-0.064*** (0.00)
Tenure		0.048*** (0.00)	0.067*** (0.00)	0.073*** (0.00)
Regionally mobile				1.886*** (0.00)
<i>Regional level covariates</i>				
Population			-0.000 (0.48)	-0.000 (0.39)
Pop. density			0.063*** (0.00)	0.058*** (0.00)
log(GDP)			0.859*** (0.00)	0.984*** (0.00)
Unemployment			-0.217*** (0.00)	-0.219*** (0.00)
Foreigners			0.232*** (0.00)	0.219*** (0.00)
High-skilled			-0.005 (0.90)	-0.002 (0.97)
Female high-skilled			-0.034*** (0.01)	-0.033** (0.01)
Services			1.115*** (0.00)	1.068*** (0.00)
Male jobs			-0.529*** (0.00)	-0.533*** (0.00)
Constant	24.553*** (0.00)	19.901*** (0.00)	40.706*** (0.00)	40.009*** (0.00)
Year dummies	yes	yes	yes	yes
R <sup>2</sup>	0.008	0.075	0.086	0.087
Number of obs.	595222	595222	595222	595222

In order to examine the impact of male and female labor supply on occupational segregation, these imbalances thus provide a valuable source of regional variation that we exploit in our empirical approach.

For the East-West-migration shock to have an effect on occupational segregation in the West, it is necessary to demonstrate that the occupational composition of the inflow is different from the stock. Therefore, we run linear regressions where the dependant variable is the share of women among all employees in region  $k$  at time  $t$ . The outcome variable is explained through a range of person specific individual characteristics as well as a range of local labor market characteristics defined on the level of distinct regional labor market segments (as explained in the following section). We run separate regressions on the female and female worker samples.

The estimated parameters on the individual characteristics as well as the regional macro variables are generally significant and exhibit the expected signs. In particular, for both women and men, the estimates on the East German dummy are negative and significant. This means that if one compares an East-West migrant to a West German resident with otherwise comparable characteristics, he or she will be significantly more likely to be employed in an occupation with a higher share of male workers. This suggests that the migrants are indeed behaviorally different from the incumbent population.

However, as this holds for both female and male East-West migrants, the overall effect of the migrant shock on the occupational segregation index in the West German labor market is a priori indefinite. Thus, further regression analysis on the occupational segregation index is warranted.

Before turning to this empirical analysis, we first need to describe the data on which the occupation segregation measures are constructed, however.

## 4 Data

We use the IAB employment sample 1975-2004 - regional file (IABS-R04) which is described in detail by Drews (2008). This administrative data set contains information on

a 2% sample of the population working in jobs that are subject to social insurance payments. In particular, we have daily information on employment periods and periods for which the individual received unemployment compensation from the Federal Employment Agency.

For the purpose of our analysis, we construct a panel data set based on this spell information by generating one observation per individual and year that contains the employment status, type of job and other individual characteristics as of May 15th of each year.

For each individual in our sample, we construct a dependent variable that indicates the share of female workers in the occupation in the year 1992. Furthermore, we classify individuals depending on whether they work in a male-dominated (female-dominated) occupation or not.

We classify occupations to be female-dominated if the share of female employees that we observe in this occupation in Germany in the year preceding our observation period exceeds 70%. In contrast, occupations with a female workforce of less than 30% are considered as male-dominated occupations. Occupations can be identified up to the 3-digit level and encompass 132 occupation groups. In line with the literature, we find that women are overcrowded in fewer occupations than men (Sorensen, 1990; Lewis, 1996). Thus, only 29 out of 132 occupations are defined as female-dominated according to our definition, while 66 out of the 132 occupations.

For each employment spell, the IABS-R04 contains information on the NUTS3 region of the workplace, i.e. the county level (Kreis). Since individuals need not work and live within the same county, we decided to aggregate the county level information up to functional urban areas, the so called Raumordnungsregionen, (ROR), that lump together three to four counties that are closely linked by commuting ties. In terms of the regional hierarchy, the ROR are between the NUTS2 and the NUTS3 level of aggregation

Table 5: Description of regional indicators at the level of the 74 western planning regions (ROR)

Regional indicator	Description	Source
Services	Number of employees in services per employees in the industrial sector	INKAR <sup>a</sup>
log(GDP)	Log. of gross domestic product	INKAR
Unemployment	Unemployment rate	INKAR
Foreigners	Percentage of foreign population	INKAR
Population	Population in 1,000	INKAR
Population density	Population in 1000 per km <sup>2</sup>	INKAR
High-skilled	Percentage of employees with tertiary education	IAB-R01 <sup>b,d</sup>
Female high-skilled	Percentage of high-skilled employees who are female	IAB-R01 <sup>d</sup>
Male workforce	Percentage of workforce that is male	IAB-R01 <sup>d</sup>
Male jobs	Percentage of jobs that are typically occupied by men <sup>c</sup>	IAB-R01 <sup>d</sup>
Share of eastern women	Share of female employees with east German origin in the local female workforce	IAB-R01 <sup>d</sup>
Share of eastern men	Share of male employees with east German origin in the local male workforce	IAB-R01 <sup>d</sup>

<sup>a</sup> INKAR database (released by “Bundesamt für Bauwesen und Raumordnung (BBR))

<sup>b</sup> IAB-R01 - IAB employment subsample, see text for details

<sup>c</sup> Calculated by applying the national shares of women and men in a particular occupation in 1992 to the contemporary regional structure of occupations.

<sup>d</sup> Indicators based on own calculations

and encompass 79 West German regions.

Based on this regional classification, we merge information on the individual characteristics sex ratio and the regional economic structure. In particular, we merge regional information on the share of industrial jobs, the unemployment rate and the population density in order to control for the regional economic conditions that might also be related to occupational segregation. Since a consistent time-series on the regional information is not available before 1995, we restrict our sample to women during the years 1995 and 2004.

Table 6: Summary statistics of yearly regional indicators at the level of the 74 western planning regions (ROR)

Regional indicator	1995-2004		1995	2004
	Mean	Std. Dev.	Mean	Mean
Share services	1.6	0.61	1.3	1.8
log(GDP)	9.6	0.68	9.5	9.7
Unemployment	8.8	2.44	8.6	9.0
Foreigners	8.7	3.31	8.8	8.5
Population	753.9	518.2	759.3	760.1
Population density	3.4	3.73	3.4	3.4
High-skilled	7.3	2.85	6.3	8.5
High-skilled women	30.9	5.64	29.0	33.7
Male workforce	56.6	2.48	49.6	63.2
Male jobs	56.4	2.61	57.1	55.0
Share of eastern women	1.44	1.08	0.7	2.1
Share of eastern men	1.62	1.22	0.8	2.4

Summary information as regards both the individual and regional level data are shown in the following Tables.

However, the benchmark year for defining occupational segregation remains the start year 1992. Thus, we can compute the occupational dissimilarity index for each regional entity, each year, as well as the decomposition according to equation (7) against the benchmark.

## 5 Empirical Analysis

### 5.1 Empirical Strategy

Our empirical analysis proceeds in two steps. The first step is to show that the segregation index decreases due to a change in the gender composition of the occupations brought about by East-West-migrants. We use regional variation for 74 planning regions in West



Table 7: Descriptives for sample of job moves in western Germany 1995-2004 by sex and origin (mean values)

	Origin	Females		Males	
		west	east	west	east
<b><i>Dependent variable</i></b>					
Female share in previous occupation		66.2	62.7	26.4	18.2
Female share in current occupation		66.0	64.0	27.0	18.8
<b><i>Individual level covariates</i></b>					
Age		33.7	32.7	34.1	33.7
Education (reference: no vocational training)					
Vocational training		0.65	0.73	0.60	0.72
Tertiary education		0.07	0.06	0.09	0.05
Type of job (reference: fulltime)					
Apprenticeship		0.05	0.03	0.04	0.02
Parttime		0.31	0.20	0.08	0.03
Employment history (prior to current job)					
Months not employed		9.41	7.67	6.76759	5.76
Receipt of UB		0.25	0.42	0.328475	0.46
Work experience after 1990		60.7	58.5	64.5341	66.0
Tenure		5.18	5.00	5.20509	4.94
Regionally mobile		0.23	0.56	0.288059	0.65
<b><i>Regional level covariates</i></b>					
Population		1202.2	1118.2	1199.8	1086.5
Pop. density		5.3	5.0	5.3	4.7
log(GDP)		10.2	10.1	10.2	10.1
Unemployment		8.9	8.7	8.9	8.7
Foreigners		10.8	10.3	10.7	10.1
High-skilled		9.2	9.4	9.1	9.2
Female high-skilled		30.5	30.9	30.5	30.7
Services		1.8	1.9	1.8	1.8
Male jobs		56.0	55.6	56.1	56.0
<b>Number of job moves</b>		<b>433,854</b>	<b>16,059</b>	<b>568,965</b>	<b>26,257</b>

Germany, and model the segregation index in region  $k$  of period  $t$  as a function of the regional share of female respectively male workers of East German origin. In addition, we allow for demographic and economic controls on the regional level, as well as a common time trend.

We perform random effects and fixed effects analysis on the regional level, though we present fixed effects results only, as the outcomes are not substantially different.

Table 8: Occupational Segregation (D) for western Germany and its decomposition in a within occupation (G) and an across occupation difference (B) across time

Year	$D_t$	$D_t - D_{92}$	$G_t$	$B_t$
1992	61.5	0.0	0.0	0.0
1992	61.7	0.2	0.1	0.1
1994	61.6	0.1	-0.0	0.1
1995	61.5	-0.1	-0.2	0.1
1996	61.0	-0.5	-0.4	-0.2
1997	60.8	-0.8	-0.4	-0.3
1998	60.1	-1.5	-1.0	-0.5
1999	59.0	-2.5	-1.3	-1.3
2000	58.2	-3.3	-1.6	-1.7
2001	57.7	-3.9	-2.0	-1.8
2002	57.5	-4.1	-2.3	-1.7
2003	57.5	-4.0	-2.5	-1.5
2004	57.6	-3.9	-2.7	-1.3

The regression outcome at this first stage indicate that a higher share of East German workers in the local West German labor market significantly reduces occupation segregation measured local level, whereas the opposite is true for the share of male East German workers. This is consistent with the hypothesis that the migrants predominantly maintain their previous occupation, i.e. both women and men enter markedly more male occupations than otherwise comparable West German workers. As the inflow of female workers is stronger, the effect of East German women entering the West German market dominates, despite the stronger dissimilarity of East and West German male workers.

If one decomposes the dissimilarity index, it becomes evident that the impact of East German women mostly works through the within occupation changes rather than changes in the occupational structure. This means that the occupation dissimilarity index declines through the share of female workers in typically male occupations increasing.

The second step is to analyze potential spill over effects on the West German workforce. In this step, we ask whether West German women are more likely to work in

regions with a high share of East German women.

For the estimations, we use a sample of individual job moves by West German women between 1995-2004. The dependent variable is the share of female employees in the current occupation. The problem of potential endogeneity of location choice of East-West migrants as regards the outcome variable is solved using the distance of the locality from the former boarder as an instrument. This instrument is a strong one according to any standard test.

The estimation outcomes suggest a strong impact of the local presence of East German women on the propensity of West German women to enter a job with a higher share of male workers. Among all German women, a 1 percentage share increase in the local labor market share of East German women raises the average share of male workers in occupations entered by West German women by 0.64 percentage point. The effect is stronger using the IV strategy than plain OLS or FE, which suggests that endogeneity of location choices in East-West migration location is a relevant issue.

For robustness checks, we furthermore check, if the effect differs by age, qualification and labor market attachment. It turns out that the effect is robust across all segmentations of the sample. But in addition, it is clearly stronger for women that are more similar to the East German immigrant, i.e. better educated, younger and full time workers. This reinforces the role model argument.

## 6 Conclusions

The paper has analyzed the sources of declining occupational segregation by gender in West Germany after German re-unification. We focused on the impact of massive, regionally imbalanced inflows of East Germans with distinct labor market attitudes and histories facilitating entry in male dominated jobs.

Our evidence on the basis of administrative panel data that allows control of unobserved heterogeneity shows that the labor supply shock from a growing share of East Germans in the West German work force significantly reduced male-female-imbalance within occupations thus reducing the degree of occupational segregation in the two decades after German unification.

However, it appears that this direct effect has been reinforced by an indirect effect through changes in the behavior of West German women who respond to the presence of East German women in their regional environment. In particular, it appears that West German women have found it less difficult to enter typical male jobs in local labor markets affected by large East-West migration shocks. This holds after controlling for a wide range of macro economic variables and unobserved individual and region characteristics that might pull women into typically more male occupations.

This result has proven robust over a range of specifications. In particular, it goes through if one controls for the possibility of endogenous location choices of the East-West-migrants— distance of location from the former boarder turns out to be a strong instrument in our context.

The fact that the presence of East German women with strong labor market attachment and higher presence in male dominated jobs facilitates entry of West German women into such jobs is evidence for a sizeable spill over effect which supports the hypothesis of a role model effect. This suggests that occupational segregation is not only driven by demand factors, notably employers discrimination, but also by labor supply factors. Yet such labor supply factors appear to go beyond gender specific tastes for certain occupation characteristics.

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Table 9: Fixed effects estimates for dissimilarity index, western Germany 1995-2004 21

	A	B	C	D
	Coeff.	Coeff.	Coeff.	Coeff.
	(p-value)	(p-value)	(p-value)	(p-value)
Share of eastern women		-0.5769*** (0.000)	-0.4810*** (0.000)	-0.3554*** (0.005)
Share of eastern men		0.4698*** (0.000)	0.3084*** (0.009)	0.2233* (0.057)
Male workforce			0.1123 (0.313)	0.3975*** (0.001)
log(GDP)			-3.7216*** (0.005)	-3.3208** (0.012)
Unemployment			0.2673*** (0.000)	0.2184*** (0.001)
Services			-3.4255*** (0.000)	-2.4825*** (0.000)
Male jobs			0.0941** (0.013)	0.1022*** (0.006)
Population				0.0066 (0.204)
Pop. density				-2.4401** (0.041)
Foreigners				0.1091 (0.242)
High-skilled				-0.5120*** (0.000)
Female high-skilled				0.0245* (0.092)
1996	-0.5061*** (0.001)	-0.4664*** (0.002)	-0.4548*** (0.003)	-0.3314** (0.030)
1997	-0.6915*** (0.000)	-0.6320*** (0.000)	-0.5982*** (0.001)	-0.5375*** (0.005)
1998	-1.2256*** (0.000)	-1.1636*** (0.000)	-0.4794*** (0.008)	-0.1001 (0.602)
1999	-2.2027*** (0.000)	-2.1610*** (0.000)	-1.0215*** (0.000)	-0.6149*** (0.004)
2000	-2.9075*** (0.000)	-2.8825*** (0.000)	-1.0683*** (0.000)	-0.6271** (0.017)
2001	-3.3211*** (0.000)	-3.3077*** (0.000)	-1.1388*** (0.000)	-0.5536* (0.076)
2002	-3.4068*** (0.000)	-3.3735*** (0.000)	-0.9500*** (0.007)	-0.1201 (0.741)
2003	-3.3635*** (0.000)	-3.3027*** (0.000)	-0.7530** (0.048)	0.2535 (0.523)
2004	-3.2607*** (0.000)	-3.1916*** (0.000)	-0.3308 (0.441)	0.6968 (0.117)
Constant	64.7312*** (0.000)	64.7584*** (0.000)	90.6850*** (0.000)	73.9837*** (0.000)
$R^2$	0.69	0.70	0.75	0.77

Table 10: Fixed effects estimates for dissimilarity index and its decomposition (specification D from Table 9 only), western Germany 1995-2004

	Seg. Index Coeff. (p-value)	Within Coeff. (p-value)	Between Coeff. (p-value)
Share of eastern women	-0.3554*** (0.005)	-0.2770** (0.022)	-0.0784 (0.195)
Share of eastern men	0.2233* (0.057)	0.1400 (0.207)	0.0834 (0.133)
Male workforce	0.3975*** (0.001)	0.1619 (0.163)	0.2357*** (0.000)
log(GDP)	-3.3208** (0.012)	-2.2535* (0.073)	-1.0674* (0.089)
Unemployment	0.2184*** (0.001)	0.1478** (0.022)	0.0706** (0.028)
Services	-2.4825*** (0.000)	-0.8016** (0.034)	-1.6809*** (0.000)
Male jobs	0.1022*** (0.006)	0.0509 (0.145)	0.0513*** (0.003)
Population	0.0066 (0.204)	0.0051 (0.297)	0.0015 (0.551)
Pop. density	-2.4401** (0.041)	-2.8731** (0.011)	0.4330 (0.444)
Foreigners	0.1091 (0.242)	0.1149 (0.194)	-0.0058 (0.896)
High-skilled	-0.5120*** (0.000)	-0.4432*** (0.000)	-0.0688* (0.091)
Female high-skilled	0.0245* (0.092)	0.0241* (0.080)	0.0004 (0.956)
Constant	73.9837*** (0.000)	18.9102 (0.126)	-6.4702 (0.295)
$R^2$	0.77	0.43	0.85
Number of obs.	740	740	740