The Impact of Immigration on Natives' Wages: Heterogeneity following from Product and Labor Market Regulation

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Abstract

Does product and labor market regulation alter the consequences immigration has on native wages? We exploit German reunification as a natural experiment and compare the wage consequences of the influx of East Germans to West Germany in different labor market segments: one segment without product and labor market regulation, and one segment where product and labor market regulation interact. We find a negative effect of immigration on the wages of native West Germans in the segment with free firm entry into product markets and weak workers' influence in firms' decision making. Natives were shielded from wage losses if firm entry regulation interacted with labor market institutions, implying a strong influence of workers on the decision making of profit-making firms.

Keywords: Immigration, Product Market Regulation, Labor Market Regulation

JEL Classification: J61, L50, J50

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1 Introduction

How does immigration affect natives' wages? This question is not only of interest to economists; policy makers and the general public in host countries alike have long been interested in the topic. Many empirical studies have tried to establish the causal effect of immigration on natives' wages. The inconclusive results, however, have only served to fuel the debate among the different parties. In addition, the debate has led studies to seek an alternative strategy; one that focuses on explaining why empirical studies fail to produce unanimous results. We contribute to this area of the recent literature by proposing differences in the institutional background against which immigration occurs as important determinants of the impact of immigration on natives' wages; studies that fail to take these differences into account average over heterogeneous effects, thereby obscuring effects of immigration on natives' wages one might otherwise observe.

Two institutions determine the background against which immigration occurs in our empirical analysis: a product market regulation that introduces firm entry costs and a labor market regulation that gives workers the right to influence firms' decision making. Our starting point is the standard model, that is, immigration occurs in product markets with free firm entry and without labor market institutions giving workers influence in firms' decision making.[1] In this classical setting, we expect immigrants to exert downward pressure on natives' wages.

We then augment this traditional perspective by asking the following question: "How do the consequences of immigration on natives' wages differ in a setting where regulation hampers firm entry into product markets and labor market institutions give workers a strong influence in firms' hiring, firing and pay scheme decisions?" By doing so, we follow the theoretical literature that investigates how the interaction of product market regulation and labor market regulation affects labor market outcomes.[2] In this theoretical literature product market regulation determines product market competition and

[1] Additional assumptions of this traditional model are: Firms maximize profits and produce goods using immigrant labor, native labor and capital. The production function exhibits constant returns to scale, capital input is fixed, and immigrant and native labor are close substitutes in production.

[2] See Blanchard and Giavazzi, 2003, Seldeslachts, 2008, and Ebell and Haefke, 2006.

thereby firms' profits; and labor market regulation determines the influence workers have on firms' decision making, and thereby the distribution of profits between workers and firms. Building on these arguments, we expect the downward pressure of immigrants on natives' wages to be much weaker in this case than in the non-regulated, classical one.

We exploit the German reunification experiment that led to a large inflow of Germans from the Former German Democratic Republic (called East Germans hereafter) to the West German labor market in the empirical analysis; together with a product market regulation that has its roots in the nineteenth century and a labor market institution that goes back to the 1950s. The product market regulation – the German Trade and Crafts Code – restricts firm entry in a clearly defined set of product markets, and not in others. The labor market institution – the German Works Constitution Act – regulates the conditions under which work councils have to be established in firms. Work councils are the institutions that determine the influence of incumbent workers on firms' decision making.

Owing to a number of unique features, immigration of East Germans to the labor market of the Federal Republic of Germany (West Germany) after the fall of the Berlin Wall in 1989 has attracted considerable attention in the recent immigration literature.[3] One important feature is that East Germans are closer substitutes to West Germans than immigrants to other countries typically are to native workers. They are, for example, Germans with full political and economic rights, that is, they have free access to the German labor market and there are no specific labor market provisions; there are no language difficulties and they are comparably well educated. In addition, the inflow of East Germans to the West German labor market was large; between 1989 and 1999, East Germans increased the labor force in West Germany by 4.1 percent in net terms.[4]

[3]D'Amuri, Ottaviano and Peri (2010), for example, investigate the effect of the immigration of East Germans to the West German labor market and find no detrimental effect on West Germans' wages, a result that is consistent with what we find when not taking the institutional background into account.

[4]A number of studies have analyzed how other groups of immigrants to West Germany have affected the labor market outcome of West Germans. Glitz (2007) investigates the immigration of ethnic Germans to West Germany, the second largest group that immigrated to West Germany after 1989. Glitz does not find a negative wage effect of the inflow of ethnic Germans on West German residents' wages. Importantly for our study, the results suggest that ethnic Germans who migrated to West Germany after reunification are similar to low-educated West Germans in terms of their occupational distribution. This is not surprising given that the ethnic Germans came from countries with education systems that differed substantially

These unique features of the West German immigration experience together with substantial variation of firm entry regulation across product markets and of the relevance of labor market institutions across firm groups provide us with an ideal research design for addressing our research question. The source of data variation that we use for identifying the effects of interest is the differential supply of East Germans across occupation-age cells in the West German labor market and over time after 1989.[5] The experimental nature of German reunification allows us to construct an instrumental variable that accounts for the endogeneity issues that typically plague the causal interpretation of estimates of the effect of immigration on natives' wages such as migrant's self-selection or endogenous employer decisions. The instrumental variable exploits detailed information on the occupation in which East Germans were trained in East Germany before the fall of the Wall in 1989.

The results add to the literature by providing evidence that the impact of East German immigrants on West Germans' wages differ across the different regulatory segments of the labor market we consider. The inflow of East Germans led to a substantial drop in West Germans' wages in the labor market segment with free firm entry and weak workers' influence on firms' decision making (the classical case). In contrast, natives were shielded from wage losses in the regulatory segment of the labor market in which restricted firm entry interacts with a strong influence of workers in firms' decision making. We show the robustness of the results in various respects.

So far, few analyzes in the empirical literature have taken the institutional background against which immigration occurs into account. This is surprising given that there is a literature on the consequences of product market regulation for labor market outcomes and on its interactions with labor market regulation that goes back at least to Krueger and Pischke (1997) or Gersbach (2000). These authors stress the relevance of product market regulation for labor market developments. Blanchard and Giavazzi (2003) provide a well-known theoretical analysis where product market regulation implies rents and labor

from that in West Germany. In addition, German language skills of ethnic Germans are often poor. Other recent studies are Bonin (2005), Felbermayr et al. (2010) and Brücker and Jahn (2010). These studies do not focus on the immigration wave West Germany experienced after 1989.

[5]This is an adapted version of the empirical strategies used, for example, by Friedberg, 2001, Card and Lemieux, 2001, or Borjas, 2003.

market regulation determines their distribution between employers and employees. They show how the existence of product market regulation and labor market regulation as well as the interaction of these institutions influences wages as well as unemployment.

To the best of our knowledge, the study by Angrist and Kugler, 2003, is the only one that considers product market and labor market institutions when it comes to the impact of immigration on natives.[6] Using country-level panel data for European Countries during the 1980s and 90s they implement an instrumental variable strategy to take into account that the location choice of immigrants is endogenous in equations explaining natives' labor market outcomes. They report a negative effect of the immigrant share in the labor force on native employment that is more pronounced in country-years with higher product and/or labor market regulation. As acknowledged by the authors, their empirical strategy does not allow to identify whether the findings are a consequence of differential product market regulation, differential labor market regulation or differential interactions of these regulations across countries - a criticism our research design improves upon.

Our study relates to several strands of the immigration literature which are in search of explanations for why the observed consequences of immigration on natives' wages and employment are often weak. Among the different explanations, the degree of substitution between natives and immigrants has been particulary discussed, for example, in a series of papers following Borjas (2003). The labor supply shock we focus on is one where immigrants are more likely to be close substitutes to native labor than traditional immigrants are.

Other studies suggest that producers adapt their production technologies in response to an inflow of immigrants, which is in line with theories of endogenous technological change. For example, Lewis (2004) examines industries in Miami after the Mariel Boatlift experiment, first analyzed by Card (1990) who finds no detrimental effects of the large, sudden inflow of Cuban immigrants to the Miami labor market. Lewis reports that the industries

[6]In a couple of cross-country studies, labor market institutions are used as the residual culprit when immigrants fared differently in terms of employment and wages across countries. See, for example, Kahn, 2004, or Antecol et al., 2006. Empirical studies that investigate the dependence of labor market outcomes on interactions between product market regulation and labor market regulation, but do not consider immigration or other labor supply shocks, are more numerous. Examples are Nicoletti and Scarpetta (2005) and Griffith, Harrison and Macartney (2007).

adjusted to the influx of the Marielitos by employing more unskilled-intensive production technologies.[7] Peri and Sparber (2009) show that immigration can cause natives taking over different production tasks, thereby reducing downward wage pressure. We will show for some of these adjustment processes that they are not alternative explanations for the different patterns across labor market segments we observe.

The paper is structured as follows. In the next section we discuss the adjustment processes in terms of wages that we expect after the inflow of East Germans to the West German labor market in different regulatory settings. In Section 3, we introduce the labor supply shock that follows from East Germans migrating to the West German labor market after the fall of the Berlin Wall and the collapse of the GDR. We also provide a discussion of the specific product and labor market regulation we are focusing on in this study. In Section 4 we introduce our empirical model and in Section 5 we sketch the data. Section 6 provides the empirical results and we conclude in Section 7.

2 Conceptual Framework

We focus on two regulatory segments of the labor market in our empirical analysis:

1. Employees in product markets without regulatory restrictions to firm entry and in firms with weak workers' influence on firms' decision making (classical labor market segment);

2. Employees in product markets with regulated firm entry and in firms with strong workers' influence in firms' decision making (labor market segment with both regulations);

The first regulatory segment is one where standard models of the immigration literature assuming competitive product and labor markets apply best (see, for example, Borjas

[7]Bodvarsson et al. (2008) also revisit the Mariel Boatlift experiment and investigate another specific adjustment process after the immigration wave. Their findings suggest that the potential negative effect of immigrants was dampened by the fact that immigrants consumed local goods and thereby increased labor demand in the sectors in which they predominantly found work.

1995, 1999). The set up of the models for this classical case is such that real wages are determined by the marginal product of labor.[8] As a result, a labor supply shock owing to immigration of individuals who represent close substitutes in production exerts downward pressure on natives' wage. Further predictions are that the national income increases, and that immigrants and those who use immigrant labor benefit from the labor supply increase. Specifically, a firm paying lower wages due to immigration, but keeping production constant, will ceteris paribus earn higher profits. However, such profits, as well as profits coming from other sources, will not persist in the long run in competitive markets with free firm entry for two reasons: existing firms will expand output production and new firms will enter the market as long as they can expect to earn non-zero profits.[9]

The second case that we consider is the case with product market regulation and labor market regulation interacting. Such interactions are at the core of many theory models, including Blanchard and Giavazzi (2003), Gersbach (2004), Spector (2004), or Seldeslachts (2008). Product market regulation can restrict product market competition by many means. For example, via involvement in production, tariff rates, other regulatory barriers to trade or firm entry regulation. We focus on a firm entry regulation. As we will explain in detail in Section 3.2, the German Trade and Crafts Code restricts firm entry in some product markets, but not in others.[10] In the regulated markets, product market competition is lower and profits are higher, even in the long run with an endogenous number of firms, than in the non-regulated markets.

In a similar vein, labor market institution can have various forms including unemployment insurance, employment protection or minimum wages. We focus in this study on an institution that regulates workers influence directly on firm level decision making. We will explain in Section 3.3, how the German Works Constitution Act regulates the introduction of work councils for one group of firms and not for others. Due to the Ger-

[8]Firms maximize profits and produce goods using immigrant labor, native labor and capital. The production function exhibits constant returns to scale, capital input is fixed, and immigrant and native labor are close substitutes in production.

[9]See, among others, Angrist and Kugler, 2003.

[10]Arguing that market entry for potential entrepreneurs is free in product markets that do not fall under the firm entry regulation of the German Trade and Crafts Code we abstract from other forms of entry costs, such as administrative costs, that apply to both types of product markets to a similar degree.

man Work Constitution Act, incumbent workers participate in wage classifications and re-classifications at the firm level, they have veto rights in hiring and firing decisions and they have to be continuously informed about firm performance and prospective management strategies. Accordingly, the employees, and in particular their representatives in the work councils, are aware of the firm profit situation, including the profit consequences of newly hired East German employees. The representatives of incumbent workers in work councils will only approve personnel measures accompanying new hiring decisions when the incumbents don't loose from it.

The interaction of the firm entry regulation with the labor market institution generally sets the opportunity for a wedge between real wages and the marginal product of labor; and this shields (incumbent) natives from the negative wage effects owing to immigration. Altogether, we expect no negative response of natives' wages to immigration of East Germans in the labor market segment where product and labor market regulation interact.

In addition to these two polar cases, we also consider an intermediate case in the empirical analysis that covers two groups of employees. First, employees in product markets with free firm entry and in firms with strong workers' influence in firms' decision making. Despite strong workers' influence, the wedge between real wages and the marginal product of labor will be small as the level of persistent profits is low in product markets with free firm entry. Firms cannot pass on wage costs surpassing the marginal product of labor to consumers by raising prices if firm entry is free. Firms that try, would be forced out of the market by competitors paying workers according to their marginal product. As a result, there is not much available that could be used for disentangling real wages and the marginal product of labor. Second, employees in product markets with restricted firm entry and in firms with weak workers' influence in firms' decision making. In this group, workers' influence is too weak to lead to a substantial wedge between real wages and the marginal product of labor. Even thought the product market is non-competitive and allows for persistent profits, the labor market is competitive and real wages will reflect the marginal product of labor. Taken together, we expect the response of natives' wages to immigration in this intermediate segment of the labor market to be similar to the response that we observe for the classical case, but to a weaker extent.

Overall, we argue that in some circumstances the conditions in product and labor markets lead real wages to only weakly reflect the marginal product of labor and that this property is then also relevant when the marginal product of labor changes owing to economic shocks. Not taking these conditions in product and labor markets into account when empirically analyzing the impact of economic shocks on wages possibly obscures effects one might otherwise find. We illustrate this point using a huge, non-anticipated labor supply shock owing to immigration of close substitutes in production. The key hypothesis that we test is that natives' real wages are shielded from falling despite this huge labor supply shock (and the resulting decline in natives' marginal product) in the segment of the labor market where product market regulation hampers firm entry and labor market institutions give workers influence in a firm's decision making.

3 Migration, Institutional Background and Wages

3.1 Migration pattern after the fall of the Berlin Wall

Germany was divided after World War II for 45 years. While East-West migration was still common in the first years after the creation of the German Democratic Republic (GDR) in 1949, it was virtually impossible after the Berlin Wall had been built in 1961. After the fall of the Berlin Wall on November 9, 1989, migration from East to West Germany became straightforward again, and massive migration set in.[11] Figure 1 shows the pattern of migration between East and West Germany for the time period between 1985 and 1999. Before 1989 less than 50,000 people came from East to West Germany per year. In 1989 and 1990 the figures increased to about 400,000 people per year. Thereafter, the net inflow to West Germany flattened out due to declining immigration from the East to the West but also due to increasing emigration from the West to the East. Between 1994 and 1999 the gross flows were relatively stable and the net inflow to the West was

[11] Migration of East Germans who fled their home country and reached West Germany indirectly, via Hungary and Austria in most cases, set in a bit earlier as several Central and Eastern European countries neighboring the GDR lifted travel restrictions already in 1988. The majority of the migrants in 1989 came directly from East to West Germany after the break-down of the German-German border in November 1989.

below 50,000 people per year.[12] The massive migration wave between 1989 and 1992 increased the West German labor force by 3.4 percent in net terms and the wave up to 1999 increased it by 4.1 percent (in 1989 the civilian labor force in West Germany was 29.6 million).[13]

This migration pattern in the aggregate administrative data of the Federal Statistical Office of Germany (Statistisches Bundesamt Deutschland) corresponds with the pattern in the survey data that we use for our subsequent empirical analysis (see Section 3.4 for details). In the survey waves of 1992 and 1999, the shares of East Germans among medium-educated employees in the West German labor market are 3.1 and 4.3 percent.[14] Employees with medium education, the ones we focus on in this paper, have a vocational training degree either from the dual system of apprenticeship or a vocational school. In our data, 73.2 percent of all East Germans emigrating to West Germany have medium education;[15] Hunt (2006) reports a similar share of 69 percent using a different data set.

The Germans who migrated after reunification from the East to the West are distinct from "traditional" immigrants in a number of dimensions and they are similar in many respects to native workers in West Germany. They are Germans with full political and economic rights who have free access to the West German labor market any time. In contrast, traditional immigrants often only have restricted work permits or a potential employer has to prove that there is no German worker who could do the job instead. They do not face language barriers. Migrants from East Germany are relatively well educated compared to traditional immigrants and easier to integrate in the West German labor market than

[12] Burda and Hunt (2001) report migration figures between East and West Germany from 1957 onwards and Fuchs-Schündeln and Schündeln (2009) provide migration figures up to 2006.

[13] In the US, the influx of immigrants between 1980 and 1990 was the largest influx since the first decade of the 20th century. This wave increased the immigrant share in total employment by 2.2 percentage points, from 6.7 to 8.9 percent (Jaeger, 2007).

[14] Among employees with high education, those who hold a degree from a university or a technical college, the shares of East Germans in the West German labor market are 3.5 and 3.5 percent in 1992 and 1999. The respective shares of East Germans among employees with low education (neither a vocational training degree nor a higher educational degree) are 3.9 and 3.4 in 1992 and 1999. Note that the immigration shares are at a similar level in all three education groups. Accordingly, the large inflow of East Germans in the West German labor market caused no major shifts of the relative supplies of different types of labor in West Germany.

[15] All the descriptive statistics that we report in this paragraph are for the raw sample of 46,890 employees from the survey waves 1992 and 1999 who have German nationality, spent their youth in Germany, reside in West Germany and report data on education.

traditional migrants. This is because the German Democratic Republic (GDR) had a vocational training system with several similarities to the West German system dating back to the common history of both parts of Germany before World War II. In addition, the reunification contract acknowledged all training degrees from the former GDR. In all these respects migrants from East Germany are closer substitutes to West Germans than traditional immigrants. Altogether, the specific characteristics of East Germans places the labor supply shock that we investigate between the two types of labor supply changes the previous literature focussed on: migration from a foreign country and shifts in birth cohort sizes or changes in female labor force participation (Welch, 1979; Card and Lemieux, 2001).

3.2 Firm Entry Regulation in the German Trade and Crafts Code

The German Trade and Crafts Code regulates firm entry into certain product markets, but not into others.[16] The roots of the law go back to times long before World War II. In 1897, parts of the historical guild system in Germany became institutionalized as a first backlash to the introduction of the freedom of trade ("Gewerbefreiheit") in the German Reich in 1871. In 1908, the master craftsman certificate was imposed on individuals who wanted to train apprentices in one of the regulated occupations ("Kleiner Befähigungsnachweis"), but in 1935 it gained a substantially different role: individuals who wanted to be registered so that they could start a legally independent business in one of the regulated occupations needed a relevant master craftsman certificate ("Großer Befähigungsnachweis"). This firm entry regulation was confirmed in the post-war version of the West German Trade and Crafts Code of 1953.[17] Since then, there were only minor

[16]See the "Handwerksordnung" (HWO, 1953, Fassung 1965) and the "Ergänzende Vorschriften zur Handwerksordnung" and its minor updates up to the end of the 1990s.

[17]See § 1 and § 7 HWO. Exceptions are possible for individuals with skills that are considered to be adequate, but such exceptions were rarely granted during the 1990s. Decisions on exceptions are taken by the public administration with involvement of the Trade and Crafts Chamber ("Handwerkskammer") in charge (§8 HWO, Monopolkommission 1998 und 2001). In addition, there exist some educational degrees that are considered as equivalent to the master degree by law, but are similarly time-consuming to acquire (§7 HWO). Non-incorporated firms can be registered if a fully liable owner holds a relevant master craftsman certificate, in case of incorporated firms the managing director ("Betriebsleiter") has

changes in the regulation that are not relevant for our analysis.[18] In our main estimation sample, the regulated occupations account for about 40 percent of employment.

The set of occupations to which the law applies covers many occupations that were organized as guilds in the Middle Ages and various later additions (Boyer 1990, Deregulierungskommission 1991). Regulated occupations are in fields as diverse as metalworking, food, as well as clothing and textiles. In addition, regulated and unregulated occupations can be in similar fields: for example, confectionary, hairdressing or printing and bookbinding are regulated, but ice cream production, beautician services or copy and paper production are not.

People often envisage firms in this regulated product market as being predominantly small, with the owner being the same person who actually carries out the tasks. This picture is not born by the empirical evidence though. Table 1 shows the firm size distribution in the regulated and unregulated product market. The firms size distribution is remarkably similar across the groups of regulated and non-regulated product markets; in both groups more than 40 percent of the employees work in firms with more than 50 employees.

A person can acquire a master craftsman certificate after several stages of training, collecting work experience, and examination – each stage taking up to several years to complete. First, the individual needs a basic vocational training degree in a relevant occupation; this typically involves two or three years of apprenticeship training ("Lehre und Lehrabschluss"). Second, the individual needs to work in the occupation for several years and has to earn the related journeyman degree ("Gesellenzeit und -brief"). The journeyman degree certifies a high level of vocational training in all occupation-specific tasks and is the formal prerequisite for admission to the master examination ("Meisterprüfung"). In the master exam, a regional committee of five members examines the master candidate and the examination is not public. Three members of the committee are incumbents holding a master craftsman certificate from the same occupation as the candidate (and potential entrant). During the 1980s, the candidates in about 25 percent of all exams

to fulfil the requirement (see § 7 HWO). See Prantl and Spitz-Oener (2009) for further details on the entry regulation in the German Trade and Crafts Code.

[18]The first major revision of the German Trade and Crafts Code after 1953 that altered the set of occupations to which the firm entry regulation applies took place in 2004.

failed (Deregulierungskommission, 1991). Altogether, earning a master craftsman certificate involves a substantial time investment, not only direct costs, like fees for preparation courses.

Proponents of the entry regulation in the German Trade and Crafts Code argue that the regulated markets would work inefficiently or fail without that regulation due to information asymmetries and external effects. They claim that the regulatory benefits are high quality of produced goods and services in the regulated markets, including consumer protection, and training activities providing skilled workers for other segments of the labor market. The German monopoly commission and other German or EU institutions have long since criticized this view (Deregulierungskommission 1991, Monopolkommission 1998 and 2001). At first, they stress that individuals with a journeyman degree have a similar occupational qualification as those with a master craftsman certificate. In addition, they explain that many of the goods that are produced in the regulated markets are standard experience goods. Reputation effects and private training incentives of firms, besides others, should work towards efficient market outcomes regarding product quality and training activities. The firm entry regulation is argued to come with the drawbacks of higher product prices and lower production quantities. In addition, entry and industry dynamics, competition, job creation, innovation and economic growth in the regulated markets should be lower than they would be without that entry regulation.

3.3 Work Councils according to the German Works Constitution Act

The Works Constitution Act ("Betriebsverfassungsgesetz", BetrVG) regulates the rights and obligations of works councils, which are organizations that represent workers' interest at the firm level. In addition, it prescribes, among other things, under which conditions a firm has to establish a work council, the size and the composition of the work council, and in which management organs of the firm members of the work council have to be granted seats.[19] The first Works Constitution Act that was nationally binding in the

[19]The law also regulates that firms have to pay for operating expenditures of the work council, provide office space and office personnel and exempt a certain number of members of the work council from work,

Federal Republic of Germany came into effect in 1952, but the roots of the law go back to the labor movement in the mid-1800s. Back then, there existed many local laws that were typically binding for specific industries before the 1950s, for example, for mining in Bavaria since 1900. The law that was in force during the 1990s dates back to 1972.[20]

The firm has to involve the work council in decisions such as hiring and firing, pay schemes, working hours, and work safety. In the context of our analysis, paragraph 99 of the Work Constitution Act from 1972 is particularly relevant as it regulates the involvement of the work council in human resource measures. Firms with more than 20 employees have to involve the work council in every hiring decision. The work council has to be informed in advance about the consequences of the hiring for the incumbent employees, the targeted wage classification of the vacancy, possible transfer of personnel associated with it etc. The work council has a veto right, in particular, when there is the possibility that owing to the new hiring incumbent workers get fired or have to endure other disadvantages (§99(2)3 BetrVG). In firms with more than 100 employees a work council has to set up an economic committee (Wirtschaftsauschuss) and the management of the firm has to (fully and timely) inform the committee about the current and future economic and financial situation of the firm (§106(1) BetrVG).

Work councils have to be established in firms with more than 5 employees if demanded so by the work force, and the size of the work council then depends on the size of the firm (§9 BetrVG). The empirical evidence shows that work councils are more common in large firms than in small firms. Addison et al. (1997), for example, report that virtually all firms larger than 250 employees have a work council, whereas this is only the case for 1 percent of firms with 5-9 employees.[21] About 92 percent of all employees in firms with more than 50 employees work in firms with work councils and only 18 percent of the employees in firms with less than 50 employees.

Altogether, the institutional details and the empirical evidence support the view that

so that these can devote all their work time to their council duties; the number of exempted council members depends on the council size and thus firm size (§38(1) BetrVG).

[20] See "Betriebsverfassungsgesetz" (BetrVG, 1972).

[21] Beckmann, Föhr and Kräkel (2009), for example, report similar results on the presence of work councils by firm size using an alternative firm data source.

the instruments that determine the workers' involvement in hiring, firing and pay scheme decisions on the plant level in Germany - work councils - are prevalent in large firms, but not so in small firms. This is a feature, that we will use in our empirical analysis.

3.4 Wages in different segments of the West German labor market

As shown in Table 2, West German employees working in small firms that are not subject to the firm entry regulation earned about 7.9 Euros per hour in 1985; by 1999 the hourly wages had increased to 9.4 Euros for this group of workers.[22] In large firms not subject to the firm entry regulation West German employees earned about 9.2 Euros per hour; by 1999 their hourly wages had increased to 11.0 Euros. The mean hourly wages are higher in the corresponding labor market segments with firm entry regulation, although they are comparable in size (between 8.4 Euros in 1985 and 11.5 Euros in 1999). East Germans earn less than West Germans in all survey waves and segments of the West German labor market.

Our data also reflects the development of wage dispersion over time that is typically found in the literature: the standard deviations of wages in the West German labor market showed a stable or slightly declining wage dispersion until the beginning of the 1990s, thereafter wage dispersion has been rising.[23] The standard deviation of real hourly wages paid in the West German labor market is 3.6 Euro in 1985 (mean wage: 8.6 Euro). While the mean wage increases up to the year 1992 and 1999 (9.9 and 10.2 Euros), the standard deviation decreases to 3.5 Euro in 1992 and then increases substantially, to 5.6 Euro in 1999. In addition, Table 2 indicates that the four segment-specific standard deviations decrease or remain nearly constant when moving from the survey wave in 1985 to the one in 1992. Between 1992 and 1998 all segment-specific standard deviations increase, most so for employees in product markets with firm entry regulation and in small firms with weak workers' influence.

[22] The figures are real hourly wages; base year: 1992

[23] (see, e.g. Dustmann, Ludsteck and Schönberg, 2009, or Antonczyk et al., 2010.

4 Methodolody

The empirical model that is now standard in the immigration literature assumes that aggregate output is produced with a CES production function using labor and capital. In addition, it assumes that workers across occupation-age cells are imperfect substitutes in production (see, for example, Card and Lemieux (2001), Borjas (2003) or Ottaviano and Peri (2008) for detailed description of the theoretical framework). The basic empirical specification derived from this framework has then the following form:

$$\log w_{ijgt} = \alpha + \beta p_{jgt} + \varrho_{jg} + \varsigma_{jt} + \tau_{gt} + X_{ijgt} + \nu_{ijgt}. \tag{1}$$

The outcome variable w_{ijgt} indicates the real hourly wage of West German employees, indexed by i, who work in occupation j in the West German labor market, belong to age group g in time period t. Our main explanatory variable, p_{jgt}, is the share of East Germans in a West German occupation-age-time cell.[24] We measure immigration at the age-occupation-level to focus on the effects of immigration of close substitutes that is difficult to escape from: natives can't leave their age group and switching occupations is costly in Germany. The equation also includes the full set of occupation-age interactions ϱ_{jg} to account for different permanent levels of natives' wages across occupation-age cells. Wage changes over time that are specific to occupations are captures by the set of occupation-time interactions ς_{jt}, those specific to age groups are captured by the set of age-time interactions τ_{gt}. The vector X_{ijgt} covers measures of demographic and work-related characteristics of individuals. The error term is denoted by ν_{ijgt} and the coefficient on the immigration measure by β.

Given our main interest, we focus on estimating the following flexible variant of this basic equation with a separate immigration term for each of the three labor market segments that we introduced in Section 2:

$$\log w_{ijgt} = \alpha + \beta^N p_{jgt} N_{ijgt} + \beta^B p_{jgt} B_{ijgt} + \beta^I p_{jgt} I_{ijgt} + N_{ijgt} + B_{ijgt} + C + \nu_{ijgt}, \tag{2}$$

$$\text{with } C = \varrho_{jg} + \varsigma_{jt} + \tau_{gt} + X_{ijgt} N_{ijgt} + X_{ijgt} B_{ijgt} + X_{ijgt} I_{ijgt}.$$

[24] Alternatively, we use the corresponding absolute number of immigrants E_{jgt}.

Employees in the segment of the labor market where both, product and labor market regulation, interact are indexed by B_{ijgt}. Here, workers' influence in firms' decision making is strong due to the German Works Constitution Act and firm entry is restricted due to the German Trade and Crafts Code. Employees in the segment of the labor market where workers' influence in firms' decision making is weak and where firm entry is not restricted are indexed by N_{ijgt}. This non-regulated segment fits with the classical case of textbook immigration models. All other employees are in the intermediate segment, denoted by I_{ijgt}. In this segment either the firm entry regulation applies or strong workers' influence in firms' decision making is in place, but not both. The indicators of the three labor market segments, N_{ijgt}, B_{ijgt}, and I_{ijgt}, are interacted with the measure of the inflow of East Germans into the West German occupation-age-time cells, p_{jgt}.

The coefficients of main interest are β^N, β^B, and β^I. As explained in section 2, we expect the estimate of β^N to be negative. We expect the estimate of β^I to be less negative, but similar to β^N. In contrast to these two coefficients, we expect β^B not to be negative.

Given our model specifications, we identify immigration effects on natives' wages from the combination of variation of the inflow of East Germans across time **and** across age-occupation groups. The β-coefficients reflect differences in wage growth experienced by natives in occupation-age cells with larger or smaller inflows of immigrants. Thus, our individual-level analysis is comparable to a change analysis at the group level, rather than a level analysis (see Friedberg (2001) for a similar discussion).[25] The main advantage of using individual data instead of mean data at the occupation-age-time level is that we can extend the set of explanatory variables to mitigate potential omitted variable biases. Suppose that the inflow of East Germans into occupation-age groups led to a change in the demographic characteristics of West German employees over time and that this change differed across the three labor market segments we are interested in. To deal with the concern that such differences could contribute to the differential effects of immigration that we observe for the three segments, we include the vector of demographic

[25] As group-level analyzes are widely applied in the literature on immigration, we also estimated basic specifications of our empirical model using change regressions at the group level and mean data at the occupation-age-time level, as is, for example, done by Borjas (2003). Taking this approach, we found similar results as reported in Table 3.

and work-related characteristics of individuals, X_{ijgt}, interacted with the indicators of the three segments into our model specifications. The considered characteristics in X_{ijg} are: quadratic polynomials in age as well as in tenure, a dummy for male employees, and interactions between time and the industry of the employer.

Identification and instrumental variation

The core identification issue that we address in this paper is the fact that immigration can be endogenous in equations explaining natives' wages. There are various sources of potential bias to estimates of immigration effects in such equations. Most importantly, East German immigrants arriving in West Germany after the fall of the Berlin Wall may self-select into occupations in the West German labor market based on their anticipation of future profit and wage developments, and hiring decisions of employers may also depend on these cnsiderations.

To deal with endogenous decisions, we implement an IV approach.[26] East Germans may be attracted to occupations in West Germany for which they expect a positive shock and corresponding future wage increases in the age-class relevant to them. In that case of positive covariance between immigration and the error term in natives' wage equations, OLS estimates of the causal effect of immigration on natives' wages would be upward biased. Alternatively, immigrants may get to enter an occupation-age cell easier in case of a negative shock that is accompanied by future wage decreases; OLS estimates would then be downward biased.

The instrumental variation that we exploit follows from the creation of the GDR and the erection of the Berlin Wall in 1961, its sudden, unexpected fall in 1989 and German reunification. Our main instrument, denoted by U_{jgt}, measures the stock of all medium-educated East Germans in age-group g and time period t who received their vocational training in the former GDR in occupation j: it is a weighted count of all employed

[26]Note that the occupation-age interactions included in the empirical specification shown in equation 2 already account for endogenous decisions of immigrants or employers based on time-constant, unobservable heterogeneity of wage levels across occupation-age cells. In addition, the time-varying occupation effects and time-varying age effects included in the specification control for time-varying, unobservable heterogeneity in wage level that is specific to occupations and age groups, respectively. The IV strategy therefore mainly accounts for endogeneity issues that result form immigrants and employers taking time-varying occupation-age-specific wage changes into account.

individuals in age-group g and time period t in East or West Germany who spent their youth in East Germany and have vocational training in occupation j. The weights reflect the relevance of each of these individuals' human capital for working in occupation j. For an individual who actually work in occupation j the weight equals one, for an individual working in an occupation $k \neq j$ it is equal to the share of workers in occupation j in West Germany who moved into that occupation j before 1985 and had human capital specific to occupation k due to a vocational training in occupation k. This is our proxy for the pool of East Germans who exert a push effect on the occupation-age-time cell jgt in the West German labor market. All East Germans who were trained in occupation j have in parts human capital that is specific to that occupation. This part of their human capital tends to be remunerated most in occupation j, in particular so if they combined it with human capital specific to an occupation k that is of high relevance in occupation j. Accordingly, these East Germans are more likely to enter the occupation-age-time cell jgt in the West German labor market than other East Germans.[27]

We argue that the source of instrumental variation that we use is uncorrelated with unobserved factors influencing West Germans' labor market outcomes for the following reasons. First, it is widely know that German reunification came unexpectedly for both East and West Germans. As migration from East to West Germany was effectively impossible during GDR times, East Germans didn't prepare for that. Note also that almost 90 percent of East German migrants in our main sample did their vocational training before 1985.[28] We therefore assume that East Germans didn't take into account the earnings potential or the developments of other labor market outcomes in occupations in West Germany when deciding on their vocational training in the GDR system. Second, the planned economy system in the German Democratic Republic restricted individuals' choice of their training occupation. One political aim of the GDR vocational system was to increase social equality. Children and parents should not choose the same occupation. Finally, the an-

[27] If, for example, there are many East Germans in their early 40th in 1992 who were trained as watch maker, we expect more immigration into age group 40-44 in that occupation in West Germany at that time, relative to the immigration into other occupation-age-time cells.

[28] Assuming that East Germans did their vocational training when they were about 16 years old, the detailed distribution is as follows: 10 percent did their training before 1960, 22 percent during the 1960s, 36 percent during the 1970s, 22 percent between 1981 and 1985, and 10 percent between 1986 and 1990.

nual number of training positions per occupation depended on 5-year production plans and several ad-hoc changes to education policy, and less so on market developments in East Germany or in the main trading partner economies in Eastern Europe and Asia, and even less so in Western economies. Altogether, East Germans were often prevented from choosing a vocational training in line with their preferences and future developments in West Germany were irrelevant to these training decisions in the GDR. The weights that we use to construct the stock of all medium-educated East Germans in age-group g and time period t who received their vocational training in the former GDR in occupation j exploit information on the shares of workers in occupation-age-time cell jgt who entered that cell before 1985 in West Germany and have human capital that is specific to occupation j and k. The different endowments arise due to different training occupations k and the relative importance of these endowments to occupation j are independent of anticipations of future wage developments in occupation j.[29]

We endogenize the terms $p_{jgt} * N_{ijgt}$, $p_{jgt} * I_{ijgt}$, and $p_{jgt} * B_{ijgt}$ in equation 2, estimating two-stage least square regressions. We interact the main instrumental variable described above with the indicators for the three labor market segments, N_{ijgt}, I_{ijgt}, and B_{ijgt}, and use these instruments in the three first stage equations. Accordingly, our identification of immigration effects on natives' labor market outcomes also builds on the additional assumption that the full set of instruments effects immigration into the three labor market segments differentially.

5 Data and Definition of Main Variables

5.1 Data

We use the "Qualification and Career Survey" for the empirical analysis, an employee survey carried out by the German Federal Institute for Vocational Training (Bundesinstitut für Berufsbildung, BIBB) and the Research Institute of the Federal Employment Service

[29]Note that this holds even if the overall level of job mobility into occupation j in West Germany before 1985 is endogenous to anticipations of wage developments in occupation j after the fall of the Berlin Wall.

(Institut für Arbeitsmarkt- und Berufsforschung, IAB). The data source has several advantages for the purposes of our study. First, we can use survey waves before and after reunification, specifically the waves of 1986, 1992 and 1999.[30] Second, we can directly identify East and West Germans in the West German labor market, as well as in the East German labor market, since we have information on both the current residence of survey participants and the region they spent most of their youth in. As East and West Germans both have German nationality, data that only include information on citizenship or nationality do not allow the identification of East Germans in the West German labor market. The fact that we can directly identify the inter-regional migrants we are interested in on an individual level is an important data-related aspect that distinguishes our work from various other recent studies on immigration in Germany.

Third, we have detailed information on the occupation an individual works in when participating in the survey. This information is crucial for separating between employees in product markets with firm entry regulation and in those without. Fourth, we know the occupation in which an employee was trained in. This provides us with instrumental variation that we can use to address the identification problem arising due to potentially endogenous migration decisions. Finally, we can use detailed information on individual characteristics such as age and tenure with the current employer, and we know core employer characteristics such as employer size and industry affiliation.

We focus on individuals in the medium-education category who have a vocational training degree either from the dual system of apprenticeship or a vocational school in the empirical analysis. We thus exclude highly educated individuals with a degree from a university or a technical college and individuals with low education, holding neither a vocational training degree nor a higher educational degree. The main reason for focusing on medium-educated employees is that these employees account by far for the largest fraction of West German employees in the three segments of the labor market we are looking at (between 80 and 88 percent). In addition, medium-educated employees account for the largest group of

[30]The Data Appendix provides further details on the data source and the construction of our samples. Note that the data for the survey waves, here named 1986, 1992 and 1999 for the sake of clarity, have been collected in the winter months 1985/86, 1991/92 and 1998/99. The data have been used many times in the literature, early examples are DiNardo and Pischke (1997) and Harhoff and Kane (1997).

immigrants from East Germany to the West German labor market (see also Section 3.1).[31]

Our main estimation sample includes only individuals in occupations that are accredited by the Ministry of Education (BMBF) and the German Federal Institute for Vocational Training (BIBB). Accredited occupations are all covered by the dual system of apprenticeship, that is, training consists of on-the-job training and school training and there is an official educational degree. Accredited occupations account for 60 percent of total employment in our raw data. This is our population of interest because the German Trade and Crafts Code imposes the firm entry restriction to some of the accredited occupations, but none of the non-accredited occupations. Specifically, the firm entry regulation applies to 38 percent of the total employment in all accredited occupations in our main estimation sample.

All individuals in our estimation samples are 25 to 54 years old, work between 10 and 75 hours per week in West Germany, and report the relevant data for our analysis. As the survey coverage of foreigners varies between waves, we consider only employees in the West German labor market with German nationality and who spent their youth in Germany. In addition to focusing on accredited occupations only, we exclude employees in the public sector, in non-profit organizations or the mining and quarrying sector.

5.2 Definition of Main Variables

Immigration: Migrants from East to West Germany are those survey participants who indicate West Germany as their current residence and who spent most of their youth in the region of the former GDR.[32]

We measure the size of the labor supply shock that hits an occupation (j) and age group

[31] Highly skilled employees are strongly clustered: the share of highly skilled employees is higher than 5 percent of all employees in 8 occupations only, all these are occupations without firm entry regulation. The share of low skilled employees varies between 17 and 11 percent across the labor market segments that we consider. As low education is defined as having no occupational training, we can't construct instruments for this group. As outlined in Section 3.1, the inflow of East Germans in the West German labor market did not cause shifts in relative supply of different education groups in West Germany.

[32] The survey question is "Where did you grow up, that is, where did you spend most of your youth?". The provided answer categories are: East Germany; West Germany; former German territories in Eastern Europe; in a country that belonged to the EU in the year of the survey; in an Eastern European country; or "else".

(g) in time period t in the West German labor market as the share of medium-educated employees in the cell that grew up in the East, i.e.

$$p_{jgt} = \frac{E_{jgt}}{N_{jgt}} \tag{3}$$

where E_{jgt} is the number of medium-educated employees that grew up in the East and now work in cell jg in West Germany, and N_{jgt} is the total number of medium-educated employees in cell jg at time t. In addition, we use the immigrant number E_{jgt} as an alternative immigration measure to make sure that our empirical results are not only driven by changes of the denominator, the total number of employees N_{jgt}. For the survey wave that we observed before German reunification (the one of 1986), E_{jg1986} and p_{jg1986} are equal to zero. We classify employees into the following six age groups: 25-29, 30-34, 35-39, 40-44, 45-49, and 50-54. The occupation classes that we use are 21 grouped 3-digit or 2-digit occupation classes with firm entry regulation, and 22 occupation classes without firm entry regulation.

Instrument: Our main instrument, denoted by V_{jgt} is a measure of the stock of all medium-educated East Germans who work in age-group g in East or West Germany in time period t and received an initial vocational training degree in the former GDR that is relevant for occupation j.[33] it is a weighted count of all employed individuals in age-group g and time period t who work in *any* occupation in East *or* West Germany, who spent their youth in East Germany and hold one of the vocational training degrees represented among East Germans employed in occupation j. Across all sampled occupations, on average 8 different training degrees are represented per occupation. The weights reflect the relevance of each of these individuals' human capital for working in occupation j. For an individual working in an occupation $k \neq j$ it is equal to the share of East German workers in occupation j who switched to occupation j and had human capital specific to occupation k due to a vocational training in occupation k, for those who work in occupation j the weight equals one. This measure of the stock of East Germans is our proxy for the pool of East Germans who exert a push effect on the occupation-age-time

[33]The data set that we use for constructing the instruments covers 5.214 East Germans in the survey waves 1991 or 1998; 12 percent of these East Germans report living in West Germany.

cell jgt in the West German labor market (see section 4 for further discussion).

As an alternative instrument, we construct a related measure: it is a weighted count of all employed individuals in age-group g and time period t who work in *any* occupation in East *or* West Germany, who spent their youth in East Germany and received their vocational training specifically in occupation j.

Product market regulation: The German Trade and Crafts Code enumerates the occupations for which it regulates firm entry. We can identify the regulated occupations using the occupation codes included in the data set. The codes follow the 3-digit classification of occupational titles of the Federal Employment Bureau (BA) in the version of 1988 with 334 occupational classes. Our entry regulation measure thus is a dummy variable equal to one for occupations falling under the firm entry regulation, and zero otherwise.[34]

Labor market institution: Through work councils, the German Works Constitution Act imposes a stronger degree of workers' involvement in firm hiring, firing, and pay scheme decisions in large than in small firms. As outlined in Section 3.3 about 92 percent of all employees in firms with more than 50 employees work in firms with work councils, whereas only 18 percent of the employees in firms with less than 50 employees do so. Based on this evidence, we define a dummy variable that is equal to one for employees working in firms with more than 50 employees (proxying a strong influence of workers in a firm's decision making) and zero for employees in firms that have less than 50 employees (proxying a weak influence of workers in a firm's decision making).

Wages: Our main dependent variable is the logarithm of the real hourly wage for West Germans (in Euros; base year: 1992). The survey data contains information on monthly gross earnings, rank-ordered into 18 brackets. To calculate hourly wages for a worker, we divided the midpoint of the monthly earnings bracket of that worker by the worker's usual hours of work per month.[35] Hourly wages are then deflated to 1991 values using

[34]For robustness analyzes, we also use an industry-level measure of firm entry regulation exploiting survey data on entrepreneurs, their occupations and the 2-digit industries their firms are active in. Per 2-digit industry, we calculate the share of entrepreneurs who indicate that they are active in an occupation with firm entry regulation and encode our industry-level entry regulation measure with one if the share is higher than one half, and zero otherwise.

[35]Comparable procedures have often been used in the literature. See, for example, DiNardo and Pischke

the consumer price index.

Other variables: Further demographic, educational and work-related variables are relevant for our empirical analysis. To capture influences of individual heterogeneity on wages in our main regressions we use the following variables: age in years, gender (coded one for men, zero for women), and tenure with the current employer.[36] We also use an indicator that takes the value one for employees with supervisory functions, and zero otherwise, and an indicator for employees who perform non-routine analytical tasks at the workplace. This measure is coded one for employees who are active in researching, analyzing, evaluating and planning, making plans and constructions, and designing, and zero otherwise (see Spitz-Oener (2006) for related task measures).

Appendix Tables A-1- A-3 show descriptive statistics of the variables described in this section. As we identify immigration effects on natives' wages using data variation across occupation-age-time cells, it is an important prerequisite for our study that the wage profile as well as the immigration pattern vary sufficiently along these dimensions. The descriptive statistics in Tables A-2 and A-3 are in line with substantial and overlapping variation in both the labor supply shock following from East Germans' migrating to West Germany and West Germans' real hourly wages across occupation-age-time cells.

6 Results

- outdated text, tables new

In Table 3, column (1), we investigate the average effect of immigration on natives' wages by estimating the standard empirical specification in the migration literature (see Equation 1).[37] The OLS regression results indicate a negative correlation between the immigration of East Germans to West Germany and West Germans' wages that is weakly

(1997) or Entorf and Kramarz (1997).

[36]The tenure measure is based on the answers to the survey question "In which year did you start working for the current employer?". We define tenure as the survey year minus the year the survey participant started to work for the current employer.

[37]All results in this section allow standard errors to be correlated between employees within the same occupation-age cell. In addition, observations are weighted to take account of the sampling design of the data set.

significant at the 10-percent level. If we allow for endogeneity of the immigration measure in an IV regression, the resulting second stage estimates (see column (2)) indicate no effect of East Germans' immigration to West Germany on West Germans' wages.[38] Similar results have typically been found in the previous literature.

To explore how the West Germans' wage response varies with our measure of product market regulation, we partition the labor market into the segment of employees working in occupations with the firm entry regulation based on the German Trade and Crafts Code (regulated firm entry (R)) and the segment of those working in occupations without that regulation (free firm entry (F)). The two dummies defining the two types of product markets enter the estimation equation interacted with the immigration measure, as well as interacted with all individual characteristics.[39] The estimated coefficients in the IV regression in Column (4) of Table 3, as well as those in the OLS regression in Column (3), indicate a negative impact of East Germans' migrating to West Germany on West Germans' wages in non-regulated product markets, but no effect in product markets with firm entry regulation.[40]

In Columns (5) and (6) of Table 3, we take workers' influence in firms' decision making into account and partition the labor market into the segment of employees working in small firms and the segment of those working in large firms. We interact the two firm size dummies with the immigration measure, as well as with the individual characteristics. In addition, we also add the small firm indicator to the set of explanatory variables.

[38]The corresponding first stage estimates are shown in column (1) of Table 4. We find a positive and strongly significant partial correlation of our main instrument, the stock of East Germans in age group g in year t in all occupations with the relevant training for occupation j, with our immigration measure, the share of East Germans in age group g working in West Germany in the occupation j in year t. At the bottom of column (1) in Table 4, we report the F-test on the significance of the instrument excluded from the second-stage equation, and the F-test statistic of 31.38 supports the view that the instrument has substantial predictive power in the first stage regression. In addition, we can reject the null hypothesis of the 2SLS bias exceeding 10 percent of the OLS bias using a Stock-Yogo test on weak instruments (Stock and Yogo, 2005).

[39]Adding the dummy for occupations with firm entry regulation is not necessary as individual (time-varying) occupation effects are already taken into account in our model specification.

[40]The corresponding first stage estimates are shown in columns (2) and (3) of Table 4. As instruments, we use the main instrument interacted with the two dummies defining the two types of product markets. For each instrument, we find a positive and strongly significant partial correlation with the immigration term that is specific to the respective segment of the labor market. The results for the F-tests, as well as the Stock-Yogo test on weak instruments, support the view that the instruments are sufficiently strongly correlated with the immigration measures to allow for identification of the effects of interest.

According to the estimated coefficients in the IV regression in column (6) of Table 3, as well as those in the OLS regression in column (5), the impact of East Germans' migrating to West Germany on West Germans' wages is negative in small firms, but not statistically different from zero in large firms.[41]

Table 5 shows the results when estimating specification 2 that is at the core of our interest. The OLS estimates in Column (1) show that the inflow of East Germans is significantly negatively correlated with West Germans' wages in the non-regulated, classical labor market segment (coeff. -0.6487, s.e. 0.2233), that is, for employees working in product markets with free firm entry and in firms with weak workers' influence in firms' decision making. The coefficient for workers in the intermediate segment is also negative, but not precisely estimated (coeff. -0.1566, s.e. 0.1185). The coefficient for employees in product markets with restricted firm entry and in firms with strong workers' influence in firms' decision making is positive and statistically insignificant (coeff. 0.3155, s.e. 0.2310).[42] In column (2) we include demographic and work-related employee characteristics, interacted with the indicators of the three labor market segments, as additional explanatory variables to account for compositional changes of workers in occupation-age-time cells that differ across the three labor market segments. The individual characteristics that we use are: quadratic polynomials of age as well as tenure and a gender dummy. The results that we find for the immigration variables in column (2) are similar to those in column (1).[43]

In columns (3) to (5) we address the issue of potentially endogenous immigration of East Germans to the three considered segments of the West German labor market. We estimate two-stage least squares regressions (2SLS) using an identification strategy that

[41]The corresponding first stage estimates are shown in columns (4) and (5) of Table 4. As instruments, we use the main instrument interacted with the two firm size dummies. For each instrument, we find a positive and strongly significant partial correlation with the respective immigration term. The results for the F-tests, as well as the Stock-Yogo test on weak instruments, support the view that the instruments are sufficiently strongly correlated with the immigration measures to allow for identification of the effects of interest.

[42]In addition to our preferred model specifications where we distinguish between three labor market segments we also estimated specifications where we treat the two sub-groups in the intermediate segment separately. Both the OLS and IV regressions provide similar results for the non-regulated segment and the segment influenced by both regulations when considering four different groups in the specification. In addition, the coefficient estimates for the two intermediate groups are never significantly different from each other.

[43]Note that our main results are also robust to estimating model specifications where we allow the effect of the individual characteristics to vary over time.

involves our main instrument, the stock of East Germans in age group g in year t in all occupations with the relevant training for occupation j, interacted with the indicators of the three labor market segments. The first stage results corresponding to the second stage results in column (3) of Table 5 are in Table 6. In column (1) of Table 6, for example, we observe strong significance of the positive partial correlation between the instrument specific to the non-regulated labor market segment and the immigration term specific to that labor market segment. In columns (2) and (3), we see corresponding patterns for the two other labor market segments. Most off-diagonal partial correlations are insignificant, two are weakly significant. At the bottom of Table 6 the results of the F-tests on the significance of the instruments excluded from the second-stage equation are given; the F-test statistics range between 11.14 and 26.82. These results suggest that the instruments have sufficient predictive power in the first stage regressions. In addition, we can reject the null hypothesis of the 2SLS bias exceeding 10 percent of the OLS bias using a Stock-Yogo test on weak instruments (Stock and Yogo, 2005).

The second stage results for our main IV model specification are in column (3) of Table 5. We find a negative impact of East German migrants on West Germans' wages in the non-regulated labor market segment (coeff. -1.1132, s.e. 0.4603); the size of this effect is large: a 1 percent increase in employment owing to East Germans migrating to West Germany led to an about 1 percent decline in West Germans' wages.[44] The estimated coefficient specific to the intermediate labor market segment is negative and not statistically different from the one for the non-regulated segment, albeit being individually insignificant (coeff. -0.06571, s.e. 0.5514). In contrast, the estimated coefficient specific to employees in the labor market segment influenced by both regulations is positive, not individually significant and significantly different from the negative coefficients specific to the two other labor market segments (coeff. 0.5416, s.e. 0.5723).[45]

[44]Net East-West migration between 1989 and 1999 increased the West German labor force by 4.1 percent (The size of the labor force in 1989 was 29.633 million and 1204297 people migrated from East to West between 1989 and 1999 in net terms). This implies that the wage elasticity, evaluated at the mean labor supply increase owing to immigration, is $\frac{-1.1132}{1.041^2}$, which is equal to -1.027 (see Borjas, 2003).

[45]In columns (4) and (5) we provide the second stage results for two variants of our main model specification that are qualitatively similar to those reported so far. In the model specification of column (4) we follow Friedberg (2001) and use as main instrument the share of East Germans in age group g in year t in all occupations in West Germany with the relevant training for occupation j. In Column (5)

Our IV approach provides us with evidence for positive covariance between the inflow of East Germans' to West Germany and the error term in the equation explaining West Germans' wages. The difference between the coefficient estimates for the non-regulated labor market segment, as well as the intermediate one, in columns (2) and (3) of Table 5 are in line with East Germans entering thriving occupation-age cells with a higher propensity than others, with the OLS estimate being upward biased and the negative impact of immigrants on natives' wages being underestimated in absolute terms in column (2). As, instead, the coefficient estimate specific to employees in the labor market segment influenced by both regulations in column (3) is larger in absolute terms than the corresponding estimate in column (2), the changes in the coefficient estimates when moving from OLS to IV are also in line with an attenuation bias towards zero in the OLS regression, caused by measurement error.

Altogether, and in line with our expectations, we find a sizable negative impact of East Germans migrating to West Germany on the wages of West German employees in product markets with free firm entry and in firms with weak workers' influence in firms' hiring, firing and pay scheme decisions. In contrast, West Germans' wages are shielded most from such negative consequences if product market regulation in the form of the firm entry restriction considered here interacts with a labor market institution that gives workers a strong influence in firms' decision making. The restriction imposed on firm entry allows for persistent profits and strong workers' influence in firms' decision making allows native workers to capture some of the profits, thereby avoiding negative consequences from immigration.

we use the main instrument as in column (3), but do not consider individual employee characteristics as explanatory variables.

Extensions

Differential task specialization of natives across labor market segments

In section 2 we considered firms producing goods using immigrant and native labor, with immigrants and natives in the same occupation-age cell being close substitutes in production. If, however, immigrants and natives in one occupation-age cell are imperfect substitutes with regard to their production tasks, if natives specialize in different tasks than immigrants in response to an immigrant inflow, and if these tasks natives' move into are highly remunerated this could mitigate negative consequences of immigration on natives' wages.[46] Our finding of differential responses of natives' wages to immigration in different labor market segments might rather be a consequence of differential specialization of natives' taking place than of differential product and labor market regulation. In particular, natives' in product markets with firm entry regulation and in large firms with strong workers' influence might be more likely than natives' in other labor market segments to take over supervisory tasks or non-routine analytical tasks with high remuneration, handing over other complementary non-routine and routine tasks to the immigrants entering their occupation-age cell. The idea that task specialization in a labor market segment that includes only workers in large firms might differ systematically from other segments can be derived from the literature that aims at explaining a positive correlation between firm size and wages (see, for example, Brown and Medoff, 1989, Idson and Oi, 1999, Oi and Idson, 1999). To explore the explanatory power of this alternative explanation for our empirical findings we estimate model specifications where we explain the probability of West German employees undertaking supervisory activities as well as the probability of employees performing non-routine analytical tasks using our measures of the inflow of East Germans into West Germany, interacted, as above, with the indicators for the three labor market segments we are interested in. The estimation results are reported in Table **??**. We find, in particular in the IV regressions in columns (2) and (4), no indication of natives' task specialization in response to immigration being differential across the three labor market segments. This does not imply that we see no indication of production tasks changing in response to immigration at all, but there is not effect

[46]Such a mechanism has been investigated by Peri and Sparber (2009), among others.

heterogeneity across the considered labor market segments. In particular in column (4), all segment-specific coefficients are positive and at a similar level.

In columns (1) and (2) of Table 7 we refine our preferred model specifications from columns (2) and (3) in Table 5 by extending the vector of individual characteristics that we control for. We add the dummy for supervisory tasks and the one for non-routine analytical tasks. The estimation results for these model specifications confirm the heterogeneity in natives' responses to immigration that we reported above. If we reduce our estimation sample to those 12,495 West German employees in the West German labor market who perform neither supervisory nor non-routine analytical tasks, our main results are again confirmed.

Differential growth of native employment across labor market segments

Second, we address the concern that our main findings reported above could be driven by differential demand developments and growth perspectives across the three labor market segments not captured by industry-time or occupation-time interactions. Following Borjas (2003), we introduce as additional regressors the logarithm of the size of the native workforce per occupation-age-time cell interacted with the dummies for the three labor market segments.[47] Columns (1) and (2) in Table **??** provide the OLS as well as the IV results. The estimated coefficients for the immigration terms are in line with our previous findings, suggesting that these indeed capture the differential impact of the inflow of East Germans in West Germany on West Germans' wages across the regulatory labor market segments, not the effects of differential demand developments and growth perspectives.

Modified separation between product markets with and without firm entry regulation

Our measure of firm entry regulation separates employees with occupations to which the firm entry regulation of the German Trade and Crafts Code applies from those employees where this is not the case. One concern with this measure is that our empirical results could be influenced by glass blowers working for IT firms, beauticians working for a hair saloon, or other employees with a regulated occupation working for a firm with a primarily non-regulated market activity and vice versa. In Table 8, columns (1) and

[47]Note that these control variables are potentially endogenous in natives' wage equations. We do, however, not expect these to bias the IV estimates of our segment-specific immigration effects since our instruments should have no direct effect on the size of the native workforce (see Angrist and Kugler, 2003).

(2), we address this issue by applying a stricter separation between the labor market segment of employees in product markets with firm entry regulation, and in those product markets without it. The stricter separation is implemented by applying an industry-level measure in addition to the occupation-level measure of firm entry regulation. The industry level entry regulation measure is coded one for 2-digit industries where the share of entrepreneurs who indicate entrepreneurial activity in an occupation with firm entry regulation between 1985 and 1999 is higher than one half, and zero otherwise. We use this measure to restrict the estimation sample to the sub-sample of 14,210 employees who either work in occupations with firm entry regulation and in industries with more than 50 percent of all entrepreneurs with regulated entrepreneurial activity or who work in occupations without firm entry regulation and in industries with less than 50 percent of all entrepreneurs with regulated entrepreneurial activity. Re-estimating our preferred model specification from columns (2) and (3) in Table 5, we find our main estimation results to remain robust to applying the stricter separation between product markets with firm entry regulation and those without it. A related concern could be that very large firms, those with 1000 employees or more, are the most likely candidates for activity in many product markets, partly markets with firm entry regulation and partly not. Accordingly, classifying their employees into one of the three labor market segments we are interested in introduces noise. We, thus, re-estimate our preferred model specification on the sub-sample of 15,879 employees in firms with less than 1000 employees. As shown in columns (3) and (4) of Table 8, our main estimation results remain very stable in these regressions.

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Figures and Tables

Figure 1: Migration between East and West Germany, 1985-1999

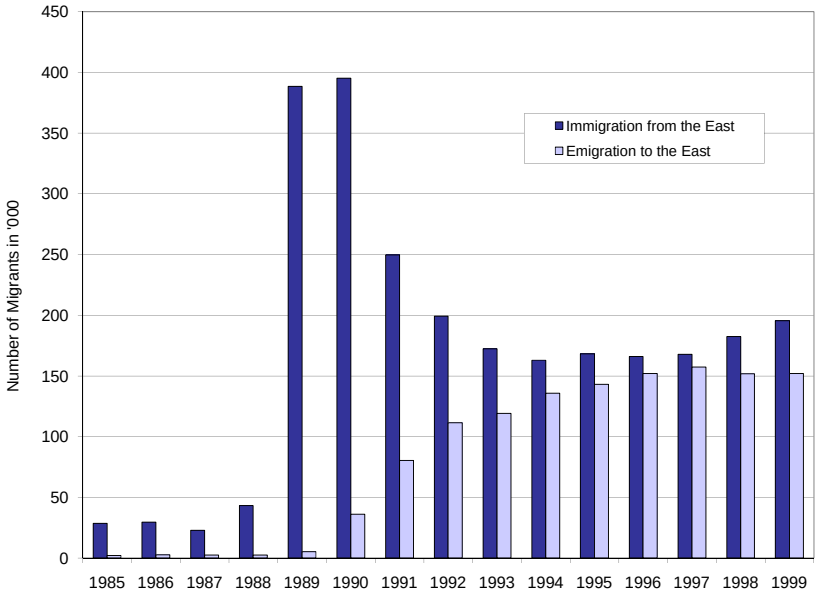

Table 1: Distribution of Employees across Firm Size

Number of Employees	Product Market without Firm Entry Regulation	Product Market with Firm Entry Regulation
1-4	11.42	8.02
5-9	16.43	17.44
10-49	28.69	31.66
50-99	11.51	9.21
100-499	17.63	15.71
500-999	4.56	5.00
1000 or more	9.77	12.97

Notes: This table shows the distribution of West German employees across firm size in product markets with regulated firm entry and product markets without regulated firm entry in 1991 and 1999. The calculations are based on the main estimation sample of 17,970 employees who have medium education, are 25 to 54 years old, have German nationality, spent their youth in West Germany, work between 10 and 75 hours per week in West Germany, and report the relevant data for our analysis. Excluded are employees in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

Table 2: Mean Real Hourly Wages of East and West Germans in the West German Labor Market

	West Germans			East Germans	
	1986	1992	1999	1992	1999
Workers in Product Markets without Firm Entry Regulation and...					
with Weak Workers' Influence	7.86	8.97	9.41	8.30	8.09
	(3.57)	(3.87)	(6.44)	(3.21)	(2.75)
with Strong Workers' Influence	9.18	10.54	11.01	9.95	10.06
	(4.02)	(3.51)	(5.62)	(3.09)	(3.83)
Workers in Product Markets with Firm Entry Regulation and...					
with Weak Workers' Influence	8.35	9.39	9.61	9.09	9.29
	(2.95)	(2.73)	(3.70)	(2.85)	(4.01)
with Strong Workers' Influence	9.18	10.71	11.52	9.82	10.85
	(2.71)	(2.76)	(3.66)	(2.80)	(3.57)

Notes: In this table, we report the means of real hourly wages in 1991 Euros in different segments of the West German labor market per survey wave (standard deviations are in brackets). Calculations are based on a sample of 29,401 East and West German employees in the West German labor market who have medium education, are 25 to 54 years old, have German nationality, spent their youth in East or West Germany, work between 10 and 75 hours per week in West Germany, participate in the survey waves 1986, 1992 or 1999, and for whom all relevant information is available.

Table 3: The Impact of East German Immigrants on West Germans' Wages, OLS and Second Stage Estimates

	Dependent Variable: Log Real Hourly Wages$_{jgt}$					
	OLS	OLS	OLS	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory Variables:						
Share(East Germans, S(EG))$_{jgt}$	-.118			-.822		
	(.127)			(.610)		
Unregulated Firm Entry (U) * S(EG)$_{jgt}$		-.341*			-1.663*	
		(.179)			(.868)	
Regulated Firm Entry (R) * S(EG)$_{jgt}$		.073			.456	
		(.152)			(.823)	
Weak Workers' Influence (W) * S(EG)$_{jgt}$			-.397**			-1.405**
			(.166)			(.587)
Strong Workers' Influence (S) * S(EG)$_{jgt}$			.156			.123
			(.162)			(.775)
Small Firm Indicator			-.106***			-.085***
			(.012)			(.017)
Age-Occupation Effects	Yes	Yes	Yes	Yes	Yes	Yes
Occupation-Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Age-Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
F-test: β^R=β^U (p-value)		.085			.099	
F-test: β^W=β^S (p-value)			.011			.053
Weak identification test:						
Kleinbergen-Paap rk Wald F Statistic				39.03	9.90	19.62
Observations	17,776	17,776	17,776	17,776	17,776	17,776

Notes: In this table we provide OLS and IV estimates of wage equations for our main sample with 17,776 observations on West German employees in the West German labor market. See Table 4 for first stage results corresponding to columns (4)-(6). Observations are weighted to take account of the sampling design. Robust standard errors in parentheses allow for correlation between observations within occupation-age cells. Statistical significance at the 1% (5%, 10%) level is indicated by *** (**,*).

Table 4: First Stage Results for Table 3, Columns (4)-(6)

	Dependent variables:				
	$S(EG)_{jgt}$	$R*S(EG)_{jgt}$	$U*S(EG)_{jgt}$	$W*S(EG)_{jgt}$	$S*S(EG)_{jgt}$
	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Explanatory Variables:					
Share(East Germans (S(EG))	.0015***				
with relevant training)$_{jgt}$	(.0003)				
Unregulated Firm Entry (U)*		.0001	.0014***		
S(EG, rel. train.)$_{jgt}$		(.0001)	(.0003)		
Regulated Firm Entry (R)*		.0013***	.0001		
S(EG, rel. train.)$_{jgt}$		(.0004)	(.0001)		
Weak workers' influence (W)*				.0012***	.0002*
S(EG, rel. train.)$_{jgt}$				(.0002)	(.0001)
Strong workers' influence (S)*				.0003*	0.0012***
S(EG, rel. train.)$_{jgt}$				(.0002)	(0.0002)
Firm size indicator	No	No	No	Yes	Yes
Age-occupation effects	Yes	Yes	Yes	Yes	Yes
Age-time effects	Yes	Yes	Yes	Yes	Yes
Occupation-time effects	Yes	Yes	Yes	Yes	Yes
Industry-time effects	Yes	Yes	Yes	Yes	Yes
F-test: exl. instruments (p-value)	26.74(.00)	6.97(.00)	8.91(.00)	34.62(.00)	34.41(.00)
Observations	17,776	17,776	17,776	17,776	17,776

Notes: In this table we provide estimates of the first stage equations for the models in columns (3)-(6) of Table 3. All specifications use the main sample with 17,776 observations. Observations are weighted to take account of the sampling design. Robust standard errors in parentheses allow for correlation between observations within occupation-age-group cells. Statistical significance at the 1% (5%, 10%) level is indicated by *** (**,*).

Table 5: The Impact of East German Immigrants on West Germans' Wages by Labor Market Segment, OLS and Second Stage Estimates

	Dependent Variable: Log Real Hourly Wages$_{jgt}$					
	OLS	OLS	IV	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory Variables:						
Weak Workers' Influence (W)*Unregulated Firm	-.580**	-.634***	-1.961**			
Entry (U)*Share(East Germans, S(EG))$_{jgt}$	(.254)	(.231)	(.785)			
Strong Workers' Influence (S)*U*S(EG)$_{jgt}$	.024	-.0001	-1.092			
	(.221)	(.216)	(1.167)			
W*Regulated Firm Entry (R)*S(EG)$_{jgt}$	-.215	-.177	.110			
	(.203)	(.198)	(.819)			
S*R*S(EG)$_{jgt}$	.302	.248	1.319			
	(.233)	(.214)	(.921)			
Classical Labor Market Segment (C)*				-.675***	-1.634**	-1.984**
Share(East Germans; S(EG))$_{jgt}$				(.228)	(.663)	(.789)
Intermediate Labor Market Segment (I)*				-.092	-.651	-1.138
S(EG)$_{jgt}$				(.147)	(.747)	(1.161)
Labor Market Segment with Both				.275	.838	.507
Regulations (B)*S(EG)$_{jgt}$				(.216)	(.833)	(.987)
Segment-Specific						
Individual Characteristics	No	Yes	Yes	Yes	Yes	Yes
Age-Occupation Effects	Yes	Yes	Yes	Yes	Yes	Yes
Age-Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Occupation-Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
F-test: $\beta^{SU}=\beta^{WU}$ (p-value)	.041	.024	.345			
F-test: $\beta^{WR}=\beta^{WU}$ (p-value)	.267	.143	.082			
F-test: $\beta^{WR}=\beta^{SU}$ (p-value)	.420	.547	.432			
F-test: $\beta^{SR}=\beta^{WU}$ (p-value)	.012	.007	.009			
F-test: $\beta^{SR}=\beta^{SU}$ (p-value)	.380	.409	.125			
F-test: $\beta^{SR}=\beta^{WR}$ (p-value)	.083	.125	.090			
F-test: $\beta^{I}=\beta^{B}$ (p-value)				.139	.049	.049
F-test: $\beta^{I}=\beta^{C}$ (p-value)				.024	.244	.366
F-test: $\beta^{C}=\beta^{B}$ (p-value)				.003	.011	.010
Hansen J statistic (p-value)					.404	

Table 6: First Stage Results for Table 5, Columns 5

Explanatory Variables:	Dependent variables: W*U*S(EG)$_{jgt}$ OLS (1)	Intermed.*S(EG)$_{jgt}$ OLS (2)	S*R*S(EG)$_{jgt}$ OLS (3)
S*U*	.0003	.0013***	-.00002
S(EG, relevant training)$_{jgt}$	(.0002)	(.0002)	(.00006)
S*R*	.00004	.0002	.0013***
S(EG, relevant training)$_{jgt}$	(.00007)	(.0002)	(.0002)
W*U*	.0012***	.0003	.00001
S(EG, relevant training)$_{jgt}$	(.0002)	(.0002)	(.00006)
W*R*	.00002	.0013***	.00009
S(EG, relevant training)$_{jgt}$	(.00007)	(.0003)	(.0002)
Segment indicators	Yes	Yes	Yes
Segment-specific individual characteristics	Yes	Yes	Yes
Age-occupation effects	Yes	Yes	Yes
Age-time effects	Yes	Yes	Yes
Occupation-time effects	Yes	Yes	Yes
Industry-time effects	Yes	Yes	Yes
F-test: exl. instruments (p-value)	17.71(.00)	20.48(.00)	13.19(.00)

Table 7: Extension II: The Impact of East German Immigrants on West Germans' Wages; Alternative Models; OLS and Second Stage Estimates

	Dependent Variable: Log Real Hourly Wages$_{jgt}$			
	OLS	IV	OLS	IV
Explanatory Variables:	(1)	(2)	(3)	(4)
Classical Labor Market Segment (C)*	-.787***	-1.860***	-.669***	-1.452**
Share(East Germans; S(EG))$_{jgt}$	(.278)	(.720)	(.238)	(.625)
Intermediate Labor Market Segment (I)*	-.016	-.904	-.082	-.507
S(EG)$_{jgt}$	(.166)	(.882)	(.160)	(.835)
Labor Market Segment with Both	.229	.655	.456	.789
Regulations (B)*S(EG)$_{jgt}$	(.256)	(.951)	(.261)	(.930)
Segment Indicators	Yes	Yes	Yes	Yes
Segment-specific individual characteristics	Yes	Yes	Yes	Yes
Age-Occupation Effects	Yes	Yes	Yes	Yes
Age-Time Effects	Yes	Yes	Yes	Yes
Occupation-Time Effects	Yes	Yes	Yes	Yes
Industry-Time Effects	Yes	Yes	Yes	Yes
F-test: $\beta^I=\beta^B$ (p-value)	.379	.054	.079	.098
F-test: $\beta^I=\beta^C$ (p-value)	.015	.325	.034	.264
F-test: $\beta^C=\beta^B$ (p-value)	.008	.022	.002	.024
Hansen J statistic (p-value)		.193		.414
Observations	14,061	14,061	15,710	15,710

Table 8: Extension III: The Impact of East German Immigrants on West Germans' Wages; Alternative Samples; OLS and Second Stage Estimates

	Dependent Variable: Log Real Hourly Wages$_{jgt}$			
	OLS	IV	OLS	IV
Explanatory Variables:	(1)	(2)	(3)	(4)
Classical Labor Market Segment (C)*	-.518**	-1.744**	-.667***	-1.533**
Share(East Germans; S(EG))$_{jgt}$	(.246)	(.744)	(.227)	(.636)
Intermediate Labor Market Segment (I)*	-.066	-.780	-.088	-.578
S(EG)$_{jgt}$	(.150)	(.821)	(.148)	(.713)
Labor Market Segment with Both	.386	.845	.314	.442
Regulations (B)*S(EG)$_{jgt}$	(.219)	(.894)	(.217)	(.731)
Segment indicators	Yes	Yes	Yes	Yes
Segment-specific individual characteristics	Yes	Yes	Yes	Yes
Segment-Specific Log(West German's employment)	No	No	Yes	Yes
Age-Occupation Effects	Yes	Yes	Yes	Yes
Age-Time Effects	Yes	Yes	Yes	Yes
Occupation-Time Effects	Yes	Yes	Yes	Yes
Industry-Time Effects	Yes	Yes	Yes	Yes
F-test: β^I=β^B (p-value)	.065	.038	.106	.110
F-test: β^I=β^C (p-value)	.106	.330	.027	.182
F-test: β^C=β^B (p-value)	.009	.017	.003	.016
Hansen J statistic (p-value)		.194		.333
Observations	16,531	16,531	17,776	17,776

Table A-1: Definitions of Variables and Descriptive Statistics

Variable	Definition	Mean Share	Standard Deviation
wage	real hourly wage	9.59	4.27
immigration rate	share of medium-educated East Germans in occupation-age-time cell of West German labor market	0.02	
main instrument	share of medium-educated East Germans in age-time-cell with initial vocational training in the occupation	8.74	11.86
additional instrument	share of medium-educated East Germans in West German age-time-cell with initial vocational training in occupation	1.04	1.75
firm entry regulation	1: occupation with the firm entry regulation of the German Trade and Crafts Code, 0: otherwise	0.40	
workers' influence	1: firms with at least 50 employees and strong workers' influence in firms' decision making, 0: firms with less than 50 employees and weak workers' influence	0.55	
age	employee age in years at the survey date	37.47	8.35
tenure	years of work for current employer	11.56	8.21
gender	1: male, 0: female	0.64	
supervisor	1: supervisory tasks, 0: otherwise	0.28	
non-routine analytical tasks	1: non-routine analytical tasks, 0: otherwise	0.09	

Notes: In this table, non-weighted descriptive statistics are shown for the main estimation sample of 17,967 employees. All individuals have medium education, are 25 to 54 years old, have German nationality, spent their youth in West Germany, work between 10 and 75 hours per week in West Germany, and report the relevant data for our analysis. Excluded are employees in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

Table A-2: Distribution of West Germans' wages across occupation-age-time cells

	Survey wave		
	1986	1992	1999
	median of natives' average real hourly wage in occupation-age-time cells		
	10-percent percentile; 90-percent percentile		
Classical Labor Market Segment	7.8884	9.0266	9.5453
	(6.0649; 10.3749)	(6.6428; 12.1089)	(6.9104; 13.3069)
Intermediate Labor Market Segment	8.6491	9.8537	10.0294
	(6.6209; 11.0685)	(7.4290; 12.4880)	(7.5015; 13.0548)
Labor Market Segment with Both Regulations	8.8327	10.3313	10.8333
	(7.3654; 10.6542)	(8.4860; 12.4832)	(8.7485; 13.1840)

Notes: In this table, we describe the sample distribution of West Germans' real hourly wages per survey wave (1986, 1992 and 1999) and per labor market segment (no regulation, intermediate and both regulations). In each class, we display the median, the 10-percent as well as the 90-percent percentile of the average real hourly wage of West Germans in occupation-age-time cells. The calculations are based on the main estimation sample of 17,967 employees who have medium education, are 25 to 54 years old, have German nationality, spent their youth in West Germany, work between 10 and 75 hours per week in West Germany, and report the relevant data for our analysis. Excluded are employees in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

Table A-3: Distribution of the immigration rate of East Germans' to West Germany across occupation-age-time cells

	Survey wave		
	1986	1992	1999
	median of immigration rate in occupation-age-time cells		
	10-percent percentile; 90-percent percentile		
Classical Labor Market Segment	0	0.0130	0.0391
	(0; 0)	(0; 0.0574)	(0; 0.1056)
Intermediate Labor Market Segment	0	0.0095	0.02914
	(0; 0)	(0; 0.0876)	(0; 0.0925)
Labor Market Segment with Both	0	0.0220	0.0340
	(0; 0)	(0; 0.1108)	(0; 0.0791)

Notes: In this table, we describe the sample distribution of the immigration rate of East Germans' to West Germany per survey wave (1986, 1992 and 1999) and per labor market segment (no regulation, intermediate and both regulations). In each class, we display the median, the 10-percent as well as the 90-percent percentile of the immigration rate in occupation-age-time cells. The calculations are based on the main estimation sample of 17,967 employees who have medium education, are 25 to 54 years old, have German nationality, spent their youth in West Germany, work between 10 and 75 hours per week in West Germany, and report the relevant data for our analysis. Excluded are employees in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.