Essays on migration

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Chapter 1

The impact of the statutory minimum wage on the migration flows and internal displacement in Germany

Abstract

Studies on statutory minimum wage so far focus on employment and wage inequality. This research paper documents the causal impact of the federal-level minimum wage policy on the internal and external flow of migrants in Germany. Analyzing migration patterns separately for West and East Germany we find that the share of migrants and internal migration rises for high *bite* intensity regions of West and East Germany at varying levels are the regions before the reform of more employees earned less than 8.50 €. Carrying a fixed effect estimation in a continuous difference-in-difference framework and further an event study for West Germany, we find that the migrant proportion (both internal and external) and net flow rose by approximately 0.15 p.p. for the year 2016 in the high-intensity bite regions relative to the low-intensity, while gross flow rose by 0.42 p.p. in 2015 and external migration by 0.46 p.p. The impact on the policy target group, the low-skilled migrants, increased approximately by 1 p.p. in 2016 while we do not find any impact on educational or asylum migrants. The share of net internal and external women migration increased by 0.2 p.p. and 0.3 p.p. respectively in 2015, while the gross inflow increased by 0.33 p.p. in the first year of MW introduction. We find a positive change of 0.86 p.p. for the low-skilled women migrants in the high-bite-intensive regions. These results are in line with the reducing gender wage gap post-introduction MW policy. There is also potential for further in-depth analysis of other outcomes.

1.1 Introduction

The flux of migrants crossing European borders has been in the policy debate for the past years without fail. The EU enlargement further promoted internal migration within Europe, and given the context of *migrant crisis* with millions crossing European borders, how can a labour market policy instrument like that of a Minimum Wage (MW) introduction affect the flow of migrants in different regions of a European nation? Studying the relationship between minimum wage policies and immigration flows in Europe is crucial for gaining insights into the economic, social, and policy dynamics that influence migration patterns. It allows for a more comprehensive understanding of the factors that drive immigration and helps policymakers make informed decisions about labor market regulations and immigration policies. The primary function of minimum wage laws is to establish a wage floor, which is the lowest hourly wage that an employer is legally allowed to pay to their employees. In January 2015, the federal minimum wage law was introduced in Germany, covering most employees with only a few exceptions. The wage floor was set to €8.50. There was a period of prolonged economic policy discussions and debates concerning the potential risks and advantages of the reform.

The bill was passed in July 2014 and the idea remained to reduce poverty and inequality. The minimum wage and its effects on employment, and wages are debated a lot in the policy realm and Germany is no exception. Often referred to as a 'blunt' instrument (Card & Krueger, 2015) in order to redistribute income to the poorest of families, its effectiveness as a top-down policy has been questioned for many years now. Critics of minimum wage policies argue that they can create market distortions by potentially leading to job losses or reduced job opportunities for low-skilled workers. Employers may respond to higher labor costs by reducing hiring or automating jobs. Existing research focuses on the employment and wage effects of the policy in the different regions of the country. The results are mixed

and in recent years labor economists have relied on the presence of *monopsony*[1] in the market to understand better the underlying mechanisms of their findings.

The primary function of minimum wage laws is to establish a wage floor, which is the lowest hourly wage that an employer is legally allowed to pay to their employees. The federal-level wage floor set in Germany was relatively above the average of its European counterparts and the universal aspect of it, with only a few exemptions, was expected to potentially cause a lot of job losses (Müller and Steiner, 2010; Müller and Steiner, 2011; Müller and Steiner, 2013). At the same time, this federal-level setting of the minimum in Germany narrows down the possibilities for identification strategy[2]. We can expect heterogeneity in the spatial effects with productivity and, hence, wage differences across locations. In other words, the introduction of a national minimum wage affects regions to different extents.

The cost of living varies widely across regions within a country, and a uniform minimum wage may not accurately reflect these regional differences. The policy introduction could influence the expected gains or earning potential of migrants and can impact the inflow of low-skilled or early-career migrants, in other words, target groups within Germany, as well as from abroad. Regions with a higher concentration of low-wage industries may have experienced an influx of internal migrants seeking improved economic opportunities due to the wage floor. We could expect that the introduction of the minimum wage has influenced external migration, attracting workers from other European countries or outside seeking improved earning prospects in Germany. The perceived economic stability and higher wage standards may have acted as a pull factor for external migrants, contributing to an increase in immigration to Germany. The impact on specific sectors and regions may vary, with some areas experiencing a more pronounced effect due to their economic structure and demand for labor.

The impact on the regional labour market is directly proportional to the 'bite' on

[1] Where the employer has some market power to exploit in terms of wage setting
[2] See Section 1.4 for the identification strategy

the regional wage distribution. We opt for the approach suggested by Card (1992), relying on the varying degree to which the regional labour markets are affected by the introduction of the minimum wage. Considering that the higher the bite, the stronger effect it has on the regional labour market, we employ a continuous difference-in-difference (DiD, henceforth) method to analyse the short-term effects of the minimum wage on migration, both internal and external for the first few years after the introduction of the policy. The continuous DiD helps us draw causal inference while addressing time-varying confounders and a trend before and after the policy introduction and finally, a robustness analysis to check the sensitivity of the results to different model specifications, involving the inclusion of additional covariates or changes in the time-period in our case 2011-16 and 2011-17. See Section 1.4.2 for a detailed explanation of the method in use and the empirical setup.

It is expected that the employees affected would vary strongly based on the contract of employment- full-time, part-time, entailing social security contributions (referred to as 'regular employment' in the literature) or workers in marginal employment (referred to as 'mini-jobs') with an income ceiling on €450 per month, exempting the employee from social security contributions[3]. The regular employed would be less affected than the ones in marginal employment and would reflect in the bite calculation, See Section 1.3.2.

We rely on two different definitions of the regional treatment intensity measured in the bite in order to have a holistic view[4] of the impact: the *Fraction* (Card, 1992) and the *Kaitz index* (Kaitz, 1970). While the fraction denotes the share of the eligible employees affected in a region, the Kaitz index shows how the introduced minimum wage relates to the average regional wage. In Section 1.3.2 we explain in detail the definition, construction, and rationale for relying on both indicators in our analysis.

The incentive to immigrate is that the expected gains[5] post-introduction of the

[3]The employer has the responsibility to pay the flat charges of 30%
[4]See table A.1 for differences between the two measures
[5]See Appendix A.1.2 for explanation

minimum wage be substantial. However, for the high-skilled migrants, this might not be necessarily true as the choice of the regional location would be influenced by the skill-wage disparity.

For the estimation of mobility effects, we combine the bite measures from SOEP[6] with the INKAR data on external and internal migration. In sections 1.6.3 we also look at outcome variables to disentangle mobility effects based on gender.

Hypothesis [*H1*]: *The introduction of the federal level minimum wage has an impact on the migration flows*; Hypothesis [*H1a*]: *The impact on the internal migration is greater than that of the external migration decision in high bite intensity regions*; Hypothesis[*H1b*]: *The existence of a regional impact of the MW on inducing external migration (magnet effect)*;

As for the target groups of the MW - Hypothesis [*H2a*]: *The impact on the early career migrants/ low-skilled migrants is more than the overall impact on migrant flows*; a follow-up hypothesis on other categories- Hypothesis [*H2b*]: *There is no impact on the federal MW on educational and asylum migrant flows.* And finally, the impact of the MW by gender- Hypothesis [*H3a*]: *The effect of the MW is more pronounced for women migrants than men*; Hypothesis [*H3b*]: *The impact on low-skilled women migrants is of the highest magnitude.*

The paper is structured in the following way: Section 1.2 provides the institutional background of the Statutory minimum wage reform and the literature review. Section 1.3 presents the data used in the empirical work and the definition and calculation of the outcomes of interest. Section 1.4 describes the Identification Strategy, using a continuous difference-in-difference approach if the minimum wage impacts the flow of new immigrants and the net flow of natives and migrants in Germany *Kreise*. Section 1.5 provides the descriptive statistics: pre- and post-introduction of the reform including info on Bite[7], GDP per capita (log), unemployment rate, % share

[6]Extension to the paper would include bite calculated using the comprehensive Structure of Earnings Survey (SES) 2014 at RLM level (Caliendo et al., 2018; Kosfeld and Werner, 2012)and AMR (Caliendo & Wittbrodt, 2022)

[7]For now at ROR level and assumed to be the same for the constituting *Kreises*. Extensions to the research would rely on the Structure of Earnings Survey (SES) data for the bite at regional

of employees in the construction sector[8], and the population classified by West and East Germany. Section 1.6 shows the baseline results for the effect on migration, robustness checks testing the parallel trends assumption, and different specifications for the bite and sample restriction based on the existence of a sector-specific minimum wage. Section 1.6.2 presents an event study analysis to derive economic inferences from the outcomes. Section 1.6.3 shows the heterogeneity analysis based on Gender and categories of migrants and finally, Section 1.7 concludes.

1.2 Institution and Literature review

Germany introduced a statutory minimum wage of 8.50 € per hour to be effective from Jan 1, 2015. As per the Minimum Wage Act, the Minimum Wage Commission, *Mindestlohnkommission* would pass resolutions to adjust the amount of minimum wage. Some peculiarities of the German minimum wage were that it was set at a relatively high level of wage and impacted about 15% of the workers in the year of introduction (DESTATIS, 2016).

The introduction of a federal-level minimum wage in Germany in 2015 was a planned policy change that had been anticipated and debated for some time before its implementation. Various political parties, particularly the Social Democratic Party (SPD) and The Left (Die Linke), advocated for a minimum wage. In the 2013 federal election campaign, the SPD made the introduction of a minimum wage one of its key promises. After the election, the SPD formed a coalition government with the Christian Democratic Union (CDU) and the Christian Social Union (CSU). As part of the coalition agreement reached between the SPD and CDU/CSU, it was agreed to introduce a federal minimum wage in Germany. The specifics, including the initial wage level of €8.50 per hour, were negotiated as part of this agreement. The German Bundestag (parliament) passed the minimum wage legislation which

levels- RLM, AMR and Kreis

[8]We add this control in our sensitivity analysis. In Section 1.3 we give the rationale for including different sets of controls in our analysis

came into effect on January 1, 2015 (Mindestlohnkommission, 2016).

Sector-specific minimum wages or minimum industry wages have existed prior to the introduction of federal minimum wages and continue to exist. Unlike the statutory minimum wage, these minimum wages are set for specific sectors through collective bargaining agreements between employer associations and trade unions by negotiations. Collective agreements can be either industry-wide (*Flächentarifvertrag*) or company-specific (*Betriebstarifvertrag*). Once a collective agreement is reached, it is legally binding for both parties, i.e., employers and employees within the covered scope. It sets the standards for wages, working hours, vacation days, and other employment conditions. Collective agreements in Germany can be extended to cover all employers and employees within an industry, even those not directly involved in the negotiation. This extension is known as "*Allgemeinverbindlicherklärung*". The legal minimum wage further strengthens the provision of setting minimum industry wages through collective bargaining agreements. In case the sectoral minimum wage is higher it continues to exist, as in the case of nursing care, many trade industries, temporary employment agencies, providers of training and professional development, etc.

Minority populations and women are sometimes overrepresented in low-wage jobs (DiNardo et al., 1996). The Minimum wage policies can help reduce gender wage disparities and improve economic equity for these groups (Caliendo and Wittbrodt, 2022; Di Nola et al., 2023). Section 1.6.3 tests the hypothesis - The impact on the migration of women is relatively higher than the overall impact.

The "bite" defining the intensity of the impact of the federal minimum wage on wages varied regionally with varying treatment intensity as defined by Card (1992) and only a few industries were exempted[9]. On the continuous evaluation of the impact of the policy reform, the commission, having a statutory mandate under

[9]The exempted sectors are the agriculture and forestry sectors, meat processing industry, hairdressers, and – in East Germany specific- employment offered by temporary employment agency ('Leiharbeit') and textile producers. I drop the employees from the sample covered by the sectoral minimum wages or exempted from the mandatory minimum wage floor.

Section 9 (4) MiLoG, was assigned the task of presenting its findings and resolution to the Federal Government. The first revision was introduced on January 1, 2017, raising the minimum wage to € 8.84. The more recent changes in the minimum wage floor increase to € 9.19 in 2019, to € 9.35 in 2020[10].

The time periods covered in our baseline specifications are from 2011-16, which entails a short-term impact after the policy introduction with no variability in the minimum wage post-reform over the years 2015 and 2016. Appendix ..... shows the extended timeline from 2011-17, where 2017 is the year when the first revision to the MW took place. The increase in the MW impacts the earning potential of the natives and migrants further requires an identification strategy similar to Cadena (2014) to map the changes in low-wage, in our case 2016-2017, and the corresponding migration data (INKAR) and is not covered in the scope of this paper. Disentangling the effect of the change in the MW is beyond the scope of this research.

Over time, it is expected that the wage gap between high-wage jobs and low-wage jobs will reduce. Figure 1.1 shows that the employed receiving the federal minimum wage between the starting year of 2015 to April 2018 more than halved, from 1.91 million jobs to 930,000. The Federal Statistical Office (Destatis) also notes a bridging effect between the proportion of employed workers in Western and Eastern Germany receiving the minimum wage. In 2018, in Germany, 2.4% of all jobs were covered by the minimum wage, with 4.6% in Eastern Germany, but still less than half of the proportion in 2015. The labor market conditions in different regions of a country can vary widely. High-wage areas may have a stronger job market with more employment opportunities, which can attract migrants. Conversely, low-wage areas may struggle with higher unemployment rates, potentially leading to emigration.

The existing literature on minimum wage and mobility is not vast and has exploited mostly the heterogeneity in the state-level minimum wages and the effect on employment and wage outcomes. One of the first studies to formulate the link

[10]And in the last two years, the minimum wage has been further increased to € 9.50 in 2021, to € 9.82 in January 2022.

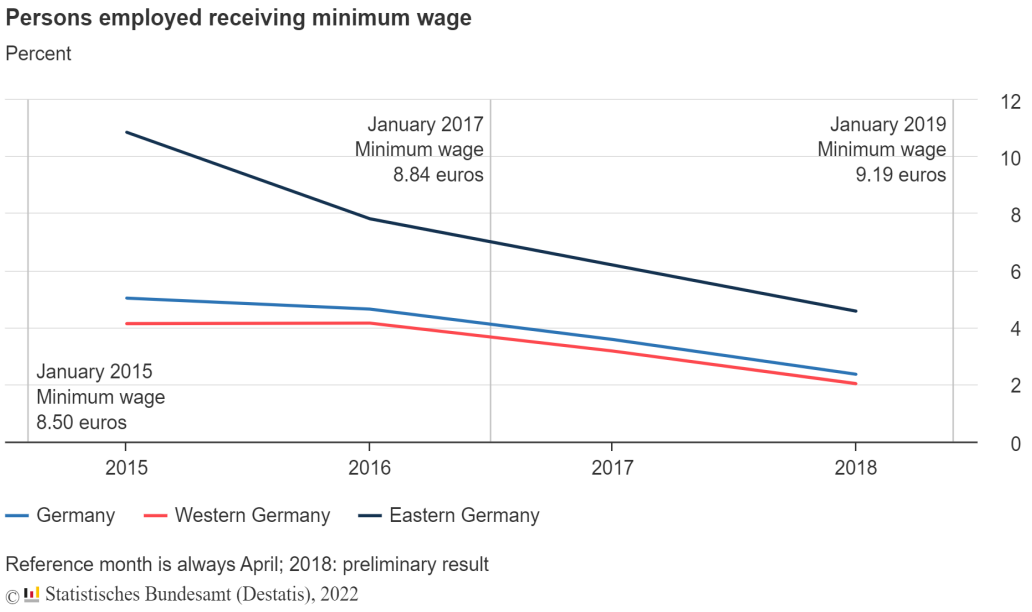


Figure 1.1: Minimum wage jobs share 2015-2018

between minimum wage and location choices is that of Harris and Todaro (1970) and they use the minimum wage to explain the high levels of urban employment in some developing countries, where the underlying assumption concerning the decision to migrate is in terms of expected wages. Basu (1995) extends their framework to include international migrants. Castillo- Freeman and Freeman (1992) study the extension of the US minimum wage to the island of Puerto Rico and how it acts as a push factor. It finds that the migration from Puerto Rico to the United States comprised mostly of the jobless on the island, likely to be dis-employed by the minimum wage. As the wage reached parity with the US levels, the education level of migrants was noted to be below that of the non-migrants. Orrenius and Zavodny (2008) study the effect of the minimum wage laws on the employment and earnings of low-skilled immigrants and natives in the United States for the years 1994-2005. They show that low-skilled immigrants may have been discouraged from settling in states with wage floors substantially higher than the prevailing federal minimum wage.

Cadena (2014) studies the effect of minimum wage, especially on teens' employment

losses, and finds the effect to be larger in states with lower levels of inflow of migrants historically. Boffy-Ramirez (2013) finds that the low-skilled immigrants who have been in the US between two and four years are more likely to settle in states that have a state-level wage, with one dollar increase in the minimum wage leading to 26% increase in immigrant numbers.

For the studies mentioned above, relying on the changes in the state minimum wages, there exist causality issues as pointed out in Giulietti (2014), wherein the state-level shocks could in theory impact both the immigration and the state-level policy leading to omitted variable bias. Also, immigration can have an impact on the state minimum laws, leading to reverse causality. Giulietti (2014) tackles endogeneity issues considering the federal minimum as a natural experiment instead of the inclusion of fixed state effects and controlling for state-level, time-varying characteristics as in the previous studies on state-minimum wage. There might exist spurious correlations between immigration and minimum wage, as immigrants might choose to move to regions with better economic conditions. Giulietti (2015) finds in the US during 1996-97 and 2007-09, that the minimum wage policy induced low-skilled migrants into the United States, and finds no impact on the flow of high-skilled immigrants. The study finds the effect when interstate mobility is taken into account, and it notes changes occur only for legal immigrants while undocumented immigrants are not affected.

Meta-analysis like Martínez and Martínez (2021) and Paun et al. (2021) tries to understand the varying effects and the bias in the literature and throws some light on the different methodologies in place. Whether the minimum wage increases or decreases migration flows at the end depends on the overall wage and employment effects[11]. The findings are mixed on the impact of minimum wage on employment. Manning (2021) shows that the reason for a kind of *elusive employment* effect remains the existence of imperfect competition in the labor market. An influx of

[11] A large stand of literature focuses on the effects of minimum wage on wages, employment, and unemployment in Germany

immigrant workers willing to accept lower wages might lead to competition for jobs, potentially impacting the wages and employment opportunities for native workers, especially those in low-skilled sectors.

The gap in the literature on the underlying mechanisms for migration, like employment, unemployment, and wage effects lies in the varying intensity of the impact on the natives and migrants. And if the Federal MW policy has an impact on inducing migrants, internal or international, in the European context? This paper focuses on the latter, also proposed by Giulietti (2015) in order to answer if the federal minimum wage attracted migrants to different regions based on the varying regional[12] intensity measure by the *bite*[13].

1.3 Data

The primary sources of data are the German INKAR[14] (für Bau, 2021)- Indicators and maps on spatial and urban development, 2021, the German Socio-economic Panel, GSOEP (Socio-Economic Panel, 2019), and DESTATIS (Bundesamt, 2021) data. The outcome variables in the analysis are the Migrant Proportion and Net flow of external migrants by Kreise[15] for separate regressions using the mobility indicators from INKAR data along with other contextual and labour market characteristics of the different kreises.

and European Committee of the Regions et al. (2021) lists the regions with GDP levels above 20% of the national averages, in addition to the average wages of all employees and employment shares to the national averages. The regions with the lowest GDP per capita compared to the national average are at the bottom end and are not necessarily the ones with the lowest wages; instead, the average wage levels are higher than the national average. When comparing different industries,

[12]Different regional definitions have been taken as a part of the robustness check - ROR, RLM, AMR (Caliendo et al., 2018; Caliendo and Wittbrodt (2022); and Di Nola et al., 2023)

[13]See Section 1.3.2 for the bite definition(s) and construction

[14]Indikatoren und Karten zur Raum- und Stadtentwicklung in Deutschland und in Europa, INKAR

[15]In Section 1.6.1 we carry out analysis at ROR level as a Robustness check

the authors find that agriculture and construction are the only two industries where regional wage levels are typically at the lower end in areas with low GDP levels.

It adds to the motivation to control for more than just the GDP per capita to account for the inter-regional differences.

Hence, we include GDP per capita, unemployment rate, and the share of employees in the construction sector from the "Indicators and Maps on Urban Development in Germany and Europe" at the Kreise level. The population data for the years 2011-2017[16] comes from the Federal Statistical Office (DESTATIS) at *Kreise* level. Combining the INKAR and DESTATIS, we could compute the migrant share by Kreise in Germany. At the same time, we constructed the variable Migrant Proportion for the change in migrant stock variables (Giulietti, 2014). The migrant proportion or *Ausländeranteil* is simply the share of foreigners in the population in percentages, we calculate the migrant stock at two different points in time and calculate the change in stock over the lagged year's total population, Eq. 1.1.

$$Migrant\,Proportion_t = \frac{(migrant\,stock_t - migrant\,stock_{t-1})}{total\,population_{t-1}} \tag{1.1}$$

The other outcome of interest explored in the regression is the total net migration of external migrants, *Außenwanderungssaldo*[17], see Eq.1.2. A net migration flow model cannot isolate various push and pull factors Parikh, Van Leuvensteijn, et al. (2003). Hence, it is better to use gross migration flows or gross migration rates-Influx or *Zuzugsrate* covering both within and external federal borders of Germany[18]. The two definitions of migration are migrant proportion and net flow[19] at a given year to analyze the impact of the minimum wage on both internal and external

[16]We combined the kreises for transitioning years 2010-11 Mecklenburg-Western Pomerania district reform: Statistisches Landesamt Mecklenburg-Vorpommern and 2015-16 Kreise reform in our sample to have a uniform regional analysis.

[17]Other variables: External migration balance, *Gesamtwanderungssaldo* focusing on the net flow across the borders of the Federal Republic will be included in the analysis

[18]Refer to the Appendix Tables A.2, A.3, A.4 for a detailed overview of the variables and the limitations provided by the INKAR migration data.

[19]1 out of 1000 inhabitants. We further convert these in terms of % of the population of the region

migration[20].

$$Netflow = \frac{(Inflow - Outflow)}{total\,population} * 100 \tag{1.2}$$

1.3.1 Migration data

The source of data on the outcome variables on migration comes from the INKAR dataset. The dataset is constructed and maintained by *Bundesinstitut für Bau-, Stadt- und Raumforschung*, BBSR- The Federal Institute for Research on Building, Urban Affairs, and Spatial Development. INKAR offers indicators on education, demography, the labour market, the economy, housing, transport and the environment. The mobility subsection contains information on migration both internal and external. We use spatial mapping included with BBSR source for INKAR data to create the thematic maps on immigration data for the years before (2013-2014) and soon after (2015-2016) the minimum wage policy introduction. Figure 1.2 illustrates the net migration in the years 2013-2016[21] using the INKAR datasets.

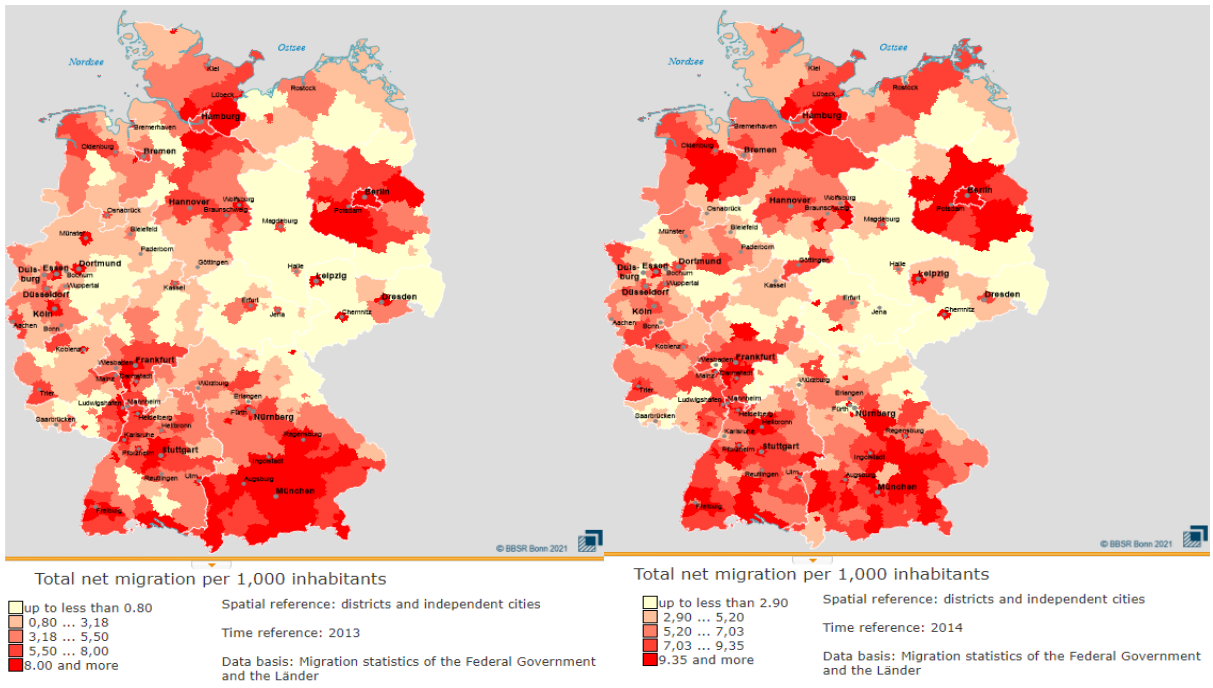
The research timeline overlaps with the *migration crisis*, with vast waves of asylum seekers moving to Germany and other European nations. Hence, including asylum seekers and early career migrants as another outcome variables[22], we verify if the varying bite actually captures the expected effects or if there are existing spurious correlations. On the other hand, the policy variable should positively impact the flow of early career migrants, with a more substantial effect in regions with higher bite. In Section 1.6.3, we carry out these heterogeneity analyses.

The dataset provides information not only on the total share and flows of internal and external migrants but also on their gender and motivation as early career migrants, educational migrants, or asylum migrants. In the robustness analysis, we use these other outcome variables to test if the policy introduction targeted the

[20]Results based on separate variables with data on internal migration balance for women documented in the Heterogeneity analysis-Gender subsection 1.6.3

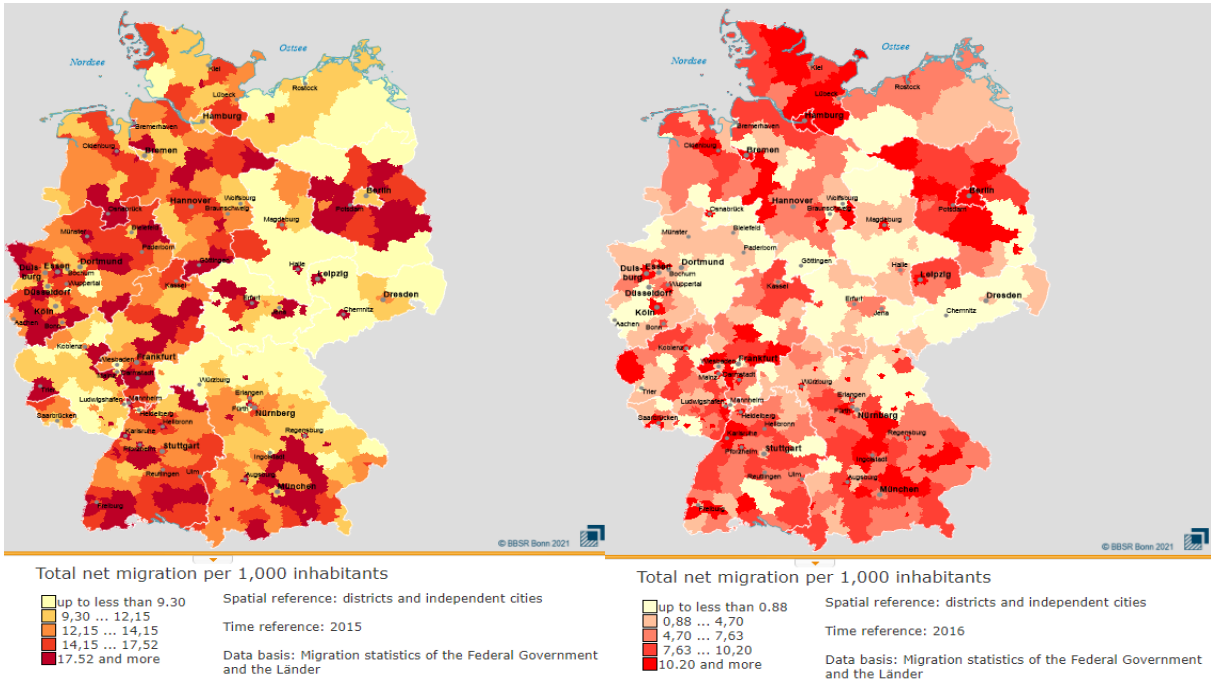
[21]The bins are created such that they are equally distributed.

[22]See Appendix A.4 for the explanation of these outcome variables



(a) 2013

(b) 2014



(c) 2015

(d) 2016

Figure 1.2: Net regional migration for the years 2013-2016 in Germany (INKAR data)

group of early career migrants with low wages and further the impact on the migrant women in Section 1.6.3 [See Appendix Table A.3 for an explanation of the outcome variables.].

1.3.2 Bite

In order to create the *bite*, we use the SOEP-core (Socio-Economic Panel, 2019), created by the German Institute for Economic Research, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin, with the recent data: *Wave 35*(2020) for the year 2018, with individual data on monthly wages, both contractual and actual wages and working hours. *Immigrant samples* added in 1994-95 and 2013-2015 accounting for the changes that took place in German society.

In order to construct the Bite(s) the quintessential information is the hourly wage, as the policy focuses on it. The regional or spatial information within SOEP[23] data is restricted to a more aggregated level of Spatial Planning regions- *Raumordnungsregionen* (RORs)[24], instead of the district level (*Kreise*) available with the SES data. We calculate the bite using GSOEP 2013, 2014 and 2015, see Table 1.1. Using the 2013 wave, we could check if there exist any anticipation effects[25] and with further 2014 wave in the extension to the paper, we will check for the correlation between the GSOEP and SES data and improve the precision of the bite calculations. As per the policy reform, our prime variable of interest remains the employees' hourly wage. This information is not present directly in SES and SOEP-CORE datasets[26] but they do have variables like gross monthly income and hours worked, using which we can compute the hourly wages as follows:

$$Hourly\,wage = \frac{Gross\,monthly\,income}{Weekly\,hours * Average\,weeks\,per\,month} \tag{1.3}$$

[23]SOEP and SES record the wages differently.

[24]See Appendix Figure A.2 to see a list of RORs and the constituent kreises

[25]As mentioned in the Section 1.2 of the potential anticipation effects

[26]SOEP offers the data available annually and enables to test parallel trend assumption and both *actual* and *contractual, see Section 1.4.2* wages

Hence, hourly wages could be computed for these two given weekly hours worked information to result in either actual or contractual hourly wages. Legally, the policy reform must account for the overtime measured in actual weekly hours, making actual hourly wages our core variable in our baseline specifications, but for a complete picture of the wages and further the *bite* measure, we must rely on both of the wage measures. Also, the reporting on the monthly income corresponds to the previous month while the weekly hours are measured in the current survey, calculating time-variant *overtime* prone to measurement errors. In our baseline specification, we would rely on contractual wages to compare the results from the SES and SOEP at the ROR regional level. Still, we showcase the results using the actual wages, including the overtime hours and cover the complete effect of the policy in the appendix. Using the geo-codes, we combine the individual-level data from GSOEP to the regions RORs[27] and compute the regional bite intensity. The need to carry out the analysis at a regional level different than Kreise arises to have more aggregated regions and to capture the economic structure of the place, and also to minimize the instance of commuter flows crossing the regional boundaries (Kosfeld & Werner, 2012).

Table 1.1 shows the eligible number of employees for the waves 2013-2015 based on the criteria set forth by the minimum wage commission. These criteria include age, employment type, and if the employee was part of a long-term unemployment period. Further, given the sample size, we drop the regions which are non-representative[28], that is, we drop the RORs *Schlewig-Hosltein Ost*[103][29], and *Lüneburg*[309][30] of Lower Saxony leaving us with 94 RORs (397 Kreises).

We use *Sample 1* in Table 1.1 for our baseline specification and the *Sample 2* for the robustness check, see Section 1.6.1.

[27]The assumption remains that the bite calculated is representative at the Kreise level and there is no heterogeneity within the RORs, which assumption is relaxed as the bite is then calculated at the Kreise/ RLM/ AMR level

[28]The number of eligible employees in the regions less than 30 for GSOEP 2013 or 2014

[29]Ostholstein[1055] and Lübeck[1003] kreises

[30]*Lüneburg[3355], Uelzen[3360], Lüchow-Dannenberg[3354]*

Table 1.1: Sample of eligible employees in SOEP data

	Sample	2013	2014	2015
	SOEP v35	31447	28008	27597
	w/o non-eligible	14686	13276	12962
(sample 1)	w/o small regions	**14611**	**13221**	**12914**
	w/o sector-specific	12989	11868	11579
(sample 2)	w/o small regions	**12956**	**11840**	**11554**

Note: Own calculations based on the Minimum wage commission criteria

The regional *bite* intensity is constructed following the two most common definitions used in the literature - *fraction*, and the *kaitz index*, see Eq. (1.4) and Eq. (1.5). We use both these measures in our empirical approach, Section 1.4.2. It is worth noting that even though for both the measures, a higher value implies that the stronger the minimum wage bites, the Kaitz index (Kaitz, 1970) is not solely affected by the changes incurred in the minimum wage but also other aspects of the wage distribution. *Fraction* focuses on the group of individuals affected by the minimum wage off of the eligible ones, neglecting the concentration of individuals below the wage floor as they all impact the bite measure the same. Card (1992), Stewart (2002), Dolton et al. (2010), Dolton et al. (2015), Caliendo and Wittbrodt (2022) rely on the *fraction* in their work.

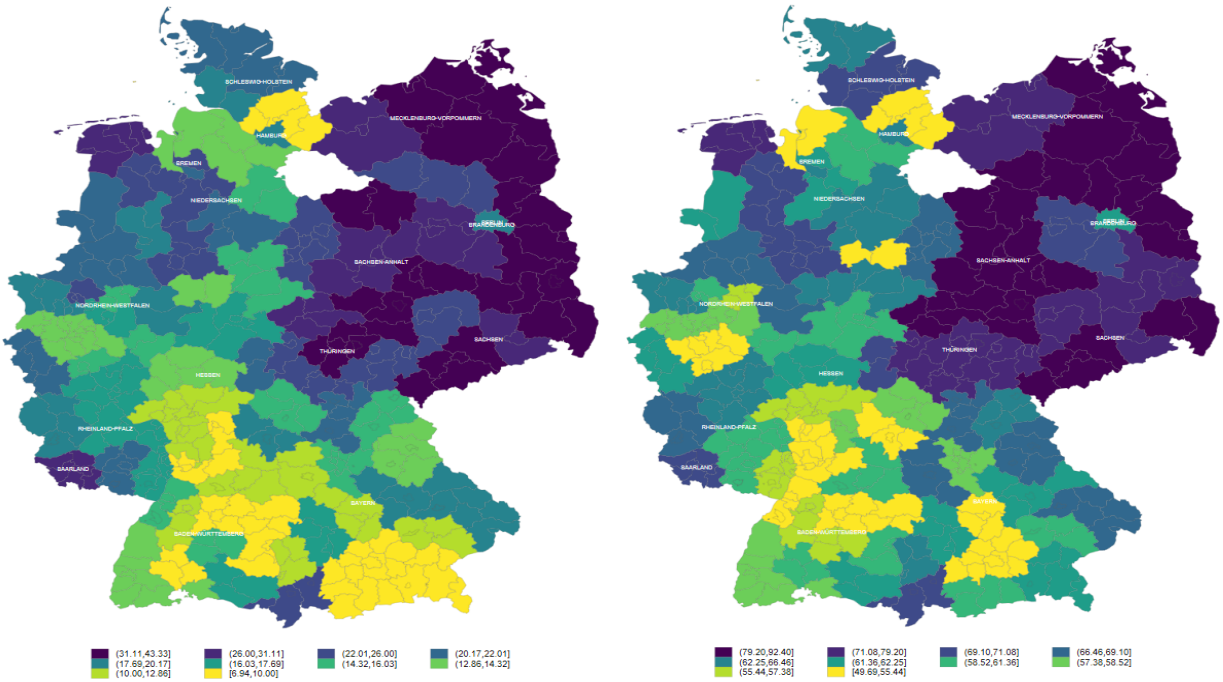
$$Fraction = \frac{No.\ of\ employees\ impacted}{Eligible\ employees} * 100 \tag{1.4}$$

$$Kaitz\ Index = \frac{Minimum\ wage}{Median\ wage\ in\ the\ region} * 100 \tag{1.5}$$

The Kaitz Index provides a nuanced view of a region's wage structure and disparities. At the same time, the Fraction offers a direct measure of the proportion of the workforce impacted by the minimum wage. Combining both indicators helps policymakers and researchers understand the depth of wage disparities and how minimum wage policies influence a significant portion of the workforce. The Kaitz Index guides policymakers in addressing wage inequality, while the Fraction assists in evaluating minimum wage policies' reach and potential socio-economic impact.

Different regions may have varying wage structures, and using both indicators allows for a more context-specific assessment of the minimum wage impact. By incorporating both the Kaitz Index and Fraction, analysts can paint a more complete picture of the regional bite intensity of the federal minimum wage, taking into account the depth and breadth of its impact on the workforce. See Appendix Table A.1 for the comparisons between the two indicators tabulated.

Figure 1.3 and Figure 1.4 illustrate maps with the continuous and binary regional bite intensities based on actual wages[31] in Germany respectively. At first glance, the maps seem similar but differ in intensities. In various *Raumordnungsregionens* where the minimum wage 'bites' hard mainly in East Germany like in *Oberes Elbtal/Osterzgebirge, Oberlausitz-Niederschlesien, Westsachsen* and *Südthüringen* and also in the West like in *Schleswig-Holstein Süd* and *Saar*, but also the other way around with *Fraction* being of higher intensity in the regions of *Südlicher Oberrhein*, *Hochrhein-Bodensee*, *Neckar-Alb*, *Bodensee-Oberschwaben* and *München*. There is a lot of heterogeneity between West and East Germany and within.

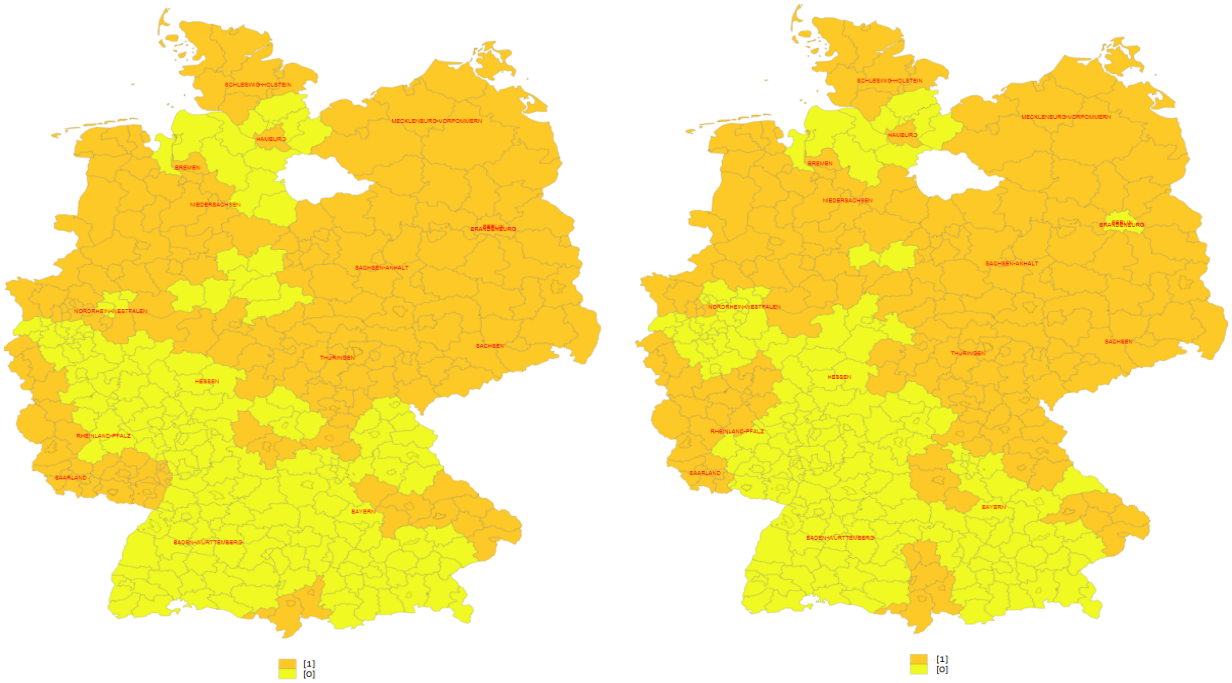


(a) Bite- Fraction in %

(b) Bite- Kaitz Index in %

Figure 1.3: Bite (Continuous)- Fraction (a) and Kaitz Index (b), GSOEP 2013

[31] See Appendix A.1 for the maps using contractual wages



(a) Bite- Fraction (Binary) (b) Bite- Kaitz Index (Binary)

Figure 1.4: Bite (Binary)- Fraction (a) and Kaitz Index (b), GSOEP 2013

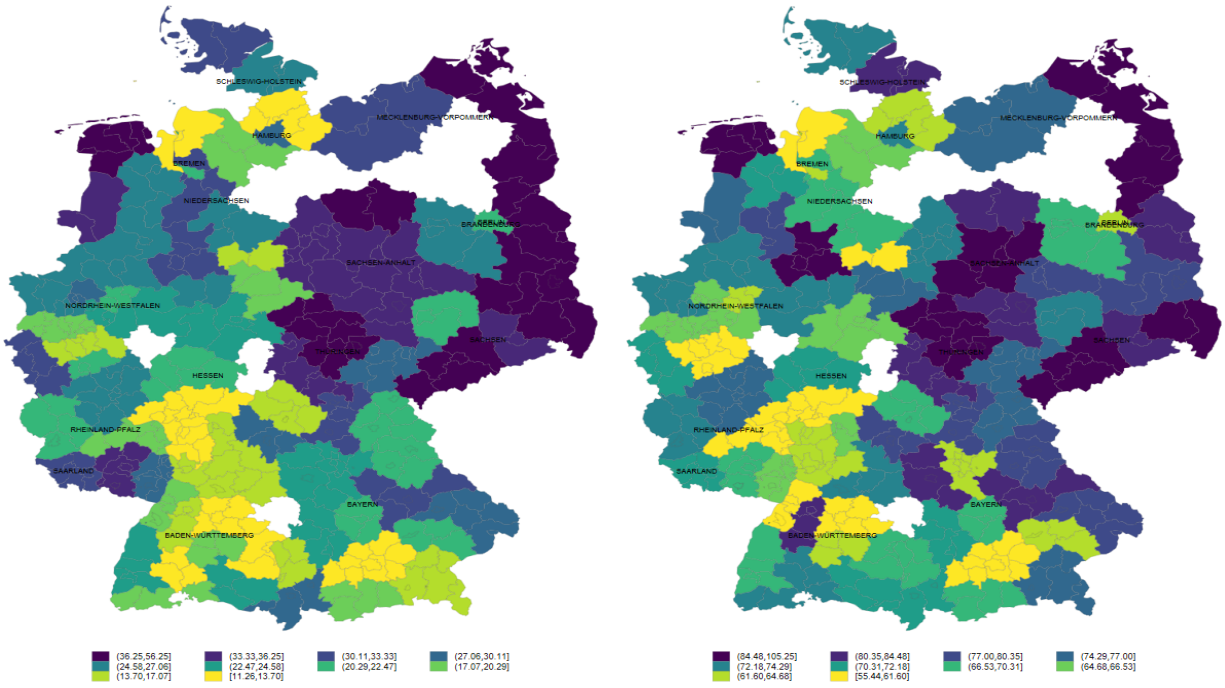
The maps provide an overall picture of different regions regarding migration patterns. The *fraction* and *Kaitz index* calculated based on the actual hourly wages[32] impacted at the time of the Minimum Wage (MW) introduction. Overall, we can expect more migration flows in regions where the intensity of the *bite* is more substantial. Moreover, the flow of the policy target groups[33] like the low-skilled migrants and women are expected to be relatively higher.

Figure 1.3 and Figure 1.4 also indicate the need to analyze West and East Germany separately to understand the causal effect of the minimum wage on the movement of migrants within and through external borders. In line with Peichl and Ungerer (2017), we can expect that regions with higher bite intensity will induce more immigration flows both internal and external.

[32] Appendix A.1 contains the maps constructed using the contractual wages for the year 2013
[33] See Section 1.6.3 for specific group results

Bite based on Gender

With the existing gender wage gap and a significant part of the lower wage distribution comprised of women, the impact of the minimum wage could be expected to be higher for them. We create a separate bite intensity based on the implications for women employees in different regions following the literature (Caliendo & Wittbrodt, 2022), that is the bite created accounts for the intensity of the impacted women out of the eligible women[34]. We ensure that the sample is representative[35]. We are left with 87 RORs with varying bite intensity for women (Caliendo & Wittbrodt, 2022) and we carry out this event study for West Germany with 68 representative RORs to analyze the short-term impact on the internal balance of women migrants, see Table A.3 for explanation (Parikh, Van Leuvensteijn, et al., 2003).



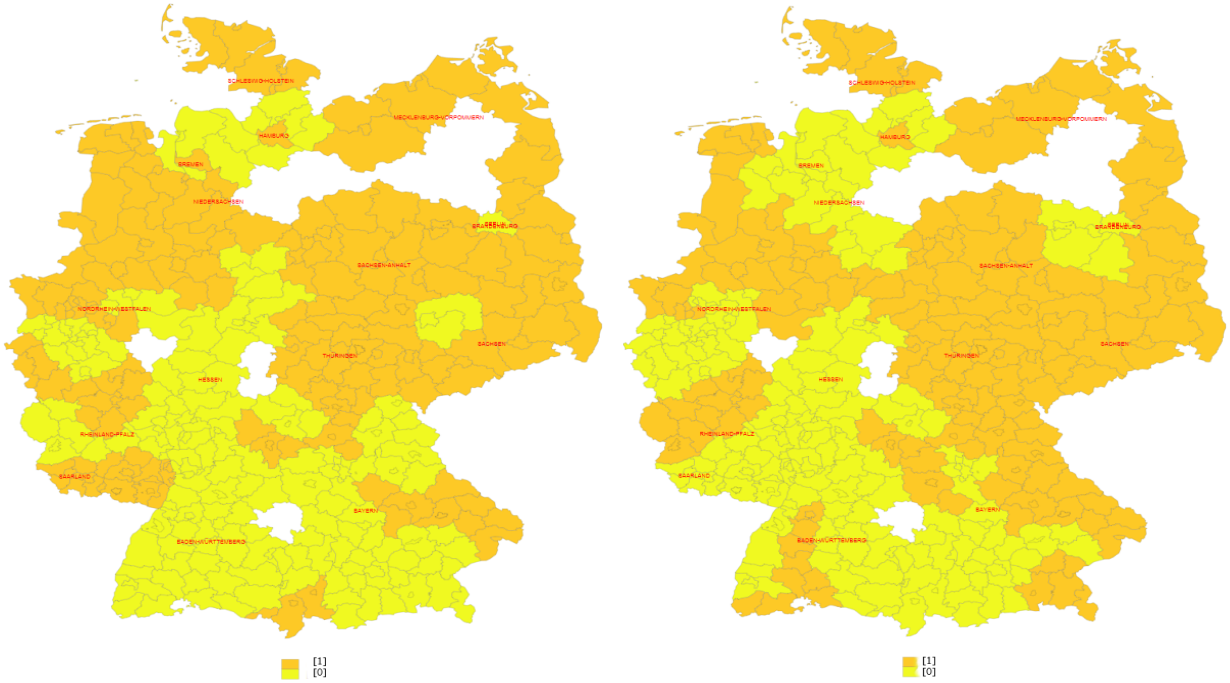
(a) Bite (women)- Fraction in %

(b) Bite (women)- Kaitz Index in %

Figure 1.5: Bite by Gender(Woman, Continuous)- Fraction (a) and Kaitz Index (b), GSOEP 2013

[34]We also calculate the Bite for women affected out of the total eligible population and the results are the same.

[35]We drop the regions with less than 30 women employees: Other 7 RORs are dropped from Sample 1 [Table 1.1]- *Schleswig-Holstein [105] Süd-West, [313] Südheide, [513] Siegen, [603] Osthessen, [808] Ostwürttemberg, [1204] Prignitz-Oberhavel, and [1301] Mecklenburgische Seenplatte*



(a) Bite- Fraction (Binary) (b) Bite- Kaitz Index (Binary)

Figure 1.6: Bite (Women, Binary)- Fraction (a) and Kaitz Index (b), GSOEP 2013

Comparing the maps in Figures 1.3a and 1.5b, we could see some differences in the bite measures (fraction) in the south-west and also, the binary indicators in the Figures 1.4a and 1.6b are on the same line.

1.4 The identification strategy and empirical approach

The identification relies on the varying regional bite intensity with the introduction of the federal minimum law starting in 2015 in Germany. Since the policy is made at the federal level, it is exogenous to the state-level legislation as exploited in most of the existing literature on minimum wage and mobility.

1.4.1 Identification strategy

We motivate the identification strategy based on the research question raised by Giulietti (2014)- "Is the minimum wage a pull factor for immigrants?" which relies on the relationship between immigration and the expected wage and carries out a first differences regression:

$$\Delta m_j = \alpha + \beta \Delta z_j + \Delta x_j + \Delta \epsilon_j \tag{1.6}$$

where Δm m represents the net immigration rate, defined as the difference in the stock of immigrants (in the percentage of the total population) between the period before and after the minimum wage increase. We do not look at the changes in the federal minimum wage but rather focus on the short-term effects, the variation is simply the varying regional bite intensity (ROR), see Section 1.3.2 for the calculation and the descriptive statistics in Table 1.5. While the federal minimum wage can be a factor in migration decisions, it is not the sole determinant. Individuals and families consider a complex mix of economic, social, legal, and personal factors when deciding whether or not to migrate, where to, and to which particular location.

Section 1.4.2 shows the empirical approach, with controls at the regional level *kreise*[36]. The underlying assumption is that varying intensity[37] of the minimum wage 'bite' impacts the location decision of the migrants through the expected wage, See Appendix A.1.2 for a detailed explanation.

For this paper, we exploit the bite variation in different to account for the varying migration flows, including both natives and foreigners to other regions of Germany following mechanisms of internal and external migration. We take as given the change in wages in light of varying regional bite intensity, given the correlation of the employment change with change in migration flows.

1.4.2 Empirical Approach

We find the causal impact on migration flows and internal displacement of migrants in Germany using a continuous difference-in-difference analysis as also used in Caliendo et al. (2017) relying on the regional attractiveness measured by the *bite*[38]. The difference-in-difference estimation with continuous treatment is post-2015 when the

[36]See A.1.6 for the regional classifications in Germany
[37]Based on the eligible working population in a region
[38]See Section 1.3.2 for the Bite calculation.

statutory minimum wage was enacted. Accordingly, the migration effect on average is estimated by:

$$MIG^{w}_{Kreise,t} = \alpha + \beta * Bite2013^{w}_{ROR} * post2015 + \gamma_t + \theta_{Kreise} + \delta * X_{Kreise,t} + \epsilon_{ROR} \quad (1.7)$$

The dependent variables will be used to map the migrant proportion and net flow of migrants by kreise and other battery of outcome variables to be referred to in the heterogeneity analysis, in the data waves 2011-2016[39], β measures the treatment effect of the minimum wage, $Bite2013^{w}_{ROR}$ includes the regional bite intensity at ROR level[40], $post2015$ is a dummy with value 1 for the years post the introduction of the federal minimum wage, γ and θ are included for the time-fixed and region-fixed effects[41] respectively, δ measures the effect of a vector of regional characteristics like unemployment, employees in the construction sector, GDP per capita, etc. in their lagged values in the line with Dolton et al., 2015 and Dube et al., 2010. The Bite measures taken are *fraction* and *Kaitz index* with w=Actual, Contractual wages as two different specifications. We are exploiting the Federal minimum wage policy which is exogenous to regional[42] conditions, and to counter the threat to our identification of the spatial dependency of regions, creating biased results (Giulietti, 2014). The standard errors[43] are clustered at *Raumordnungsregionen*, ROR level.

The very nature of the diverging definitions, see Section A.1 we expect the estimates relying on the *Kaitz index* to capture most of the spillover effects and the fraction with a more restrictive scope with fewer spillover effects. Also, we also use *bite* as a binary indicator in our sensitivity analysis, Section 1.6.1 to test the

[39]The results of the timeline 2011-2017 in the appendix, to be interpreted with caution as the minimum wage was revised in the year 2017

[40]At present assumed to be the same for the constituting Kreises which will be substituted with the Bite calculated using SES 2014. The data extraction is expected for September 2023

[41]Time-fixed effects help control for time-invariant characteristics that may affect the dependent variable on the migration flows and the region-fixed effects help control for unobserved characteristics that are constant within each region but may vary across regions- NUTS3 regions Kreises for Germany.

[42]AMR, RLM, ROR

[43]We carry out an Arbitrary Correlation Regression (Colella et al., 2019) in our Sensitivity Analysis and included in the result tables to incorporate standard errors that account for spatial correlations between the labour market regions

general robustness of our approach.

Parallel trends assumption

In order to check for the parallel trends assumption to show that the introduction of the MW policy is the cause of the change in the migrants' flow, we carry out a placebo test for the pre-reform years (2011-2014) for both the West and East Germany using the bite measure constructed using the actual wages.

Table 1.2: Placebo test for effects on the Migrants proportion

Panel A:	**West Germany**			
	(1)	(2)	(3)	(4)
Bite X Post-MW (fake)	0.002	0.002	-0.004	-0.004
	(0.006)	(0.005)	(0.006)	(0.005)
GDP per capita$_{t-1}$	0.076**	0.076***	0.066***	0.066***
	(0.031)	(0.026)	(0.020)	(0.018)
Unemployment rate$_{t-1}$	-4338.821	-4338.821	-13009.611	-13009.611
	(10305.972)	(8834.507)	(9331.231)	(7994.672)
Share of Construction$_{t-1}$	2185.998	2185.998	856.789	856.789
	(7819.390)	(6702.955)	(7981.003)	(6837.844)
Population density$_{t-1}$			-0.016***	-0.016***
			(0.004)	(0.003)
Observations	1260	1260	1260	1260
R^2	0.755	0.755	0.801	0.801
Panel B:	**East Germany**			
	(1)	(2)	(3)	(4)
Bite X Post-MW (fake)	0.001	0.001	0.003	0.003
	(0.008)	(0.006)	(0.008)	(0.006)
GDP per capita$_{t-1}$	-0.012	-0.012	-0.012	-0.012
	(0.052)	(0.043)	(0.051)	(0.042)
Unemployment rate$_{t-1}$	-16549.807	-16549.807	-17534.006	-17534.006
	(13839.531)	(11532.391)	(13519.066)	(11239.483)
Share of Construction$_{t-1}$	5906.890	5906.890	6315.116	6315.116
	(8930.442)	(7441.679)	(8722.752)	(7251.923)
Population Density$_{t-1}$			0.005	0.005
			(0.008)	(0.007)
Observations	300	300	300	300
R^2	0.700	0.700	0.702	0.702
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations (placebo) in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Migrant proportion, the coefficient of interest is for the interaction of the bite, and the post-2013 (fake) dummy variable. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3) and (4) control for regional Population density as well. Specifications (2) and (6) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.3: Placebo test for effects on the Net flow

Panel A:	**West Germany**			
	(1)	(2)	(3)	(4)
Bite X Post-MW (fake)	0.002	0.002	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.003)
GDP per capita$_{t-1}$	-0.016**	-0.016***	-0.017***	-0.017***
	(0.007)	(0.006)	(0.007)	(0.006)
Unemployment rate$_{t-1}$	-6336.985***	-6336.985***	-7540.467***	-7540.467***
	(1980.566)	(1697.785)	(2391.851)	(2049.254)
Share of Construction$_{t-1}$	-1174.270	-1174.270	-1358.760	-1358.760
	(3311.594)	(2838.772)	(3263.507)	(2796.059)
Population density$_{t-1}$			-0.002	-0.002*
			(0.001)	(0.001)
Observations	1260	1260	1260	1260
R^2	0.770	0.770	0.774	0.774
Panel B:	**East Germany**			
	(1)	(2)	(3)	(4)
Bite X Post-MW (fake)	0.005	0.005	0.004	0.004
	(0.006)	(0.005)	(0.007)	(0.006)
GDP per capita$_{t-1}$	0.030	0.030	0.030	0.030
	(0.026)	(0.022)	(0.025)	(0.021)
Unemployment rate$_{t-1}$	-4189.256	-4189.256	-3217.303	-3217.303
	(4521.833)	(3768.014)	(4756.477)	(3954.440)
Share of Construction$_{t-1}$	7747.315	7747.315	7344.169	7344.169
	(7921.559)	(6600.984)	(7805.294)	(6489.166)
Population Density$_{t-1}$			-0.005	-0.005
			(0.005)	(0.004)
Observations	300	300	300	300
R^2	0.881	0.881	0.883	0.883
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1
The table shows the results for fixed-effect estimations (placebo) in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Net migration, the coefficient of interest is for the interaction of the bite, and the post-2013 (fake) dummy variable. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)-GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3) and (4) control for regional Population density as well. Specifications (2) and (6) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

We carry out a *placebo test*[44] assuming the year 2013[45] as the year of introduction

[44]In Section 1.6.2 we carry out an event study analysis which would further verify the parallel trend assumption plotting the coefficients year-by-year, that is, pre-reform as well as post-reform years

[45]Represented as the fake dummy in the Table 1.2 and Table 1.3

of the policy for years 2011-2014:

$$MIG^{w}_{Kreise,t} = \alpha + \beta_{placebo} * Bite2013^{w}_{ROR} * post2013 + \gamma_t + \theta_{Kreise} + \delta * X_{Kreise,t} + \epsilon_{ROR} \tag{1.8}$$

Table 1.2 and Table 1.3 show for both the outcome variables in the equation, the coefficient of interest is nearing zero, which further indicates that we are measuring the effect of the minimum wage policy reform and not capturing other noises for the years post-introduction of the federal minimum wage.

1.5 Descriptive Statistics

In this section, we present the snapshot of a battery of migration outcome variables, the regional controls[46] and finally the bite constructed using SOEP[47] data.

Table 1.4 shows the descriptive statistics before (2011-2014) and after the reform (2015-2017) including info on Bite (Fraction, Kaitz index), GDP per capita, unemployment rate, % share of employees in the construction sector[48], population classified by West and East Germany. The Bite values calculated at ROR level, are assumed to be consistent within the constituent Kreises, which will make our regression results at kreise level only suggestive. In the sample, are only the regions with the representative sample of employees in SOEP data, 73 RORs for West Germany and 21 RORs) in East Germany. Table 1.5 indicates the need to analyze West and East Germany separately for the different growth paths represented in terms of GDP per capita and share of employees in the construction sector taking into account the existence of different labor market structures existing post-reunification. As expected, the mean values of the created bite measures indicate the high intensity in East Germany (Mindestlohnkommission, 2016).

Table 1.5 shows the descriptive statistics on the battery of different dependent

[46]The regional controls at the RLM level will be constructed following the literature (Caliendo et al., 2018)

[47]The bite using SES data will be used once the code is approved and the data is extracted

[48]Rationale for choice of control variables showed in the data section

Unit		WEST GERMANY		EAST GERMANY	
		Pre-reform	Post-reform	Pre-reform	Post-reform
% Share of affected by eligible	$Bite_{ROR,2013}$ (Actual)	15.841		30.405	
		(5.033)		(6.293)	
% Share of affected by eligible	$Bite_{ROR,2013}$ (Contractual)	12.799		24.058	
		(4.574)		(5.523)	
(Min. wage/ median wage) *100	$Bite_{ROR,2013}$ Kaitz (Actual)	60.619		78.743	
		(5.605)		(7.188)	
(Min. wage/ median wage) *100	$Bite_{ROR,2013}$ Kaitz (Contractual)	56.003		71.784	
		(5.504)		(6.241)	
€1,000 per inhabitant	GDP per capita	34.772	37.786	24.522	27.051
		(7.121)	(7.857)	(2.395)	(2.566)
% Unemp. in the labour force	Unemployment rate	5.657	5.238	10.198	8.363
		(2.255)	(2.096)	(1.826)	(1.736)
% Share of employees in the construction sector	Construction Emp	6.034	5.896	7.935	7.525
		(1.460)	(1.387)	(1.094)	(1.135)
Number of inhabitants	Population	918929.1	940395.6	595745.8	599213.7
		(677808)	(700053.5)	(301893.8)	(303872.9)

Notes: Unit of observation for the control variables ROR-Pre- (2011-2014) and post-reform (2015-2017) years. 73 RORs in the West and 21 RORs in East Germany. Data years from INKAR 2012-2017, SOEP 2013 data for Bite calculation, and DESTATIS 2011-2017 for the population data.

Table 1.4: Descriptive Statistics

variables available with INKAR data concerning both internal and external migration[49], with classifications for the category of different migrants, including women migrants.

Variable	Obs	Mean	Std. Dev.	Min	Max
Migrant proportion based on stoc	2744	.423	.836	-5.731	6.238
Net flow of migrants	2744	5.814	6.218	-40.6	59.3
arrivals per 1000 inhabitants	2744	52.491	22.439	17.23	346.51
men arrivals per 1000 inhabitant	2744	58.987	27.781	18.18	487.18
women arrivals per 1000 inhabita	2744	46.174	18.043	14.92	241.76
External migration balance per 1	2744	58.806	116.268	-138.81	2610.04
External men migration balance/1	2744	6.877	16.019	-19	360.84
External migration women balance	2744	4.907	7.48	-8.81	160.98
Educational migrants (age 18-25)	2744	-9.921	52.048	-985.61	237.48
Early career entrants (age 25-30	2744	-3.751	30.902	-492.66	70.34

Table 1.5: Descriptive Statistics- Migration Variables INKAR

[49]See Appendix A.1.4 for the explanation on the measurement and shortcomings of the outcome variables

1.6 Effect on migration

The effect on migration is measured using the statistics present in the INKAR and DESTATIS datasets for the years under consideration 2011-2017[50].

Table A.5 shows the results based on the change in the Migrants Proportion and Table A.6 shows the results of the change in the net flow rate[51] to find the average impact for the years 2011-2016[52] on mobility from 2011-2014 *pre-reform* to 2015-2016 *post-reform*. In our baseline specifications, we exclude the year 2017[53] as the minimum wage was increased to EUR 8.84 the minimum wage commission's revision. Hence, it would affect regions with different intensities, and we do not account for it.

The results for both the outcome variables are significant for West Germany, affirming the change post-reform year 2015. To induce economic justification we divide the regions into treatment (high-bite intensity) and control (low-bite intensity) groups and carry out an event study analysis, see Section 1.6.2. To ascertain that pre-reform effects are absent, we carry out the placebo test (2011-2014) in Section 1.4.2. At this point we cannot derive inferences on the magnitude of the effect, but only the direction of change, if any. In both the specifications, we provide analysis based on the bite measure calculated based on Actual wages (including overtime hours) and further for both *Fraction* and *Kaitz* index, for a holistic coverage[54] of the minimum wage in the varying regions.

In the West, we could expect both natives and migrants to move to seek better work opportunities in light of the minimum wage in place. This result is in line with Ahlfeldt et al. (2018) posing a possible explanation for the decrease in the local

[50]Extensions would be introduced for the years starting 2017 with the modification of the minimum wage to account for the changed number of employees impacted and the inclusion for two more years of migration data

[51]1 migrant per 1000 inhabitants converted into % of the population

[52]The results are consistent with the prolonged timeline 2011-2017, where in 2017 the first revision to the minimum wage took place

[53]We show the results for the year 2017 in our event study analysis, see Section 1.6.2

[54]See Table A.1 for the differences and the rationale to including both in our baseline specifications.

Table 1.6: Effect on the Migrants proportion

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.016***	0.016***	0.009*	0.009**	0.007	0.007	-0.001	-0.001
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
GDP per capita$_{t-1}$	0.041**	0.041***	0.045***	0.045***	0.040**	0.040**	0.043***	0.043***
	(0.017)	(0.016)	(0.015)	(0.014)	(0.017)	(0.016)	(0.015)	(0.014)
Unemployment rate$_{t-1}$	-5950.395	-5950.395	-9020.254	-9020.254	-6509.614	-6509.614	-9854.858	-9854.858
	(7623.642)	(6893.618)	(7045.702)	(6368.986)	(7628.910)	(6898.382)	(7066.082)	(6387.408)
Share of Construction$_{t-1}$	5684.207	5684.207	8953.322	8953.322*	5614.179	5614.179	8670.128	8670.128*
	(5779.544)	(5226.107)	(5661.399)	(5117.640)	(5874.945)	(5312.373)	(5681.532)	(5135.840)
Population density$_{t-1}$			-0.010***	-0.010***			-0.010***	-0.010***
			(0.003)	(0.002)			(0.003)	(0.002)
Observations	1890	1890	1890	1890	1890	1890	1890	1890
R^2	0.735	0.735	0.758	0.758	0.733	0.733	0.757	0.757
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	-0.000	-0.000	0.002	0.002	-0.002	-0.002	0.001	0.001
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
GDP per capita$_{t-1}$	0.081	0.081*	0.078	0.078*	0.081	0.081*	0.077	0.077*
	(0.052)	(0.046)	(0.052)	(0.046)	(0.051)	(0.045)	(0.051)	(0.045)
Unemployment rate$_{t-1}$	-10284.540	-10284.540*	-11584.820	-11584.820*	-10300.909	-10300.909*	-11500.367	-11500.367*
	(6827.518)	(6015.692)	(6818.993)	(5999.967)	(6719.928)	(5920.895)	(6699.764)	(5895.058)
Share of Construction$_{t-1}$	8238.522*	8238.522**	8346.138*	8346.138**	8254.335*	8254.335**	8389.005*	8389.005**
	(4595.341)	(4048.932)	(4638.407)	(4081.290)	(4674.862)	(4118.997)	(4676.740)	(4115.019)
Population Density$_{t-1}$			0.004	0.004			0.004	0.004
			(0.003)	(0.003)			(0.003)	(0.003)
Observations	450	450	450	450	450	450	450	450
R^2	0.648	0.648	0.650	0.650	0.648	0.648	0.650	0.650
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Migrant Proportion, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) control for regional Population density as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

labor force in counties with high bites in 2015 to change in migration.

The results of Dustmann et al. (2020), state how minimum wage induces low-wage workers (concentration in East Germany in our analysis) to move to higher-paying firms, mostly located in West Germany. To comment on the scale or magnitude of the effect we divide the regions in West Germany into two groups- high-bite and low-bite, dividing the sample at its median intensity of *bite* [55] intensity regions and the analysis is captured in the Section 1.6.2 - Event study.

[55] Calculations based on actual wages

Table 1.7: Effect on the Net flow of migrants

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.013***	0.013***	0.010***	0.010***	0.012***	0.012***	0.009**	0.009***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
GDP per capita$_{t-1}$	-0.010	-0.010	-0.008	-0.008	-0.011	-0.011*	-0.009	-0.009
	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Unemployment rate$_{t-1}$	-3079.499	-3079.499	-4595.198	-4595.198	-2907.707	-2907.707	-4519.479	-4519.479
	(3184.695)	(2879.736)	(3097.201)	(2799.725)	(3161.728)	(2858.967)	(3144.980)	(2842.915)
Share of Construction$_{t-1}$	583.758	583.758	2197.836	2197.836	954.597	954.597	2426.983	2426.983
	(3815.260)	(3449.918)	(3628.003)	(3279.545)	(3890.342)	(3517.811)	(3688.435)	(3334.173)
Population density$_{t-1}$			-0.005***	-0.005***			-0.005***	-0.005***
			(0.001)	(0.001)			(0.001)	(0.001)
Observations	1890	1890	1890	1890	1890	1890	1890	1890
R^2	0.656	0.656	0.670	0.670	0.656	0.656	0.670	0.670
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.011	0.011*	0.007	0.007	0.009	0.009	0.004	0.004
	(0.007)	(0.006)	(0.008)	(0.007)	(0.008)	(0.007)	(0.009)	(0.007)
GDP per capita$_{t-1}$	0.056	0.056	0.063	0.063*	0.053	0.053	0.061	0.061*
	(0.039)	(0.035)	(0.039)	(0.034)	(0.038)	(0.033)	(0.037)	(0.033)
Unemployment rate$_{t-1}$	-5804.214	-5804.214	-3304.478	-3304.478	-5405.851	-5405.851	-3035.115	-3035.115
	(6687.319)	(5892.163)	(7021.684)	(6178.313)	(6675.410)	(5881.670)	(7029.487)	(6185.178)
Share of Construction$_{t-1}$	8287.511**	8287.511**	8080.623**	8080.623**	8468.586**	8468.586**	8202.410**	8202.410**
	(3763.547)	(3316.043)	(3831.557)	(3371.350)	(3876.944)	(3415.956)	(3920.472)	(3449.586)
Population Density$_{t-1}$			-0.008*	-0.008**			-0.008**	-0.008**
			(0.004)	(0.003)			(0.004)	(0.003)
Observations	450	450	450	450	450	450	450	450
R^2	0.739	0.739	0.745	0.745	0.738	0.738	0.745	0.745
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Net migration, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) control for regional Population density as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

1.6.1 Robustness

Regional Classification

To check for the robustness of our results, we take the control and dependent variables on the migration flows at the ROR[56] level.

Binary specification

We carry out the baseline analysis using a binary bite intensity indicator[57] instead of a continuous *fraction* or *kaitz index*. Figure 1.4a and Figure 1.4b show the

[56] As per the level of the regional bite indicator.

[57] See Section 1.3.2 for its construction

distribution of the binary indicator originally measured in *fraction* impacted by the MW in the region. The results are in line with different specifications. Using a similar indicator for West Germany we carry out the year-by-year event analysis and map the effects post-introduction of the MW policy.

Sectoral minimum wages

We further restrict the eligibility criteria to the employees belonging to sectors that did not have an existing sectoral minimum[58] wage in place. Applying the sectoral minimum constraint on the data, we drop the ROR *Prignitz-Oberhavel*[1204][59] from the sample for the non-representativeness of the sample[60] leaving us with 93 RORs. This corresponds to the *Sample 2* in Table 1.1. The results are in line with the baseline specifications, and with the event study analysis.

Weighting

The GSOEP data comes with weights at the ROR level, and we further use the weighted data to see if the results align with our baseline specification results without weights. We use the weights for the bite at ROR level, and our results are in line with the baseline specifications and the results hold also when carrying out other robustness tests.

Spatial correlation

We use the arbitrary correlation regressions to incorporate standard errors that account for spatial correlation[61] between labour market regions (Colella et al., 2019). The regressions are included in our baseline and the event study analysis and impact mostly the standard errors and in some cases the significance levels of our results.

[58] See Section 1.2 for the detailed explanation
[59] *Prignitz, Ostprignitz-Ruppin and Oberhave*l kreises
[60] The number of eligible employees in the region less than 30 (GSOEP 2013)
[61] Caliendo and Wittbrodt (2022) follows the same approach

1.6.2 Event study analysis

We carry out an event study to better assess the impact and the magnitude of change in mobility indicators using the defined segregation of the Kreises into *high or low bite* intensity regions at the median[62]. As the wage distribution between West and East Germany is different (Bachmann et al., 2020), the effects of the minimum wage on migration could potentially vary; hence, the event study is carried out separately for the two regions[63].

We include in the paper the study on West Germany for the years 2011-2016, as it comprises a relatively higher number Kreises (315) and a higher degree of heterogeneity, relying on the regional bite intensity constructed using actual wages and including the interactions between the high-bite intensity dummies with the respective time dummies keeping 2013 as our baseline[64].

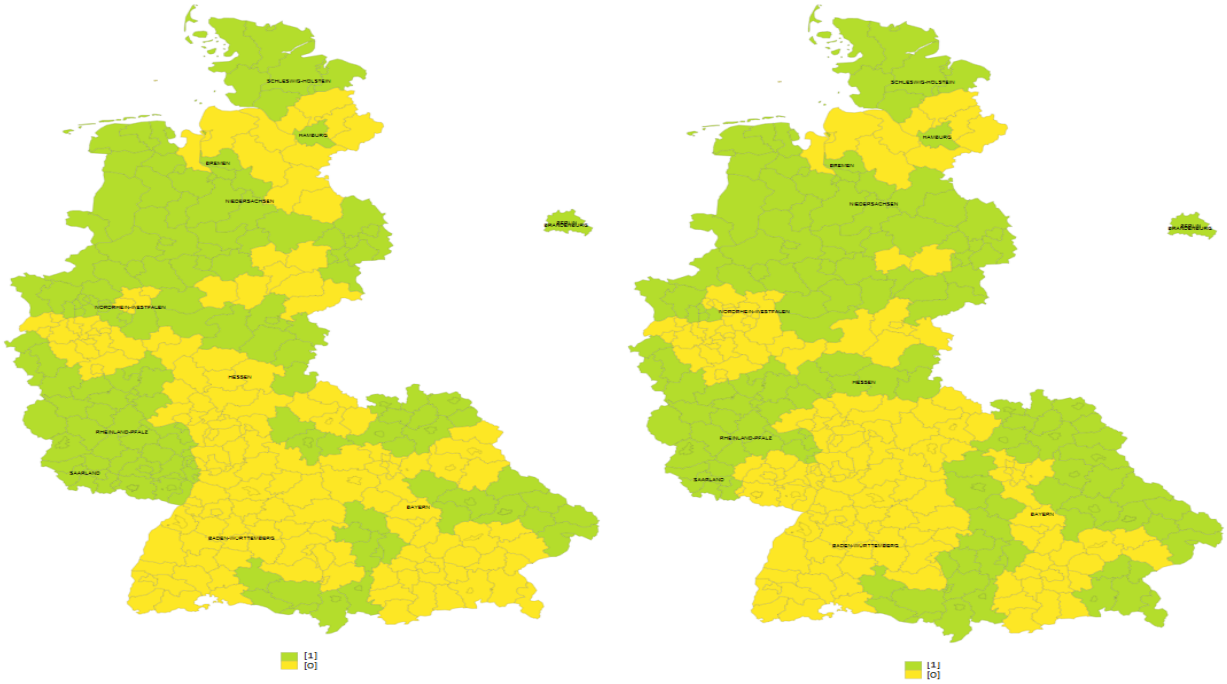
$$NET^{w}_{Kreise,\tau} = \alpha + \sum_{\tau=2011\tau\neq2013}^{\tau=2017} \beta_\tau * DBite2013^{w}_{ROR} * D_\tau + \sum_{\tau=2011\tau\neq2013}^{\tau=2017} \mu_\tau * D_\tau + \theta_{Kreise} + \delta * X_{Kreise,t} + \epsilon_{ROR} \tag{1.9}$$

The dependent variables will be used to map the migrant proportion and the net flow of internal and external migrants by Kreise, respectively, see Table A.2, β measures the treatment effect of the minimum wage, D_τ and θ are included to control for time-fixed and region-fixed effects and regional controls like unemployment rate, employees in the construction sector, GDP per capita (log), and population density are added as well in their lagged values, δ measures the effect of a vector of individual characteristics. The Bite measures taken are *fraction* and *kaitz index* with w=(Actual, Contractual wages) as two different specifications. The standard errors are clustered

[62] I consider high-intensity regions as treated.

[63] We document the results for West Germany, for the heterogeneity within the regions and the significance of results

[64] The particular year of 2013 is ideal as it helps to visualize the existing anticipation effects if any, and it is close to the policy introduction in 2015. Analysis was carried out using 2012 and 2014 as baselines, respectively



(a) Bite- Fraction (Binary) (b) Bite- Kaitz Index (Binary)

Figure 1.7: Bite (Binary)- Fraction (a) and Kaitz Index (b), GSOEP 2013- West Germany

at the ROR level[65]. We further estimate the coefficients using arbitrary spatial correlation as suggested by Colella et al., 2019.

In the event study analysis, $DBite2013$[66], is the dummy for high-bite intensity regions and D_τ is the year dummy. We run regressions based on the Eq. 1.9 for other migration outcome variables.

Plotting the coefficients, we see the results captured post-2015, and only in 2016 were the results significant, implying the adjustment mechanism took a year to finally influence the migration flows based on the introduction of the minimum wage policy.

Table 1.8 and Table 1.9 shows the event study analysis, the year-by-year change in the outcomes of interest in high-bite intensity regions relative to the low-bite regions in the West. For the outcome variable *Migrant Proportion*, the introduction of minimum wage in the year 2015 attracted 0.148 percentage points (henceforth,

[65] As the bite is also calculated at the ROR level

[66] The baseline year 2013 is used to avoid the anticipatory effects in the bite calculation, and the results for the year 2014 indicate some effects

Table 1.8: Event study analysis- Migrant Proportion

	West Germany			
	(1)	(2)	(3)	(4)
DBite X 2011	0.110	0.110	0.109	0.109
	(0.154)	(0.141)	(0.144)	(0.132)
DBite X 2012	-0.016	-0.016	0.003	0.003
	(0.025)	(0.023)	(0.028)	(0.025)
DBite X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
DBite X 2014	0.028	0.028	0.012	0.012
	(0.031)	(0.028)	(0.031)	(0.028)
DBite X 2015	0.060	0.060	0.028	0.028
	(0.082)	(0.075)	(0.079)	(0.072)
DBite X 2016	0.148**	0.148**	0.102	0.102
	(0.067)	(0.061)	(0.073)	(0.067)
DBite X 2017	0.111**	0.111**	0.059	0.059
	(0.054)	(0.049)	(0.064)	(0.058)
GDP per capita$_{t-1}$	0.025**	0.025**	0.028**	0.028**
	(0.012)	(0.011)	(0.012)	(0.011)
Unemployment rate$_{t-1}$	-9209.709	-9209.709	-11430.730*	-11430.730**
	(6291.472)	(5763.044)	(6039.693)	(5530.936)
Share of Construction$_{t-1}$	358.946	358.946	2966.845	2966.845
	(5748.892)	(5266.035)	(5757.459)	(5272.477)
Population density$_{t-1}$			-0.007***	-0.007***
			(0.002)	(0.002)
Observations	2205	2205	2205	2205
R^2	0.721	0.721	0.738	0.738
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the Migration Proportion, the coefficients of interest are the ones for the interaction of the bite dummy for high intensity and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3) and (4) control for regional Population density as well. Specifications (2) and (6) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

p.p) more migrants to the regions with high-bite intensity than the low-bite intensity regions in the year 2016[67] in West Germany. For the outcome variable *Net flow*, we find a positive change of 0.153 p.p more in kreises with high-bite intensity relative to the low ones in the year 2016[68]. The results are the same when the regressions are run using the arbitrary spatial correlations (Colella et al., 2019). Figures 1.8a and 1.8b plot the coefficient to portray these effects. The year of introduction did not reflect the *magnet effect*, most probably for the adjustment time or the flow of information and the peer effect. The central underlying assumption of the regional *bite* intensity at the ROR level being representative of the constituent kreises will be relaxed in the extension[69] to the paper with the *bite* calculated at different regional

[67]The impact falls to 0.111 p.p in 2017. The results for the year 2017 must be interpreted with caution as the minimum wage level was further revised on the suggestions of the Minimum Wage Commission

[68]0.146 p.p in 2017

[69]Explained in detail in the Section 1.7

Table 1.9: Event study analysis- Net migration

	West Germany			
	(1)	(2)	(3)	(4)
DBite X 2011	0.024	0.024	0.024	0.024
	(0.047)	(0.043)	(0.051)	(0.046)
DBite X 2012	-0.022	-0.022	-0.008	-0.008
	(0.031)	(0.028)	(0.029)	(0.027)
DBite X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
DBite X 2014	0.063	0.063	0.052	0.052
	(0.048)	(0.044)	(0.046)	(0.042)
DBite X 2015	0.092	0.092	0.070	0.070
	(0.088)	(0.080)	(0.083)	(0.076)
DBite X 2016	0.153**	0.153**	0.121*	0.121*
	(0.070)	(0.065)	(0.071)	(0.065)
DBite X 2017	0.146**	0.146**	0.109*	0.109*
	(0.068)	(0.062)	(0.064)	(0.058)
GDP per capita$_{t-1}$	-0.007	-0.007	-0.005	-0.005
	(0.005)	(0.005)	(0.005)	(0.004)
Unemployment rate$_{t-1}$	-5017.506*	-5017.506*	-6569.223**	-6569.223**
	(2978.774)	(2728.583)	(2967.790)	(2717.797)
Share of Construction$_{t-1}$	-2395.812	-2395.812	-573.804	-573.804
	(3786.606)	(3468.564)	(3744.775)	(3429.332)
Population density$_{t-1}$			-0.005***	-0.005***
			(0.001)	(0.001)
Observations	2205	2205	2205	2205
R^2	0.631	0.631	0.650	0.650
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

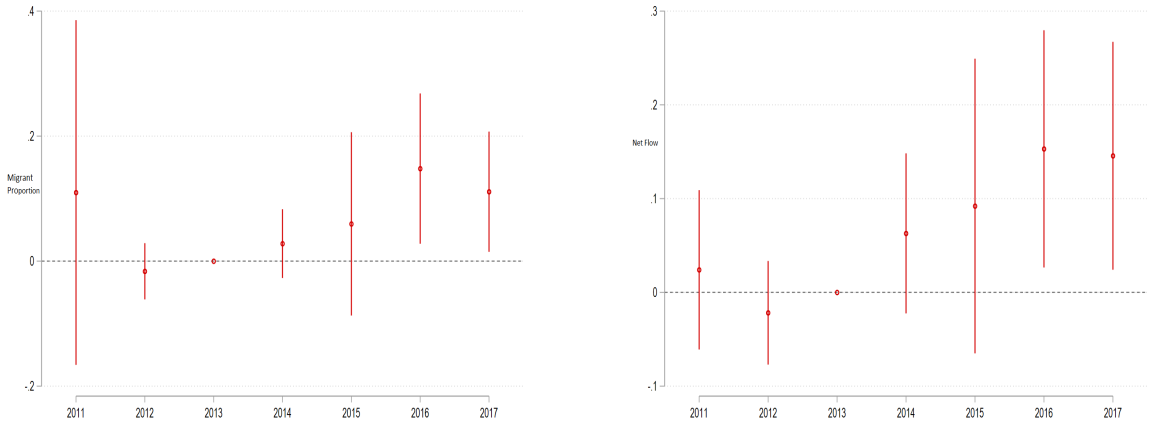
Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the Net migration, the coefficients of interest are the ones for the interaction of the bite dummy for high intensity and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3) and (4) control for regional Population density as well. Specifications (2) and (6) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

levels, hence the results are only suggestive. The results using the contractual wages of the employees, see Appendix Table **??** and Table **??** point in the same direction.

1.6.3 Heterogeneity analysis

The heterogeneity analysis would include the characteristics of the migrants, whether internal or external. Also, running the analysis for the category of migrants- early career or women migrants. The policy impacts the ones at the lower end of the income pyramid. Hence, we focus on the low-skilled/ early career migrants as an outcome variable to verify if the immigration inflows reflect the same. Also, for external migrants and the net flow of natives and foreigners, the heterogeneity analysis is based on gender. Finally, the policy is expected to impact natives and migrants who are in the early career entry or mid-age workers rather than the educational migrants or retirees, and we include the educational migrants as an



(a) Migrant Proportion %

(b) Net flow %

Figure 1.8: Event study analysis for West Germany, GSOEP 2013

outcome variable from the INKAR dataset to see if there exists an effect on this particular *sub-group*.

Internal and external migrants

The policy is expected to impact the internal movements of both natives and migrants, with literature indicating that migrants who have been in the host country for more time move internally at a higher rate with the increases in the minimum wage. Considering only the external migrants from the INKAR data we see the impact of the policy introduction on the international in the initial years. As posed by Giulietti (2014), we check if the high bite intensity regions were a magnet to pull migrants into those regions. The results are not significant[70] considering the internal and external migration balance. Since the precision of the bite will improve using SES data, we would re-run the regressions with the SES 2014 bite measures.

Following the work of Parikh, Van Leuvensteijn, et al. (2003), we use gross migration flows or gross migration rates as a dependent variable to isolate push and pull factors as emigration and immigration flows can be correlated. We find significant results using the *kaitz index* indicator. We see a positive 0.42 p.p. change in the gross inflows of migrants in the high-intensity regions in the year

[70] As an extension to the paper, we would re-run the analysis with the SES 2014 bite post-extraction, as explained in discussion Section 1.7

of introduction.

Table 1.10: Effect on the Gross flow of migrants (Kaitz Index)

	West Germany			
	(1)	(2)	(3)	(4)
DBite$_K$ X 2011	0.006	0.006	-0.005	-0.005
	(0.057)	(0.052)	(0.057)	(0.052)
DBite$_K$ X 2012	0.019	0.019	0.024	0.024
	(0.037)	(0.034)	(0.037)	(0.034)
DBite$_K$ X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
DBite$_K$ X 2014	0.061	0.061	0.056	0.056
	(0.063)	(0.058)	(0.062)	(0.057)
DBite$_K$ X 2015	0.423*	0.423**	0.414*	0.414*
	(0.234)	(0.214)	(0.234)	(0.214)
DBite$_K$ X 2016	0.169	0.169	0.153	0.153
	(0.150)	(0.137)	(0.147)	(0.135)
DBite$_K$ X 2017	0.160	0.160	0.141	0.141
	(0.116)	(0.106)	(0.111)	(0.101)
GDP per capita$_{t-1}$	-0.009	-0.009*	-0.008	-0.008
	(0.006)	(0.005)	(0.006)	(0.005)
Unemployment rate$_{t-1}$	-9739.854**	-9739.854**	-10355.453**	-10355.453**
	(4880.864)	(4470.914)	(4865.900)	(4456.018)
Share of Construction$_{t-1}$	-9547.532	-9547.532	-8810.095	-8810.095
	(7482.996)	(6854.490)	(7461.575)	(6833.046)
Population density $_{t-1}$			-0.002	-0.002
			(0.002)	(0.002)
Observations	2205	2205	2205	2205
R^2	0.861	0.861	0.861	0.861
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density (women)	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the gross inflow rate of migrants; the coefficients of interest are with the interaction of the bite dummy for high intensity regions and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) have additional control for the regional Population density. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.11 shows an increase in the share of external migrants of 0.46 p.p. in 2015 and another 0.19 p.p. in the following year.

Early career migrants

As mentioned in the institutional setting, see Section 1.2, the minimum wage policy targets the lower income individuals[71] and the low-skilled migrants are expected to increase to a relatively higher degree with the MW introduction. We include other outcome variables- *Early Career Migrants*[72] from the INKAR [See Table A.4] includes the ratio of both natives and foreigners aged 25-30 to the total population of early career sub-population (%). Table A.7 shows the average change in the low-skilled migration. We further carry out an event study analysis of this outcome variable. Table 1.13 shows the year-by-year p.p. change of this sub-category of

[71] This points to the effectiveness of the minimum wage if it impacts its target group or not.

[72] Used as a proxy to low-skilled migrants

Table 1.11: Effect on the External migration (Kaitz Index)

	West Germany (Kaitz Index)			
	(1)	(2)	(3)	(4)
$DBite_K$ X 2011	0.040	0.040	0.039	0.039
	(0.048)	(0.044)	(0.049)	(0.045)
$DBite_K$ X 2012	-0.023	-0.023	-0.023	-0.023
	(0.033)	(0.031)	(0.034)	(0.031)
$DBite_K$ X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
$DBite_K$ X 2014	0.069	0.069	0.069	0.069
	(0.058)	(0.053)	(0.058)	(0.053)
$DBite_K$ X 2015	0.461**	0.461**	0.460**	0.460**
	(0.205)	(0.188)	(0.206)	(0.188)
$DBite_K$ X 2016	0.187*	0.187**	0.186*	0.186**
	(0.099)	(0.090)	(0.097)	(0.089)
$DBite_K$ X 2017	0.085	0.085	0.084	0.084
	(0.086)	(0.079)	(0.083)	(0.076)
GDP per $capita_{t-1}$	0.001	0.001	0.001	0.001
	(0.007)	(0.006)	(0.007)	(0.006)
Unemployment $rate_{t-1}$	-3960.063	-3960.063	-3991.035	-3991.035
	(3927.176)	(3597.328)	(3856.275)	(3531.440)
Share of $Construction_{t-1}$	-4829.160	-4829.160	-4792.057	-4792.057
	(6497.097)	(5951.398)	(6499.476)	(5951.990)
Population $density_{t-1}$			-0.000	-0.000
			(0.001)	(0.001)
Observations	2205	2205	2205	2205
R^2	0.553	0.553	0.553	0.553
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density (women)	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1
The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the external migration; the coefficients of interest are with the interaction of the bite dummy for high intensity regions and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) have additional control for the regional Population density. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

migrants in high-intensity regions relative to low-intensity regions using the bite indicator constructed using actual wages[73] in West Germany.

As with other outcome variables, the change is significant from the second year of the introduction with an increase of 1.034 p.p. in 2016[74]. In Figure 1.9 we plot the coefficients for the event analysis accounting for the arbitrary spatial correlations (Colella et al., 2019). The huge spike for the year 2016 points to the fact that the policy target group migrated to high-bite intensity regions to a great extent.

[73]See Appendix Table **??** and Table A.8 for the average and the event study results using contractual wages

[74]The effect lowers to a rise to 0.447 p.p. for the following year. The results for the year 2017 must be interpreted with caution in light of an increase in the minimum wage.

Table 1.12: Effect on the low-skilled migrants

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.477*	0.477*	0.381	0.381	0.038	0.038	-0.077	-0.077
	(0.274)	(0.248)	(0.268)	(0.243)	(0.298)	(0.270)	(0.293)	(0.264)
GDP per capita$_{t-1}$	-0.619**	-0.619***	-0.572**	-0.572***	-0.683***	-0.683***	-0.625***	-0.625***
	(0.249)	(0.225)	(0.231)	(0.209)	(0.240)	(0.217)	(0.223)	(0.201)
Unemployment rate$_{t-1}$	-291529.716**	-291529.716**	-336308.853**	-336308.853***	-326429.255**	-326429.255***	-377353.168***	-377353.168***
	(132365.630)	(119690.574)	(132022.605)	(119342.274)	(135421.663)	(122453.967)	(136320.442)	(123227.318)
Share of Construction$_{t-1}$	-5706.587	-5706.587	41979.036	41979.036	-19611.876	-19611.876	26908.160	26908.160
	(143235.832)	(129519.868)	(137703.424)	(124477.469)	(148385.156)	(134176.103)	(140791.354)	(127268.814)
Population density$_{t-1}$			-0.142***	-0.142***			-0.150***	-0.150***
			(0.029)	(0.026)			(0.029)	(0.027)
Observations	1890	1890	1890	1890	1890	1890	1890	1890
R^2	0.611	0.611	0.616	0.616	0.609	0.609	0.615	0.615
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.962	0.962	0.727	0.727	0.437	0.437	0.184	0.184
	(1.290)	(1.137)	(1.310)	(1.153)	(1.336)	(1.178)	(1.326)	(1.166)
GDP per capita$_{t-1}$	2.827	2.827	3.182	3.182	2.398	2.398	2.817	2.817
	(2.350)	(2.071)	(2.330)	(2.050)	(2.290)	(2.017)	(2.227)	(1.959)
Unemployment rate$_{t-1}$	303551.980	303551.980	442195.465	442195.465	338094.630	338094.630	476692.492	476692.492
	(679205.342)	(598444.411)	(674676.742)	(593641.633)	(725074.837)	(638859.793)	(722479.505)	(635702.829)
Share of Construction$_{t-1}$	251243.470	251243.470	239768.785	239768.785	273441.479	273441.479	257880.305	257880.305
	(543718.878)	(479067.969)	(520221.562)	(457737.993)	(559190.482)	(492699.922)	(531468.040)	(467633.662)
Population Density$_{t-1}$			-0.418***	-0.418***			-0.446***	-0.446***
			(0.111)	(0.098)			(0.110)	(0.097)
Observations	450	450	450	450	450	450	450	450
R^2	0.502	0.502	0.508	0.508	0.500	0.500	0.507	0.507
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the early career/ low-skilled migrants, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) control for regional Population density as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.13: Event study analysis- Low-skilled migrants- West Germany

	West Germany			
	(1)	(2)	(3)	(4)
DBite X 2011	0.042	0.042	0.042	0.042
	(0.166)	(0.152)	(0.173)	(0.158)
DBite X 2012	0.093	0.093	0.125	0.125
	(0.121)	(0.111)	(0.119)	(0.109)
DBite X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
DBite X 2014	0.192	0.192	0.166	0.166
	(0.142)	(0.130)	(0.140)	(0.128)
DBite X 2015	0.250	0.250	0.199	0.199
	(0.407)	(0.373)	(0.411)	(0.376)
DBite X 2016	1.034***	1.034***	0.958***	0.958***
	(0.346)	(0.317)	(0.342)	(0.314)
DBite X 2017	0.447**	0.447**	0.361*	0.361*
	(0.212)	(0.195)	(0.210)	(0.192)
GDP per capita$_{t-1}$	-0.043**	-0.043***	-0.038**	-0.038***
	(0.017)	(0.016)	(0.016)	(0.014)
Unemployment rate$_{t-1}$	-29857.537**	-29857.537**	-33511.381**	-33511.381***
	(13187.025)	(12079.432)	(12988.030)	(11893.977)
Share of Construction$_{t-1}$	9752.661	9752.661	14042.963	14042.963
	(11842.757)	(10848.070)	(11551.686)	(10578.624)
Population density$_{t-1}$			-0.012***	-0.012***
			(0.003)	(0.002)
Observations	2205	2205	2205	2205
R^2	0.595	0.595	0.600	0.600
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the early career migrants/ low-skilled migrants, the coefficients of interest are the ones for the interaction of the bite dummy for high intensity and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3) and (4) control for regional Population density as well. Specifications (2) and (6) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

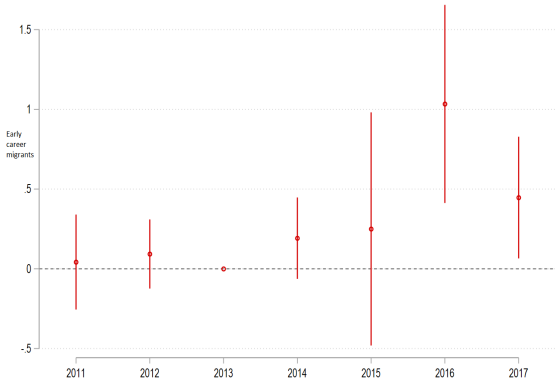


Figure 1.9: Coefficients plot for early career migrants

Gender

Table 1.14 shows the results for the average change in the net internal migration of women considering the period 2011-2016. Table **??** shows an increase in the internal net migration of women by 0.186 p.p in 2015 and a decreasing but yet positive change of 0.134 p.p in 2016[75]. In line with Caliendo and Wittbrodt (2022), who find that the gender gap decreases between the two waves of SES (2014 and 2018), we see the high-bite intensity regions for women witness more internal migration. We plot the coefficients of these increases in Figure 1.10. We do not find significant results for external migration of women[76] using the fraction indicator, while we document a positive

Accordingly, the migration effect for women on average is estimated by:

$$MIG_{W}{}^{w}_{Kreise,t} = \alpha + \beta * Bite_{W}2013^{w}_{ROR} * post2015 + \gamma_t + \theta_{Kreise} + \delta * X_{Kreise,t} + \epsilon_{ROR} \tag{1.10}$$

β measures the treatment effect of MW, $BiteW2013^{w}_{ROR}$ includes the regional bite intensity at ROR level[77], $post2015$ is a dummy with value 1 for the years post the introduction of the federal minimum wage, γ and θ are included for the time-fixed and region-fixed effects, δ measures the effect of a vector of regional characteristics

[75] And to 0.103 p.p for 2017

[76] Other factors apart from the existence of the minimum wage are also important to consider

[77] At present assumed to be the same for the constituting Kreises which will be substituted with the Bite calculated using SES 2014. The data extraction is expected for September 2023

like the unemployment rate, employees in the construction sector, GDP per capita (log), and population density in their lagged values in line with Dolton et al., 2015 and Dube et al., 2010. The Bite measures[78] taken are *fraction* and *Kaitz index* with w=Actual, Contractual wages as two different specifications. The standard errors are clustered at *Raumordnungsregionen*, ROR level.

Table 1.14: Effect on the Net flow of women migrants

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Bite^{w}$ X Post-MW reform	0.005	0.005	0.002	0.002	-0.001	-0.001	-0.004	-0.004
	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)
GDP per $capita_{t-1}$	-0.011*	-0.011*	-0.009	-0.009	-0.011*	-0.011**	-0.009	-0.009
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Unemployment $rate_{t-1}$	-605.581	-605.581	-1576.702	-1576.702	-1397.814	-1397.814	-2402.255	-2402.255
	(3837.542)	(3467.998)	(3533.770)	(3192.425)	(3599.773)	(3253.125)	(3335.078)	(3012.925)
Share of $Construction_{t-1}$	-4182.315	-4182.315	-2921.360	-2921.360	-4619.885	-4619.885	-3234.780	-3234.780
	(3701.526)	(3345.080)	(3516.535)	(3176.855)	(3716.634)	(3358.733)	(3502.499)	(3164.175)
Population $density^{w}{}_{t-1}$			-0.010***	-0.010***			-0.010***	-0.010***
			(0.002)	(0.002)			(0.002)	(0.002)
Observations	1830	1830	1830	1830	1830	1830	1830	1830
R^2	0.612	0.612	0.620	0.620	0.612	0.612	0.620	0.620
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.027**	0.027**	0.016	0.016	0.016	0.016*	0.009	0.009
	(0.012)	(0.010)	(0.014)	(0.012)	(0.010)	(0.009)	(0.012)	(0.010)
GDP per $capita_{t-1}$	0.062	0.062	0.078	0.078*	0.058	0.058	0.077	0.077*
	(0.056)	(0.049)	(0.053)	(0.046)	(0.056)	(0.050)	(0.053)	(0.046)
Unemployment $rate_{t-1}$	1790.724	1790.724	6505.630	6505.630	1387.213	1387.213	6539.374	6539.374
	(14980.888)	(13158.668)	(14872.984)	(13045.266)	(15229.403)	(13376.955)	(14992.036)	(13149.688)
Share of $Construction_{t-1}$	6260.518	6260.518	4936.929	4936.929	6844.216	6844.216	5161.203	5161.203
	(13353.884)	(11729.567)	(12375.845)	(10854.997)	(13352.628)	(11728.464)	(12257.861)	(10751.512)
Population $density^{w}{}_{t-1}$			-0.035***	-0.035***			-0.037***	-0.037***
			(0.006)	(0.005)			(0.007)	(0.006)
Observations	432	432	432	432	432	432	432	432
R^2	0.526	0.526	0.542	0.542	0.522	0.522	0.541	0.541
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Net migration of women, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) additional control of Population density of women as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

[78] See Section 1.3.2

Table 1.15: Event study analysis- Net Internal migration of Women

	West Germany			
	(1)	(2)	(3)	(4)
$DBite^{w}$ X 2011	0.022	0.022	0.021	0.021
	(0.060)	(0.055)	(0.061)	(0.055)
$DBite^{w}$ X 2012	0.030	0.030	0.041	0.041
	(0.036)	(0.033)	(0.034)	(0.031)
$DBite^{w}$ X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
$DBite^{w}$ X 2014	0.022	0.022	0.009	0.009
	(0.042)	(0.038)	(0.041)	(0.038)
$DBite^{w}$ X 2015	0.186*	0.186*	0.158	0.158
	(0.107)	(0.098)	(0.108)	(0.099)
$DBite^{w}$ X 2016	0.134*	0.134*	0.095	0.095
	(0.076)	(0.070)	(0.078)	(0.071)
$DBite^{w}$ X 2017	0.103*	0.103*	0.056	0.056
	(0.059)	(0.054)	(0.056)	(0.051)
GDP per $capita_{t-1}$	-0.007*	-0.007**	-0.006	-0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Unemployment $rate_{t-1}$	-2316.764	-2316.764	-3198.809	-3198.809
	(3191.437)	(2921.530)	(2877.268)	(2633.205)
Share of $Construction_{t-1}$	49.000	49.000	1880.167	1880.167
	(4052.945)	(3710.178)	(3931.342)	(3597.868)
Population $density^{w}{}_{t-1}$			-0.010***	-0.010***
			(0.002)	(0.002)
Observations	2135	2135	2135	2135
R^2	0.576	0.576	0.588	0.588
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density (women)	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the Net migration of women; the coefficients of interest are with the interaction of the bite dummy for high-intensity regions and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) have additional control for the regional Population density of women. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

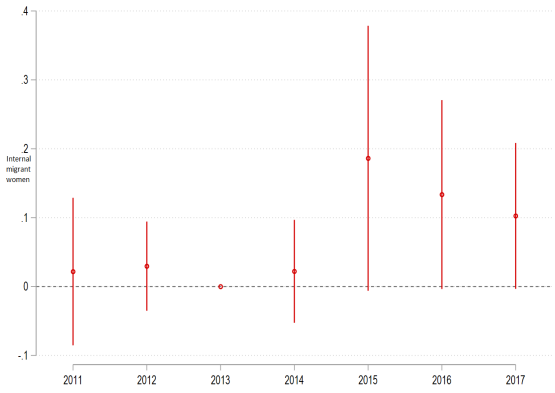


Figure 1.10: Coefficients plot for internal migrant women

Table 1.16 shows a positive change of 0.33 p.p. in the gross inflow of women migrants in the high-intensity regions. Like the net migration of women, the inflow of women migrants is impacted relatively to a lesser degree than the overall migration.

Table 1.17 shows an increase in the share of external women migrants of approx. 0.3 p.p. in 2015 and another 0.13 p.p. in the following year.

Table 1.16: Effect on the Gross flow of migrants (Kaitz Index)

	West Germany			
	(1)	(2)	(3)	(4)
$DBite^{w}_{K}$ X 2011	-0.048	-0.048	-0.052	-0.052
	(0.047)	(0.043)	(0.046)	(0.042)
$DBite^{w}_{K}$ X 2012	-0.029	-0.029	-0.022	-0.022
	(0.033)	(0.030)	(0.032)	(0.029)
$DBite^{w}_{K}$ X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
$DBite^{w}_{K}$ X 2014	0.070	0.070*	0.063	0.063
	(0.043)	(0.039)	(0.042)	(0.039)
$DBite^{w}_{K}$ X 2015	0.329**	0.329**	0.315**	0.315**
	(0.141)	(0.129)	(0.140)	(0.128)
$DBite^{w}_{K}$ X 2016	0.091	0.091	0.069	0.069
	(0.113)	(0.103)	(0.112)	(0.103)
$DBite^{w}_{K}$ X 2017	0.126	0.126	0.098	0.098
	(0.090)	(0.083)	(0.089)	(0.081)
GDP per $capita_{t-1}$	-0.005	-0.005	-0.004	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Unemployment $rate_{t-1}$	-6905.035*	-6905.035**	-7396.847*	-7396.847**
	(3754.538)	(3437.008)	(3810.866)	(3487.611)
Share of $Construction_{t-1}$	-5192.814	-5192.814	-4285.447	-4285.447
	(5166.308)	(4729.382)	(5133.046)	(4697.638)
Population $density^{w}_{t-1}$			-0.005**	-0.005**
			(0.002)	(0.002)
Observations	2135	2135	2135	2135
R^2	0.916	0.916	0.916	0.916
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density (women)	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the inflow of women; the coefficients of interest are with the interaction of the bite dummy for high intensity regions and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) have additional control for the regional Population density of women. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.19 shows a positive change of 0.86 p.p. in the low-skilled women migrants share in the high-intensive regions relative to the low ones. Though the result does not prove our *Hypothesis 3b* for the effect to be greater than the overall low-skilled migration, the effect is still considerably significant. The potential barriers to mobility, especially for external women migrants, might be driving the results.

Table 1.17: Effect on the External Women migration (Kaitz Index)

	West Germany- Kaitz Index			
	(1)	(2)	(3)	(4)
$DBite^{w}{}_{g}X$ 2011	0.032	0.032	0.032	0.032
	(0.040)	(0.036)	(0.040)	(0.036)
$DBite^{w}$ X 2012	-0.016	-0.016	-0.016	-0.016
	(0.026)	(0.024)	(0.026)	(0.024)
$DBite^{w}$ X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
$DBite^{w}$ X 2014	0.036	0.036	0.036	0.036
	(0.038)	(0.035)	(0.038)	(0.035)
$DBite^{w}$ X 2015	0.297**	0.297***	0.298**	0.298***
	(0.120)	(0.110)	(0.120)	(0.110)
$DBite^{w}$ X 2016	0.125*	0.125**	0.126**	0.126**
	(0.063)	(0.058)	(0.063)	(0.058)
$DBite^{w}$ X 2017	0.073	0.073	0.075	0.075
	(0.066)	(0.060)	(0.064)	(0.059)
GDP per $capita_{t-1}$	0.001	0.001	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Unemployment $rate_{t-1}$	-2715.430	-2715.430	-2682.502	-2682.502
	(2536.789)	(2322.247)	(2520.386)	(2306.595)
Share of $Construction_{t-1}$	-3541.487	-3541.487	-3602.236	-3602.236
	(4712.848)	(4314.272)	(4684.774)	(4287.390)
Population $density^{w}{}_{t-1}$			0.000	0.000
			(0.002)	(0.002)
Observations	2135	2135	2135	2135
R^2	0.613	0.613	0.613	0.613
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density (women)	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the external migration of women; the coefficients of interest are with the interaction of the bite dummy for high intensity regions and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) have additional control for the regional Population density of women. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.19: Event study analysis- Low-skilled women migration

	West Germany			
	(1)	(2)	(3)	(4)
$DBite^{w}$ X 2011	0.108	0.108	0.106	0.106
	(0.158)	(0.145)	(0.163)	(0.149)
$DBite^{w}$ X 2012	0.056	0.056	0.080	0.080
	(0.155)	(0.142)	(0.155)	(0.142)
$DBite^{w}$ X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
$DBite^{w}$ X 2014	0.063	0.063	0.034	0.034
	(0.157)	(0.144)	(0.154)	(0.141)
$DBite^{w}$ X 2015	0.329	0.329	0.269	0.269
	(0.236)	(0.216)	(0.235)	(0.215)
$DBite^{w}$ X 2016	0.859**	0.859***	0.777**	0.777**
	(0.364)	(0.333)	(0.356)	(0.326)
$DBite^{w}$ X 2017	0.219	0.219	0.119	0.119
	(0.197)	(0.180)	(0.187)	(0.171)
GDP per $capita_{t-1}$	-0.044***	-0.044***	-0.041***	-0.041***
	(0.016)	(0.015)	(0.015)	(0.014)
Unemployment $rate_{t-1}$	-26092.098**	-26092.098**	-27976.544**	-27976.544**
	(12305.192)	(11264.513)	(12327.163)	(11281.517)
Share of $Construction_{t-1}$	4606.196	4606.196	8518.395	8518.395
	(11221.902)	(10272.840)	(10981.779)	(10050.255)
Population $density^{w}{}_{t-1}$			-0.022***	-0.022***
			(0.005)	(0.005)
Observations	2135	2135	2135	2135
R^2	0.661	0.661	0.666	0.666
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density (women)	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the early career migrants/ low-skilled women migrants, the coefficients of interest are the ones for the interaction of the bite dummy for high intensity and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) have additional control for the regional population density of women. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.18: Effect on the Low-skilled women migration

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite^{w} X Post-MW reform	0.033**	0.033**	0.026*	0.026**	0.021	0.021	0.014	0.014
	(0.015)	(0.013)	(0.014)	(0.013)	(0.015)	(0.014)	(0.014)	(0.013)
GDP per capita$_{t-1}$	-0.054**	-0.054***	-0.050**	-0.050***	-0.057***	-0.057***	-0.052***	-0.052***
	(0.021)	(0.019)	(0.020)	(0.018)	(0.021)	(0.019)	(0.020)	(0.018)
Unemployment rate$_{t-1}$	-31791.373**	-31791.373***	-34187.236**	-34187.236***	-33640.448**	-33640.448***	-36091.589**	-36091.589***
	(13037.941)	(11782.425)	(13407.195)	(12112.125)	(13282.727)	(12003.639)	(13697.535)	(12374.419)
Share of Construction$_{t-1}$	-2991.468	-2991.468	119.447	119.447	-4409.053	-4409.053	-1028.975	-1028.975
	(12652.700)	(11434.282)	(12225.867)	(11044.907)	(12989.369)	(11738.531)	(12548.324)	(11336.216)
Population density^{w} $_{t-1}$			-0.024***	-0.024***			-0.025***	-0.025***
			(0.007)	(0.006)			(0.007)	(0.006)
Observations	1830	1830	1830	1830	1830	1830	1830	1830
R^2	0.663	0.663	0.667	0.667	0.662	0.662	0.667	0.667
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.061	0.061	0.046	0.046	0.038	0.038	0.028	0.028
	(0.043)	(0.038)	(0.046)	(0.041)	(0.038)	(0.034)	(0.040)	(0.035)
GDP per capita$_{t-1}$	0.219	0.219	0.242	0.242	0.211	0.211	0.239	0.239
	(0.171)	(0.150)	(0.172)	(0.151)	(0.169)	(0.148)	(0.170)	(0.149)
Unemployment rate$_{t-1}$	13792.993	13792.993	20302.366	20302.366	12831.119	12831.119	20310.621	20310.621
	(58788.935)	(51638.066)	(59303.543)	(52015.824)	(59217.669)	(52014.651)	(59663.562)	(52331.600)
Share of Construction$_{t-1}$	19137.076	19137.076	17309.736	17309.736	20676.560	20676.560	18233.295	18233.295
	(34724.014)	(30500.313)	(33451.053)	(29340.306)	(33955.150)	(29824.971)	(32406.802)	(28424.381)
Population density^{w} $_{t-1}$			-0.049*	-0.049**			-0.054**	-0.054**
			(0.025)	(0.022)			(0.025)	(0.022)
Observations	432	432	432	432	432	432	432	432
R^2	0.522	0.522	0.525	0.525	0.520	0.520	0.524	0.524
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the low-skilled/ early career migration of women, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) additional control of Population density of women as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Other migrants

As per the policy, the minimum wage should not have any impact on educational migrants or asylum seekers[79], and as they are not the target groups, see Appendix Table A.4 for explanation and hence we check that by including them as the outcome variables. The absence of an effect on these outcome variables in the initial years of the policy introduction signifies that the policy impacts only the targeted group. As for the asylum seekers, many of them cannot participate in the labour force for an initial period at times pending a decision on their asylum application in the Common European Asylum System (CEAS)[80] and hence the minimum wage, in theory, will not impact the location choices. Until 2016 most of the traineeships/

[79]The outcome variable for asylum migrants is being measured during the period of 'migrant crisis' 2015-16 entailed a massive flux of refugee migrants to Germany

[80]The minimum waiting time for asylum seekers is of 3 months without the possibility to work which have detrimental effects socio-economic integration (Hainmueller et al., 2016 and Jackson and Bauder, 2014).

apprenticeships were not covered under minimum wage, but adding more years to our timeline from 2011-2016 might change the results. Educational migrants' choice of location depends on a battery of welfare generosity concerns of the region and not merely the minimum wage. They form part of the potential early career individuals in the labour force.

Table 1.20 and Table 1.21 show the year-by-year effect on educational and asylum migrants using the fraction bite indicator calculated using the actual wages[81]. The results are not significant for educational migrants, by the expected outcomes. The results for asylum seekers are significant for the year before policy introduction[82] and hence not driven by minimum wage and we need to carry out the same regressions with SES 2014 bite ascertain the effect for the year of 2017[83].

[81]See Appendix Table A.9 for the one using contractual wages

[82]There might exist some spurious correlations driving the results, as we cannot control for an exogenous set of factors driving the migration decision

[83]We have not accounted for the minimum wage increase and the increase in the earnings wage potential and hence the results are only suggestive.

Table 1.20: Event study analysis, Educational migrants

	West Germany			
	(1)	(2)	(3)	(4)
DBite X 2011	-0.046	-0.046	-0.047	-0.047
	(0.216)	(0.198)	(0.238)	(0.218)
DBite X 2012	-0.005	-0.005	0.064	0.064
	(0.135)	(0.124)	(0.134)	(0.123)
DBite X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
DBite X 2014	0.094	0.094	0.037	0.037
	(0.185)	(0.170)	(0.183)	(0.168)
DBite X 2015	0.168	0.168	0.058	0.058
	(0.536)	(0.491)	(0.548)	(0.502)
DBite X 2016	0.651	0.651	0.489	0.489
	(0.494)	(0.453)	(0.480)	(0.439)
DBite X 2017	0.283	0.283	0.098	0.098
	(0.230)	(0.211)	(0.248)	(0.227)
GDP per capita$_{t-1}$	-0.031	-0.031	-0.021	-0.021
	(0.027)	(0.024)	(0.027)	(0.024)
Unemployment rate$_{t-1}$	-13113.228	-13113.228	-20961.303	-20961.303*
	(13812.022)	(12651.934)	(13325.499)	(12203.020)
Share of Construction$_{t-1}$	6452.020	6452.020	15667.143	15667.143
	(24870.430)	(22781.533)	(23886.756)	(21874.644)
Population density$_{t-1}$			-0.025***	-0.025***
			(0.005)	(0.005)
Observations	2205	2205	2205	2205
R^2	0.688	0.688	0.699	0.699
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the educational migrants, the coefficients of interest are the ones for the interaction of the bite dummy for high intensity and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives 15-64, the share of construction workers and specifications (3), and (4) control for regional Population density as well. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table 1.21: Event study analysis, Asylum migrants

	West Germany			
	(1)	(2)	(3)	(4)
DBite X 2011	-0.014	-0.014	-0.014	-0.014
	(0.022)	(0.020)	(0.023)	(0.021)
DBite X 2012	-0.018	-0.018	-0.020*	-0.020*
	(0.012)	(0.011)	(0.012)	(0.011)
DBite X 2013 (Baseline)	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
DBite X 2014	0.050***	0.050***	0.052***	0.052***
	(0.013)	(0.012)	(0.013)	(0.012)
DBite X 2015	0.021	0.021	0.025	0.025
	(0.064)	(0.059)	(0.064)	(0.059)
DBite X 2016	0.107	0.107	0.111	0.111
	(0.114)	(0.104)	(0.113)	(0.104)
DBite X 2017	0.210*	0.210**	0.215*	0.215**
	(0.113)	(0.104)	(0.112)	(0.103)
GDP per capita$_{t-1}$	0.005	0.005	0.005	0.005
	(0.009)	(0.008)	(0.009)	(0.009)
Unemployment rate$_{t-1}$	-5549.043	-5549.043*	-5329.553	-5329.553*
	(3420.502)	(3132.981)	(3428.146)	(3139.128)
Share of Construction$_{t-1}$	-13785.013	-13785.013	-14063.313	-14063.313
	(15876.541)	(14541.986)	(15728.758)	(14402.708)
Population density$_{t-1}$			0.001	0.001
			(0.001)	(0.001)
Observations	2163	2163	2163	2163
R^2	0.818	0.818	0.818	0.818
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1
The table shows the results of the event study with fixed-effect estimations for West Germany (73 RORs). The dependent variable is the asylum migrants; the coefficients of interest are the ones for the interaction of the bite dummy for high intensity and the year dummy. The fraction indicator takes values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls (lagged)- GDP per capita(log), the unemployment rate of the natives15-64, the share of construction workers and specifications (3) and (4) control for regional Population density as well. Specifications (2) and (4) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

1.7 Conclusions and Discussions

The study finds a positive change in the migrant proportion for both natives and migrants and the Net Flow of external migrants in different regions with varying treatment intensity measured by the *bite* of the minimum wage policy.

The results for the high treatment intensity regions in West Germany have a positive change of 0.148 p.p. and 0.153 p.p in *migrant proportion* and *net flow* respectively for the year 2016[84]. This shows the *Hypothesis H1* holds for the existence of an impact of MW on the migration flows. The relatively higher fall in the migrant proportion could be driven by the likeliness that the migrants who had been living in the region with low bite intensity decide to move to a high-bite-intensity

[84]For 2017, the effect falls to 0.111 p.p. and 0.146 p.p. in migrants proportion and net flow respectively.

region post the introduction as suggested by Boffy-Ramirez (2013) in the case of the US. This effect could also be partly driven by the migrant workers moving from low-wage firms to bigger or more productive firms in high-bite intensity regions in West Germany[85]. Though economically marginal, it supports the plausible explanation of the increased share of low-wage workers experiencing lower unemployment, more so, the increased employment levels in 2016 (Ahlfeldt et al., 2018). Since, the policy targets low-wage employees, the degree of substitutability[86] is higher between natives and migrants (Piyapromdee et al., 2014)) and the Net Flow rate capturing economic mechanism is similar for native to that of migrants.

The results are in line with *Hypothesis 2a* on the impact on low-skilled migrants/ early career migrants[87] when even the internal mobility is accounted for, as in Giulietti (2014). We find a significant positive change in the low-skilled/ early career migrants of 1.034 p.p. in 2016[88]. At the same time, we test for the *Hypothesis 2b* and do not find any significant effects on the educational and asylum migrants[89] which points to the fact that they were not the intended policy target group unlike those of low-skilled. The results focusing on asylum migrants points show some spurious correlations as we could not control for an exhaustive set of variables that impact the mobility choices for seeking asylum, see Table 1.21.

As for testing the *Hypothesis 3a*, we find that the net internal migration balance has been affected positively since the first year of the introduction in 2015 by 0.186 p.p., followed by a change of 0.134 p.p. in 2016[90]. The presence of relatively higher internal displacements for women, who remain the target group given the wage disparity is in line with the literature on the minimum and the gender wage gap (Caliendo & Wittbrodt, 2022) and is the underlying mechanism supporting the location choice for the potential migrant women employees in these regions of

[85]Berlin included in the sample for its growth trajectory

[86]Quality of education or language skills might hold less importance for the low-wage sector employees

[87]See Table A.4 for the explanation of the outcome variable

[88]We find a positive change of 0.447 p.p. (2017)

[89]See A.4 for the outcome variables definition

[90]Further to 0.103 p.p. in 2017

high-bite intensity. We also document a 0.33 p.p. increase in the inflow of women migrants to focus on the pull factors (Parikh, Van Leuvensteijn, et al., 2003).

For the low-skilled women migrants, we find a positive change of 0.859 p.p. in the year 2016 in the high-bite intensity regions specific to women employees. The result for the change in the outcome variable is not greater than the overall change of low-skilled migrants as per our expected outcome *Hypothesis 3b*. This could be due to the gender differential mobility barriers between men and women.

We register a significant level of *internal* displacement both for natives and migrants, with a greater degree of movement for the early career migrants[91]. At the same time, women migrants get impacted to a higher degree in light of the presence of the gender-based wage gap (Caliendo & Wittbrodt, 2022). Over time, as and when the gap reduces the impact of the minimum wage increases would impact at par both men and women.

As mentioned in the institutional setting the issue of non-compliance hinders the envisioned effects of the minimum wage to some extent. Caliendo et al., 2017 show the existence of wage increase at the bottom of the wage distribution, but there is strong evidence at the same time that the wages had not adapted fully in 2015, and that 8% of the eligible population were still earning less than the minimum wage per hour shortly after the introduction (Burauel et al., 2017). This would harm the attractiveness of different regions to attract migrants. Our results show how the effect is diminishing for the initial two years post-introduction of the policy.

[91]See Table A.4 for the variable definition and measurement

Discussion

In terms of the policy implications as pointed out by Giulietti (2015), the policymakers could invest resources in this labour market instrument by setting the minimum wage to control immigration (internal and external) alongside border controls reflected by the immigration policy. In other words, Policymakers must implement integrated labor market policies that consider both minimum wage regulations and immigration policies together. The Labour Market Reforms Database, LABREF could be a good resource to carry out further analysis in this field. They must aim to establish mechanisms for continuous monitoring and evaluation of the impact of minimum wage policies on immigration and the broader economy using data-driven insights to refine policies and address emerging challenges. Also to monitor and address wage gaps within different sectors and occupations, with a particular focus on industries with a high representation of immigrant women.

1.7.1 Data limitations

The current geographical stratification to create the bite[92]: With the regional information datasets we could link numerous indicators to spatial planning regions, keeping in mind the sensitivity of the data. The assumption of the bite calculated at ROR being representative at Kreise[93] levels lead to some measurement errors and would be accounted for using SES data to create the bite. We would work with at the district level, *Kreise*[94] at which SES respondents can be differentiated and spatial indicators are aggregated[95]. We document these different levels of aggregations in Appendix Section A.1.6.

[92]Germany has a Non-official grid (NOG)- with German "Spatial Planning Region - *Raumordnungsregion*- ROR (96)" OECD (2018), an intermediate level between Territorial level 2- Bundesländer (16) and Territorial level 3- Kreise (401).

[93]On average a ROR consists of four Kreises

[94]Pending data extraction from SES, aggregated also at 141 Regional labour markets, RLMs (Caliendo et al., 2018) and 257 Labour market regions, AMRs (Caliendo & Wittbrodt, 2022)

[95]Aggregation is carried out also for the control variables included following the literature

1.7.2 Future scope

In the extension to the paper, we would control for the nationality of the migrants, and analyze the migration effects separately on the native (internal) and immigrant (external) population using the Federal Employment Agency datasets. Adding the information on nationality or educational qualification would enrich the analysis, using administrative data such as the one maintained by the Federal Employment Agency (FEA), as it could be used as a proxy for skill unlike our simplified identifying assumption considering all migrants at the same skill level. Another factor that we could analyse would be the seasonal trend on migration as the data is registered quarterly. We do not account for the length of stay of the migrants and as suggested in the previous research by Giulietti, 2015, this could be a driving factor for internal mobility and the choice of location. Another possible explanation could be the wage effect, as there was no impact found on the contractual hours worked, which in turn affected the monthly earnings (Caliendo et al., 2017).

References

Ahlfeldt, G. M., Roth, D., & Seidel, T. (2018). The regional effects of germany's national minimum wage. *Economics Letters*, *172*, 127–130.

and European Committee of the Regions, Jeffrey, P., Martinos, H., & Tödtling-Schönhofer, H. (2021). *A fair minimum wage for the eu workers from the local and regional perspective*. Committee of the Regions. https://doi.org/doi/10.2863/563439

Bachmann, R., Bonin, H., Boockmann, B., Demir, G., Felder, R., Isphording, I., Kalweit, R., Laub, N., Vonnahme, C., & Zimpelmann, C. (2020). *Effects of the statutory minimum wage on wages and working hours: Study commissioned by the minimum wage commission* (tech. rep.). RWI project reports.

Basu, B. (1995). Minimum wage, international migration and their effects on welfare. *International Economic Journal*, *9*(2), 101–120.

Boffy-Ramirez, E. (2013). Minimum wages, earnings, and migration. *IZA Journal of Migration*, *2*(1), 1–24.

Bundesamt, S. (2021). Dezember 2020: Erwerbstätigkeit nahezu unverändert gegenüber dem vormonat.

Burauel, P., Caliendo, M., Fedorets, A., Grabka, M. M., Schröder, C., Schupp, J., & Wittbrodt, L. (2017). Minimum wage not yet for everyone: On the compensation of eligible workers before and after the minimum wage reform from the perspective of employees. *DIW Economic Bulletin*, *7*(49), 509–522.

Cadena, B. C. (2014). Recent immigrants as labor market arbitrageurs: Evidence from the minimum wage. *Journal of urban Economics*, *80*, 1–12.

Caliendo, M., Fedorets, A., Preuss, M., Schröder, C., & Wittbrodt, L. (2017). The short-term distributional effects of the german minimum wage reform.

Caliendo, M., Fedorets, A., Preuss, M., Schröder, C., & Wittbrodt, L. (2018). The short-run employment effects of the german minimum wage reform. *Labour Economics*, *53*, 46–62.

Caliendo, M., & Wittbrodt, L. (2022). Did the minimum wage reduce the gender wage gap in germany? *Labour Economics*, *78*, 102228.

Card, D. (1992). Using regional variation in wages to measure the effects of the federal minimum wage. *Ilr Review*, *46*(1), 22–37.

Card, D., & Krueger, A. B. (2015). *Myth and measurement: The new economics of the minimum wage-twentieth-anniversary edition*. Princeton University Press.

Castillo- Freeman, A., & Freeman, R. B. (1992). When the minimum wage really bites: The effect of the us-level minimum on puerto rico. In *Immigration and the workforce: Economic consequences for the united states and source areas* (pp. 177–212). University of Chicago Press.

Colella, F., Lalive, R., Sakalli, S. O., & Thoenig, M. (2019). Inference with arbitrary clustering.

Di Nola, A., Haywood, L., & Wang, H. (2023). Gendered effects of the minimum wage. *Available at SSRN 4527956*.

DiNardo, J., Fortin, N. M., & Lemieux, T. (1996). Labor market institutions and the distribution of wages, 1973-1992: A semiparametric approach. *Econometrica*, *64*(5), 1001. https://doi.org/10.2307/2171954

Dolton, P., Bondibene, C. R., & Stops, M. (2015). Identifying the employment effect of invoking and changing the minimum wage: A spatial analysis of the uk. *Labour Economics*, *37*, 54–76.

Dolton, P., Bondibene, C. R., & Wadsworth, J. (2010). The uk national minimum wage in retrospect. *Fiscal studies*, *31*(4), 509–534.

Dube, A., Lester, T. W., & Reich, M. (2010). Minimum wage effects across state borders: Estimates using contiguous counties. *The review of economics and statistics*, *92*(4), 945–964.

Dustmann, C., Lindner, A., Schönberg, U., Umkehrer, M., & Vom Berge, P. (2020). Reallocation effects of the minimum wage. *Centre for Research and Analysis of Migration, University College London https://www. cream-migration. org/publ_uploads/CDP. pdf (letzter Zugriff 17.03. 2020)*.

für Bau, B. (2021). Stadt-und raumforschung (2021) inkar–indikatoren und karten zur raum-und stadtentwicklung. *Bundesamt für Bauwesen und Raumordnung, Bonn*.

Giulietti, C. (2014). Is the minimum wage a pull factor for immigrants? *ILR Review*, *67*(3_suppl), 649–674.

Giulietti, C. (2015). Do minimum wages induce immigration? *IZA World of Labor*.

Hainmueller, J., Hangartner, D., & Lawrence, D. (2016). When lives are put on hold: Lengthy asylum processes decrease employment among refugees. *Science advances*, *2*(8), e1600432.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: A two-sector analysis. *The American economic review*, *60*(1), 126–142.

Jackson, S., & Bauder, H. (2014). Neither temporary, nor permanent: The precarious employment experiences of refugee claimants in canada. *Journal of Refugee Studies*, *27*(3), 360–381.

Kaitz, H. (1970). Experience of the past: The national minimum. *Youth unemployment and minimum wages*, 30–54.

Kosfeld, R., & Werner, A. (2012). Deutsche arbeitsmarktregionen–neuabgrenzung nach den kreisgebietsreformen 2007–2011. *Raumforschung und Raumordnung*, *70*(1), 49–64.

Manning, A. (2021). The elusive employment effect of the minimum wage. *Journal of Economic Perspectives*, *35*(1), 3–26.

Martínez, M. J., & Martínez, M. J. (2021). Are the effects of minimum wage on the labour market the same across countries? a meta-analysis spanning a century. *Economic Systems*, *45*(1), 100849.

Mindestlohnkommission. (2016). *Erster bericht zu den auswirkungen des gesetzlichen mindestlohns. bericht der mindestlohnkommission an die bundesregierung.* Mindestlohngesetz, Berlin.

Müller, K.-U., & Steiner, V. (2010). *Labor market and income effects of a legal minimum wage in germany* (IZA Discussion Papers No. 4929). Institute of Labor Economics (IZA). https://EconPapers.repec.org/RePEc:iza:izadps:dp4929

Müller, K.-U., & Steiner, V. (2011). Beschäftigungswirkungen von lohnsubventionen und mindestlöhnen–zur reform des niedriglohnsektors in deutschland. *Zeitschrift für ArbeitsmarktForschung*, *44*(1), 181–195.

Müller, K.-U., & Steiner, V. (2013). Distributional effects of a minimum wage in a welfare state–the case of germany.

OECD. (2018). *Oecd regions and cities at a glance 2018.*

Orrenius, P. M., & Zavodny, M. (2008). The effect of minimum wages on immigrants' employment and earnings. *ILR Review*, *61*(4), 544–563.

Parikh, A., Van Leuvensteijn, M., et al. (2003). Internal migration in regions of germany: A panel data analysis. *Applied Economics Quarterly*, *49*(2), 173–192.

Paun, C. V., Nechita, R., Patruti, A., & Topan, M. V. (2021). The impact of the minimum wage on employment: An eu panel data analysis. *Sustainability*, *13*(16), 9359.

Peichl, A., & Ungerer, M. (2017). Equality of opportunity: East vs. west germany. *Bulletin of Economic Research*, *69*(4), 421–427.

Piyapromdee, S., et al. (2014). *The impact of immigration on wages, internal migration and welfare* (tech. rep.). Working paper.

Socio-Economic Panel, S. (2019). Socio-economic panel (soep), data for years 1984–2018, version 35. *SOEP.[Google Scholar]*.

Stewart, M. B. (2002). Estimating the impact of the minimum wage using geographical wage variation. *oxford Bulletin of Economics and Statistics*, *64*, 583–605.

Appendix A

Appendices

A.1 Chapter 1

A.1.1 Bite indicators

Table A.1: Bite measures and their differences

Attribute	Kaitz Index	Fraction
Definition	Ratio of minimum wage to median wage in a region.	Proportion of employees impacted by the minimum wage policy.
Calculation Formula	$Kaitz = \frac{MinimumWage}{MedianWage}$	$Fraction = \frac{\text{Number of Employees Affected}}{\text{Total Number of Employees}}$
Focus	Emphasizes minimum wage relative to median wage.	Quantifies the percentage of affected employees.
Interpretation	Higher Kaitz indicates gap between minimum and median.	Higher Fraction signifies a larger percentage of employees impacted.
Sensitivity to Region	Sensitive; reflects disparities in the median wage within a region.	Sensitive; reflects variations in both median and average wages in the region.
Use Cases	Analyzing wage distribution within regions.	Assessing broad impact of minimum wage policies on the workforce.
	Identifying areas with significant wage disparities.	Understanding the extent of workforce influenced by minimum wage changes.
	Policy planning to address regional income inequality.	Tailoring policies based on the proportion of employees affected.
Limitations	Ignores overall wage distribution variations.	Fraction influenced by scope and coverage of minimum wage policy.

A.1.2 Expected wage

The term z is the log expected wage; x represents a set of covariates to control for time-varying macroeconomic fundamentals of the state; ϵ is the error term. Giulietti (2014) represents in terms of the log components of employment and wage:

$$\Delta z_j = \Delta e_j + \Delta w_j \tag{A.1}$$

And following the structural models as in Card (1992), the wage and employment equations can be written as follows:

$$\Delta W_{j,2015} = \alpha + \beta Bite_{j,2013} + \mu_{1,j} \tag{A.2a}$$

$$\Delta E_{j,2015} = \gamma + \nu \Delta W_{j,2015} + \mu_{2,j} \tag{A.2b}$$

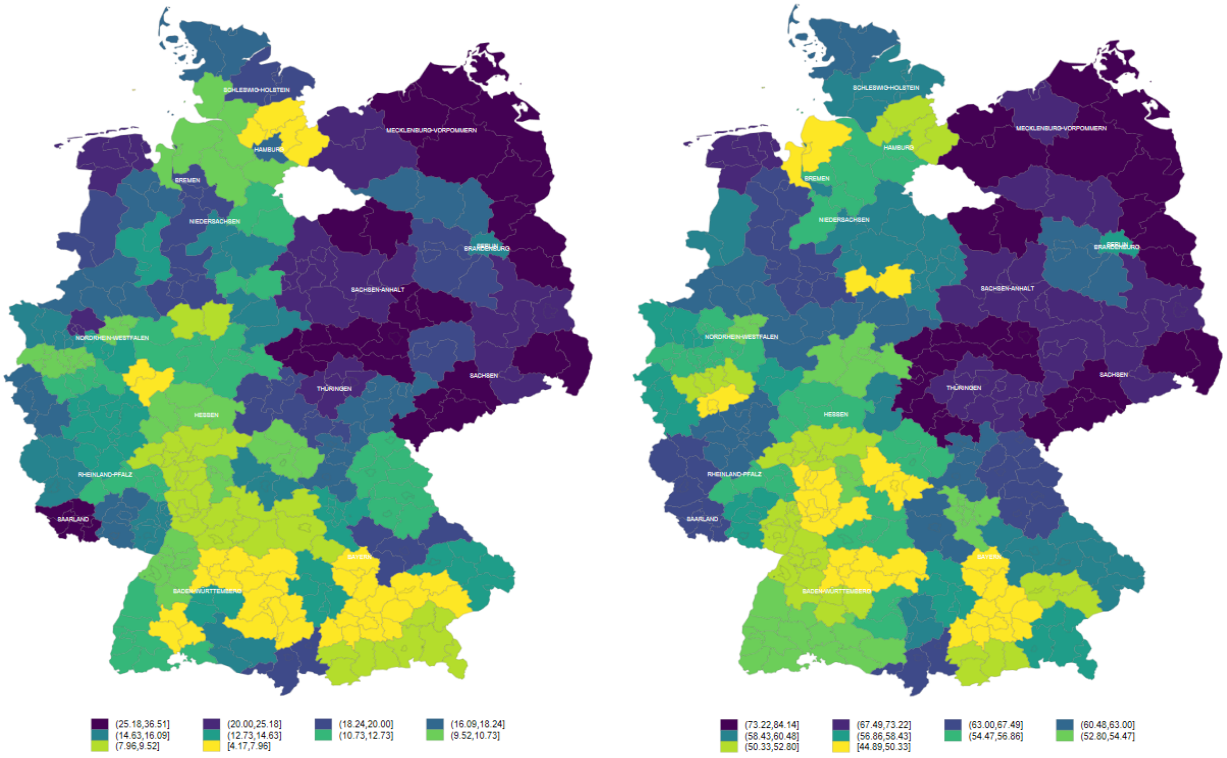
where $\Delta E_{j,2015}$ is the change in the employment for the region between 2014 and 2015. The wage change represented in Eq. (A.2a) depends on the average change α, the lagged minimum wage bite in the region j $(Bite_{j,2014})$[1] and an error term $(\mu_{1,j})$, and so β captures the average effect of the minimum wage on wages. The bite does not affect employment (E_j) directly. Based on the labour demand elasticity, η, they transfer $\Delta W_{j,2015}$ to employment changes. From Eq. (A.2a) and Eq. (A.2b), we obtain the following:

$$\Delta E_{j,2015} = \gamma_0 + \eta\beta Bite_{j,2013} + \epsilon_j \tag{A.3}$$

where $\epsilon_j = \eta\mu_1 j$ and $\gamma_0 = \gamma + \eta\alpha$ and $\eta\beta$ captures the effect of the minimum wage on employment

[1] In our case using GSOEP the lagged value is from the year 2013 to avoid anticipation effects.

A.1.3 Maps Contractual Wages



(a) Bite- Fraction in %

(b) Bite- Kaitz Index in %

Figure A.1: Bite- Fraction (a) and Kaitz Index (b), GSOEP 2013 (Contractual wages)

The maps in Figure A.1 are in line with the ones created using the actual wages, and the range of the bite is lower as noted by Caliendo et al., 2017, as the contractual wages do not include overtime payments, etc.

A.1.4 Migration outcome variables- INKAR data

Table A.2: Migration outcome: Migrant proportion and Net external flow

Variable	Variable detail	Equation	Notes
Proportion	Share of foreigners in %	Foreigners / total regional population x 100	Foreigners also include stateless persons and persons with undetermined nationalities. Persons who have both German and other nationalities are considered German citizens. Members of the stationing forces and diplomatic/consular missions and their family members are not statistically recorded. Since 1 January 2000, children of foreign parents acquire German citizenship if one parent has been habitually resident in Germany for eight years and has a residence permit or a permanent residence permit for three years. For the population, it should be noted that the figures before 2011 refer to the update based on the 1987 census (FRG) and 1981 (GDR) and from 2011 to the update based on the 2011 census. As of 31.12.
Net foreign migration	Net migration per 1,000 inhabitants	(Arrivals - Departures across the borders of the Federal Republic) / 1000 residents	The external migration balance includes only arrivals and departures beyond the borders of the Federal territory. The balances are formed from the inflows and outflows during the specified period and are related to the final population of this period. The reliability of migration balances may be affected by the under-reporting of registrations and withdrawals. Local or regional distortions can occur: emigrants, migrants, and asylum seekers are recorded as external migration gains in the central reception centers of the 'arrival regions', while the subsequent departures from the places or regions of reception are registered as internal migration losses. This discrepancy (extremely high positive external migration balances, extremely high negative internal migration balances) applies to isolated circles and should be taken into account in the interpretation. For the population, it should be noted that the figures before 2011 refer to the update on the basis of the 1987 census (FRG) and 1981 (GDR) and from 2011 to the update on the basis of the 2011 census.

Table A.3: Migration outcome: Internal women migrations and Low-skilled

Variable	Variable detail	Equation	Notes
Net internal migration of women	The total net migration of women per 1,000 female inhabitants	(Arrivals - departures of women within the Federal Republic) / 1000 female residents	Net internal migration covers only migration across municipal and district boundaries within the federal territory (internal federal migration). Removals within the municipalities (local moves) are not considered. The only changes to the main residence are hikes in the above sense. Arrivals and departures are mainly determined by means of registration forms. The balances are formed from the inflows and outflows during the specified period and are related to the final population of this period. The gender-differentiated indicator indicates that the characteristics of the group of women may differ (significantly) from the overall situation. The reliability of migration balances may be affected by the under-reporting of registrations and withdrawals. For the population, it should be noted that the figures before 2011 refer to the update based on the 1987 census (FRG) and 1981 (GDR) and from 2011 to the update on the basis of the 2011 census.
Career entry migrants (Low wage)	Net internal migration of inhabitants aged 25 to under 30 per 1,000 inhabitants of the age group.	(Arrivals - Departures of 25 to < 30-year-olds within the Federal Republic / 1000 residents of that group	Approximation of disparities in employment opportunities for young workers. Net internal migration covers only migration across municipal and district boundaries within the federal territory (internal federal migration). Removals within the municipalities (local moves) are not taken into account. Only changes to the main residence are considered to be hikes in the above sense. Arrivals and departures are mainly determined by means of registration forms. The balances are formed from the inflows and outflows during the specified period and are related to the final population of this period. The reliability of migration balances may be affected by the under-reporting of registrations and withdrawals. For the population, it should be noted that the figures before 2011 refer to the update on the basis of the 1987 census (FRG) and 1981 (GDR) and from 2011 to the update on the basis of the 2011 census.

Table A.4: Migration outcome: Educational and Asylum migrants

Variable	Variable detail	Equation	Notes
Educational migrants (high-skilled)	Net internal migration of inhabitants aged 18 to under 25 per 1,000 inhabitants of the age group.	(Arrivals - Departures of 18 to < 25-year-olds within the Federal Republic NetFlow / 1000 residents from the same group	Approximation of educational and vocational training migration or corresponding disparities. Characteristics are clearly shaped by the university locations. Net internal migration covers only migration across municipal and district boundaries within the federal territory (internal federal migration). Removals within the municipalities (local moves) are not considered. The only changes to the main residence are hikes in the above sense. Arrivals and departures are mainly determined by means of registration forms. The balances are formed from the inflows and outflows during the specified period and are related to the final population of this period. The reliability of migration balances may be affected by the under-reporting of registrations and withdrawals. For the population, it should be noted that the figures before 2011 refer to the update based on the 1987 census (FRG) and 1981 (GDR) and from 2011 to the update based on the 2011 census.
Asylum Seeker	Recipients of standard benefits under the Asylum Seekers Act per 1,000 inhabitants.	Recipients of standard benefits under the Asylum Seekers Act Asylum / 1000 Residents	Approximation of educational and vocational training migration or corresponding disparities. Characteristics are clearly shaped by the university locations. Net internal migration covers only migration across municipal and district boundaries within the federal territory (internal federal migration). Removals within the municipalities (local moves) are not considered. The only changes to the main residence are hikes in the above sense. Arrivals and departures are mainly determined by means of registration forms. The balances are formed from the inflows and outflows during the specified period and are related to the final population of this period. The reliability of migration balances may be affected by the under-reporting of registrations and withdrawals. For the population, it should be noted that the figures before 2011 refer to the update based on the 1987 census (FRG) and 1981 (GDR) and from 2011 to the update on the basis of the 2011 census.

Table A.5: Effect on the Migrants proportion

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.015***	0.015***	0.009*	0.009*	0.006	0.006	-0.003	-0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
GDP per capita$_{t-1}$	0.041**	0.041***	0.045***	0.045***	0.039**	0.039**	0.043***	0.043***
	(0.017)	(0.016)	(0.015)	(0.014)	(0.017)	(0.016)	(0.015)	(0.014)
Unemployment rate$_{t-1}$	-6103.265	-6103.265	-9107.006	-9107.006	-6726.301	-6726.301	-10031.847	-10031.847
	(7640.660)	(6909.007)	(7042.714)	(6366.285)	(7660.448)	(6926.900)	(7070.885)	(6391.750)
Share of Construction$_{t-1}$	5368.040	5368.040	8783.388	8783.388*	5475.542	5475.542	8579.070	8579.070*
	(5749.832)	(5199.240)	(5626.088)	(5085.721)	(5862.986)	(5301.559)	(5693.553)	(5146.706)
Population density$_{t-1}$			-0.010***	-0.010***			-0.010***	-0.010***
			(0.003)	(0.002)			(0.003)	(0.002)
Observations	1890	1890	1890	1890	1890	1890	1890	1890
R^2	0.734	0.734	0.758	0.758	0.733	0.733	0.757	0.757
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	-0.002	-0.002	0.000	0.000	-0.002	-0.002	0.001	0.001
	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
GDP per capita$_{t-1}$	0.081	0.081*	0.077	0.077*	0.081	0.081*	0.077	0.077*
	(0.051)	(0.045)	(0.052)	(0.046)	(0.052)	(0.045)	(0.052)	(0.046)
Unemployment rate$_{t-1}$	-10242.267	-10242.267*	-11491.926	-11491.926*	-10364.955	-10364.955*	-11473.354	-11473.354*
	(6784.871)	(5978.116)	(6775.982)	(5962.122)	(6805.902)	(5996.646)	(6730.491)	(5922.095)
Share of Construction$_{t-1}$	8273.104*	8273.104**	8398.186*	8398.186**	8234.895*	8234.895**	8397.604*	8397.604**
	(4638.950)	(4087.355)	(4663.098)	(4103.015)	(4637.319)	(4085.918)	(4670.282)	(4109.336)
Population Density$_{t-1}$			0.004	0.004			0.004	0.004
			(0.003)	(0.003)			(0.003)	(0.003)
Observations	450	450	450	450	450	450	450	450
R^2	0.648	0.648	0.650	0.650	0.648	0.648	0.650	0.650
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Migrant Proportion, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, using contractual wages both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7), and (8) control for regional Population density as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

A.1.5 Results- Contractual Wages

Table A.8: Event study analysis- Early Career migrants

	Year	Early career	
		(1)	(2)
	2011	0.248	0.248
		(0.163)	(0.149)
	2012	0.146	0.146
		(0.118)	(0.108)
	2013	0	0
Dummy bite for the high-intensity region by year	2014	0.055	0.055
		(0.148)	(0.136)
	2015	0.216	0.217
		(0.407)	(0.374)
	2016	0.888**	0.888***
		(0.358)	(0.328)
	2017	0.432*	0.432**
		(0.218)	(0.200)
	GDP	-0.044**	-0.044***
		(0.017)	(0.016)
	Constant	1.029	0.726
		(2.257)	(2.127)
	Region FE	Yes	Yes
	Year FE	Yes	Yes
	Observations	2205	2205
	R^2	0.594	0.594

Source: GSOEP 2013, INKAR; own calculations.

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The table displays the Event study results of fixed-effects estimations in a continuous difference-in-difference framework with region-fixed effects and standard errors clustered by region. The minimum wage bite is continuous for the west (73 RORs). The bite indicator is the Fraction in % using contractual wages. The dependent variable is the Early career migrants, age 25-30 (% early career population sub-population)- This is one of the target groups of the policy as it aims to impact the low-wage earners the most. Both specifications have controls for GDP per capita and the share of construction workers and the unemployed normalized at the Kreis level, Column (2) uses arbitrary spatial correlation regression as proposed by Colella et al. (2019).

Table A.6: Effect on the Net flow of migrants

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.012***	0.012***	0.009**	0.009***	0.013***	0.013***	0.009**	0.009***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)
GDP per capita$_{t-1}$	-0.010	-0.010	-0.009	-0.009	-0.011	-0.011*	-0.010	-0.010
	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Unemployment rate$_{t-1}$	-3273.794	-3273.794	-4766.951	-4766.951*	-3068.475	-3068.475	-4649.174	-4649.174*
	(3172.531)	(2868.736)	(3084.677)	(2788.404)	(3104.490)	(2807.211)	(3104.776)	(2806.572)
Share of Construction$_{t-1}$	299.041	299.041	1996.808	1996.808	858.263	858.263	2342.357	2342.357
	(3783.739)	(3421.416)	(3588.430)	(3243.773)	(3817.553)	(3451.992)	(3634.591)	(3285.500)
Population density$_{t-1}$			-0.005***	-0.005***			-0.005***	-0.005***
			(0.001)	(0.001)			(0.001)	(0.001)
Observations	1890	1890	1890	1890	1890	1890	1890	1890
R^2	0.656	0.656	0.670	0.670	0.657	0.657	0.670	0.670
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.010	0.010	0.006	0.006	0.007	0.007	0.003	
	(0.007)	(0.007)	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)	
GDP per capita$_{t-1}$	0.054	0.054	0.061	0.061*	0.052	0.052	0.060	0.060*
	(0.039)	(0.034)	(0.038)	(0.034)	(0.038)	(0.034)	(0.038)	(0.033)
Unemployment rate$_{t-1}$	-5716.710	-5716.710	-3222.063	-3222.063	-5111.460	-5111.460	-2874.769	-2874.769
	(6834.037)	(6021.436)	(7072.553)	(6223.072)	(6802.877)	(5993.981)	(7052.071)	(6205.050)
Share of Construction$_{t-1}$	8383.381**	8383.381**	8133.686*	8133.686**	8588.909**	8588.909**	8260.571*	8260.571**
	(3882.292)	(3420.668)	(3908.747)	(3439.269)	(3990.403)	(3515.924)	(3995.644)	(3515.729)
Population Density$_{t-1}$			-0.008*	-0.008**			-0.008**	-0.008**
			(0.004)	(0.003)			(0.004)	(0.003)
Observations	450	450	450	450	450	450	450	450
R^2	0.738	0.738	0.745	0.745	0.738	0.738	0.745	0.745
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the Net migration, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, using contractual wages and both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) control for regional Population density as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

Table A.9: Event study analysis- Educational and Asylum migrants

	Year	Educational		Asylum	
		(1)	(2)	(3)	(4)
Dummy bite for the high-intensity region by year	2011	0.029	0.029	-0.000	-0.000
		(0.216)	(0.197)	(0.002)	(0.002)
	2012	0.129	0.129	-0.0001	-0.001
		(0.134)	(0.122)	(0.001)	(0.001)
	2013	0	0	0	0
	2014	-0.124	-0.124	0.004***	0.004***
		(0.188)	(0.172)	(0.001)	(0.001)
	2015	-0.199	-0.199	0.003	0.003
		(0.539)	(0.495)	(0.007)	(0.006)
	2016	0.386	0.386	0.006	0.006
		(0.503)	(0.460)	(0.012)	(0.011)
	2017	0.133	0.133	0.009	0.009
		(0.234)	(0.214)	(0.012)	(0.011)
	GDP	-0.032	-0.032	0.000	0.000
		(0.027)	(0.025)	(0.001)	(0.001)
	Constant	12.333***	12.094***	0.191***	0.184***
		(2.479)	(2.318)	(0.064)	(0.061)
	Region FE	Yes	Yes	Yes	Yes
	Year FE	Yes	Yes	Yes	Yes
	Observations	2205	2205	2205	2205
	R^2	0.688	0.688	0.817	0.817

Source: GSOEP 2013, INKAR; own calculations.

Note: $*\ p < 0.1$, $**\ p < 0.05$, $***\ p < 0\ .01$. The table displays the Event study results of fixed-effects estimations in a continuous difference-in-difference framework with region-fixed effects and standard errors clustered by region. The minimum wage bite is continuous for the west (73 RORs). The bite indicator is the Fraction in % using contractual wages. The dependent variables are the educational migrants, age 18-25 (% educational sub-population) and Asylum migrants (% of the population)- These are the control outcome variables and the lack of effect in the initial 2 years of the introduction is in line with our expectations. All specifications have controls for GDP per capita and the share of construction workers and the unemployed normalized at the Kreis level, Columns (2) (4) use arbitrary correlation regressions as proposed by Colella et al. (2019).

Table A.7: Effect on the low-skilled migrants

Panel A:	**West Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	0.612**	0.612**	0.520*	0.520**	0.198	0.198	0.077	0.077
	(0.287)	(0.259)	(0.282)	(0.255)	(0.301)	(0.272)	(0.297)	(0.269)
GDP per capita$_{t-1}$	-0.602**	-0.602***	-0.554**	-0.554***	-0.678***	-0.678***	-0.620***	-0.620***
	(0.250)	(0.226)	(0.232)	(0.210)	(0.239)	(0.216)	(0.222)	(0.201)
Unemployment rate$_{t-1}$	-285792.381**	-285792.381**	-329180.993**	-329180.993***	-313074.144**	-313074.144**	-361836.266**	-361836.266***
	(131297.094)	(118724.358)	(130686.869)	(118134.831)	(135367.905)	(122405.357)	(137066.695)	(123901.895)
Share of Construction$_{t-1}$	-13279.298	-13279.298	36054.909	36054.909	-10645.265	-10645.265	35136.751	35136.751
	(142575.538)	(128922.803)	(137380.562)	(124185.616)	(145663.830)	(131715.366)	(139529.828)	(126128.453)
Population density$_{t-1}$			-0.141***	-0.141***			-0.147***	-0.147***
			(0.029)	(0.026)			(0.030)	(0.027)
Observations	1890	1890	1890	1890	1890	1890	1890	1890
R^2	0.611	0.611	0.617	0.617	0.609	0.609	0.615	0.615
Panel B:	**East Germany**							
	Fraction				Kaitz Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bite X Post-MW reform	1.795**	1.795***	1.602*	1.602**	-0.187	-0.187	-0.441	-0.441
	(0.774)	(0.682)	(0.797)	(0.701)	(1.488)	(1.311)	(1.488)	(1.309)
GDP per capita$_{t-1}$	3.084	3.084	3.466	3.466*	2.082	2.082	2.546	2.546
	(2.182)	(1.923)	(2.175)	(1.914)	(2.297)	(2.024)	(2.248)	(1.978)
Unemployment rate$_{t-1}$	284201.831	284201.831	411373.059	411373.059	328465.092	328465.092	465564.207	465564.207
	(686414.444)	(604796.315)	(689472.731)	(606660.483)	(784411.364)	(691140.908)	(781862.764)	(687953.592)
Share of Construction$_{t-1}$	237100.650	237100.650	224371.747	224371.747	282037.590	282037.590	261911.953	261911.953
	(552097.849)	(486450.639)	(527600.568)	(464230.710)	(561510.314)	(494743.914)	(532525.361)	(468563.988)
Population Density$_{t-1}$			-0.389***	-0.389***			-0.476***	-0.476***
			(0.104)	(0.092)			(0.126)	(0.111)
Observations	450	450	450	450	450	450	450	450
R^2	0.509	0.509	0.514	0.514	0.499	0.499	0.507	0.507
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	No	No	Yes	Yes	No	No	Yes	Yes

Notes: ***p < 0.01, **p < 0.05, *p < 0.1

The table shows the results for fixed-effect estimations in a continuous difference-in-difference framework. The results are subdivided into Panel A (West) and Panel B (East). The dependent variable is the early career/ low-skilled migrants, the coefficient of interest is for the interaction of the bite, and the post-2015 dummy variable. Specifications (1)-(4) have the regional bite intensity as a Fraction and (5)-(8) as the Kaitz Index, using contractual wages, and both the indicators take values from 0 to 1. All regressions include time and *Kreis* fixed-effects, regional controls- GDP per capita(log), the Unemployment rate of the natives 15-64, the share of construction workers and specifications (3), (4), (7) and (8) control for regional Population density as well. Specifications (2), (4), (6), and (8) account for the arbitrary spatial correlations (Colella et al., 2019). Std. errors are clustered at the ROR level.

A.1.6 Kreise (401)/ Labour market regions, Arbeitsmarktregion AMR (256)/ Regional labor markets, RLM(141)/ Spatial Planning regions, Raumordnungsregion, ROR (96)

Kreis	ROR	AMR	RLM	ROR name	Kreis name	AMR name	RLM name
1002	101	6	1	Schleswig-Holstein Mitte	Kiel, kreisfreie Stadt	Kiel	Kiel
1058	101	6	1	Schleswig-Holstein Mitte	Rendsburg-Eckernförde, Landkreis	Kiel	Kiel
1004	101	6	1	Schleswig-Holstein Mitte	Neumünster, kreisfreie Stadt	Kiel	Kiel
1057	101	6	1	Schleswig-Holstein Mitte	Plön, Landkreis	Kiel	Kiel
1055	103	5	2	Schleswig-Holstein Ost	Ostholstein, Landkreis	Lübeck	Lübeck
1003	103	5	2	Schleswig-Holstein Ost	Lübeck, kreisfreie Stadt	Lübeck	Lübeck
1051	105	2	3	Schleswig-Holstein Süd-West	Dithmarschen, Landkreis	Heide	Dithmarschen
1054	102	1	4	Schleswig-Holstein Nord	Nordfriesland, Landkreis	Husum	Flensburg
1001	102	4	4	Schleswig-Holstein Nord	Flensburg, kreisfreie Stadt	Flensburg	Flensburg
1059	102	4	4	Schleswig-Holstein Nord	Schleswig-Flensburg, Landkreis	Flensburg	Flensburg
1062	104	8	5	Schleswig-Holstein Süd	Stormarn, Landkreis	Hamburg	Hamburg
1061	105	3	5	Schleswig-Holstein Süd-West	Steinburg, Landkreis	Itzehoe	Hamburg
2000	201	8	5	Hamburg	Hamburg, kreisfreie Stadt	Hamburg	Hamburg
1053	104	7	5	Schleswig-Holstein Süd	Herzogtum Lauenburg, Landkreis	Ratzeburg	Hamburg
1060	104	8	5	Schleswig-Holstein Süd	Segeberg, Landkreis	Hamburg	Hamburg
3355	309	25	5	Lüneburg	Lüneburg, Landkreis	Lüneburg	Hamburg
3353	306	8	5	Hamburg-Umland-Süd	Harburg, Landkreis	Hamburg	Hamburg
1056	104	8	5	Schleswig-Holstein Süd	Pinneberg, Landkreis	Hamburg	Hamburg
3157	301	9	6	Braunschweig	Peine, Landkreis	Braunschweig	Braunschweig
3101	301	9	6	Braunschweig	Braunschweig, kreisfreie Stadt	Braunschweig	Braunschweig
3102	301	10	6	Braunschweig	Salzgitter, kreisfreie Stadt	Salzgitter	Braunschweig
3158	301	9	6	Braunschweig	Wolfenbüttel, Landkreis	Braunschweig	Braunschweig
3151	301	11	7	Braunschweig	Gifhorn, Landkreis	Wolfsburg	Wolfsburg
3154	301	14	7	Braunschweig	Helmstedt, Landkreis	Helmstedt	Wolfsburg
3103	301	11	7	Braunschweig	Wolfsburg, kreisfreie Stadt	Wolfsburg	Wolfsburg
3155	305	15	8	Göttingen	Northeim, Landkreis	Einbeck	Göttingen- Goslar
3159	305	12	8	Göttingen	Göttingen, Landkreis	Göttingen	Göttingen- Goslar
15085	1504	237	8	Magdeburg	Harz, Landkreis	Harz	Göttingen- Goslar
3153	301	13	8	Braunschweig	Goslar, Landkreis	Goslar	Göttingen- Goslar
16061	1602	248	8	Nordthüringen	Eichsfeld, Landkreis	Eichsfeld	Göttingen- Goslar
3257	307	23	10	Hannover	Schaumburg, Landkreis	Stadthagen	Hannover
3254	308	20	10	Hildesheim	Hildesheim, Landkreis	Hildesheim	Hannover
3358	313	27	10	Südheide	Heidekreis	Soltau	Hannover
3241	307	17	10	Hannover	Region Hannover, Landkreis	Hannover	Hannover
3252	308	19	11	Hildesheim	Hameln-Pyrmont, Landkreis	Hameln	Hameln
3255	305	21	11	Göttingen	Holzminden, Landkreis	Holzminden	Hameln
3351	313	24	12	Südheide	Celle, Landkreis	Celle	Celle
3354	309	29	13	Lüneburg	Lüchow-Dannenberg, Landkreis	Uelzen	Lüchow- Dannenberg
15081	1501	234	13	Altmark	Altmarkkreis Salzwedel	Salzwedel	Lüchow- Dannenberg
3359	306	28	14	Hamburg-Umland-Süd	Stade, Landkreis	Stade	Stade
3360	309	29	15	Lüneburg	Uelzen, Landkreis	Uelzen	Uelzen
3452	312	31	16	Ost-Friesland	Aurich, Landkreis	Emden	Emden
3402	312	31	16	Ost-Friesland	Emden, kreisfreie Stadt	Emden	Emden
3457	312	39	16	Ost-Friesland	Leer, Landkreis	Leer	Emden
3461	303	41	17	Bremerhaven	Wesermarsch, Landkreis	Nordenham	Oldenburg
3403	310	33	17	Oldenburg	Oldenburg (Oldenburg), kreisfreie Stadt	Oldenburg	Oldenburg
3451	310	32	17	Oldenburg	Ammerland, Landkreis	Westerstede	Oldenburg
3458	310	33	17	Oldenburg	Oldenburg, Landkreis	Oldenburg	Oldenburg
3404	311	34	18	Osnabrück	Osnabrück, kreisfreie Stadt	Osnabrück	Osnabrück
3459	311	34	18	Osnabrück	Osnabrück, Landkreis	Osnabrück	Osnabrück

3456	304	38	19	Emsland	Grafschaft Bentheim, Landkreis	Nordhorn	Emsland
3454	304	37	19	Emsland	Emsland, Landkreis	Lingen	Emsland
3462	312	35	20	Ost-Friesland	Wittmund, Landkreis	Wilhelmshaven	Wilhelmshaven
3455	312	35	20	Ost-Friesland	Friesland, Landkreis	Wilhelmshaven	Wilhelmshaven
3405	312	35	20	Ost-Friesland	Wilhelmshaven, kreisfreie Stadt	Wilhelmshaven	Wilhelmshaven
3460	311	40	21	Osnabrück	Vechta, Landkreis	Vechta	Vechta
3453	310	36	21	Oldenburg	Cloppenburg, Landkreis	Cloppenburg	Vechta
3251	302	18	22	Bremen-Umland	Diepholz, Landkreis	Sulingen	Bremen
3401	302	42	22	Bremen-Umland	Delmenhorst, kreisfreie Stadt	Bremen	Bremen
3361	302	30	22	Bremen-Umland	Verden, Landkreis	Verden	Bremen
4011	401	42	22	Bremen	Bremen, kreisfreie Stadt	Bremen	Bremen
3357	306	26	22	Hamburg-Umland-Süd	Rotenburg (Wümme), Landkreis	Zeven	Bremen
3356	302	42	22	Bremen-Umland	Osterholz, Landkreis	Bremen	Bremen
3352	303	43	23	Bremerhaven	Cuxhaven, Landkreis	Bremerhaven	Bremerhaven
4012	303	43	23	Bremerhaven	Bremerhaven, kreisfreie Stadt	Bremerhaven	Bremerhaven
5162	508	45	24	Düsseldorf	Rhein-Kreis Neuss	Düsseldorf	Düsseldorf
5116	508	50	24	Düsseldorf	Mönchengladbach, kreisfreie Stadt	Mönchengladbach	Düsseldorf
5111	508	45	24	Düsseldorf	Düsseldorf, kreisfreie Stadt	Düsseldorf	Düsseldorf
5166	508	49	24	Düsseldorf	Viersen, Landkreis	Viersen	Düsseldorf
5158	508	45	24	Düsseldorf	Mettmann, Landkreis	Düsseldorf	Düsseldorf
5114	508	48	24	Düsseldorf	Krefeld, kreisfreie Stadt	Krefeld	Düsseldorf
5113	507	47	25	Duisburg/Essen	Essen, kreisfreie Stadt	Essen	Essen
5170	507	46	25	Duisburg/Essen	Wesel, Landkreis	Duisburg	Essen
5512	509	63	25	Emscher-Lippe	Bottrop, kreisfreie Stadt	Gelsenkirchen	Essen
5117	507	47	25	Duisburg/Essen	Mülheim an der Ruhr, kreisfreie Stadt	Essen	Essen
5112	507	46	25	Duisburg/Essen	Duisburg, kreisfreie Stadt	Duisburg	Essen
5119	507	46	25	Duisburg/Essen	Oberhausen, kreisfreie Stadt	Duisburg	Essen
5124	508	52	26	Düsseldorf	Wuppertal, kreisfreie Stadt	Wuppertal	Wuppertal
5122	508	52	26	Düsseldorf	Solingen, kreisfreie Stadt	Wuppertal	Wuppertal
5120	508	54	26	Düsseldorf	Remscheid, kreisfreie Stadt	Remscheid	Wuppertal
5154	507	55	27	Duisburg/Essen	Kleve, Landkreis	Kleve	Kleve
7131	701	99	28	Mittelrhein-Westerwald	Ahrweiler, Landkreis	Ahrweiler	Bonn
5382	505	59	28	Bonn	Rhein-Sieg-Kreis	Bonn	Bonn
5314	505	59	28	Bonn	Bonn, kreisfreie Stadt	Bonn	Bonn
5316	510	58	29	Köln	Leverkusen, kreisfreie Stadt	Leverkusen	Köln
5315	510	57	29	Köln	Köln, kreisfreie Stadt	Köln	Köln
5378	510	57	29	Köln	Rheinisch-Bergischer Kreis	Köln	Köln
5362	510	57	29	Köln	Rhein-Erft-Kreis	Köln	Köln
5366	501	61	29	Aachen	Euskirchen, Landkreis	Euskirchen	Köln
5358	501	60	30	Aachen	Düren, Landkreis	Düren	Aachen
5370	501	51	30	Aachen	Heinsberg, Landkreis	Heinsberg	Aachen
5334	501	56	30	Aachen	Städteregion Aachen, Landkreis	Aachen	Aachen
5374	510	62	31	Köln	Oberbergischer Kreis	Gummersbach	Olpe
5966	513	78	31	Siegen	Olpe, Landkreis	Olpe	Olpe
5515	511	64	32	Münster	Münster, kreisfreie Stadt	Münster	Münster
5566	511	66	32	Münster	Steinfurt, Landkreis	Steinfurt	Münster
5558	511	64	32	Münster	Coesfeld, Landkreis	Münster	Münster
5570	511	64	32	Münster	Warendorf, Landkreis	Münster	Münster
5554	511	65	33	Münster	Borken, Landkreis	Borken	Borken
5711	503	67	34	Bielefeld	Bielefeld, kreisfreie Stadt	Bielefeld	Bielefeld
5766	503	69	34	Bielefeld	Lippe, Landkreis	Detmold	Bielefeld

5754	503	68	34	Bielefeld	Gütersloh, Landkreis	Gütersloh	Bielefeld
5762	512	44	35	Paderborn	Höxter, Landkreis	Höxter	Höxter
5770	503	70	36	Bielefeld	Minden-Lübbecke, Landkreis	Minden	Minden
5758	503	67	36	Bielefeld	Herford, Landkreis	Bielefeld	Minden
3256	307	22	36	Hannover	Nienburg (Weser), Landkreis	Nienburg	Minden
5916	504	63	37	Bochum/Hagen	Herne, kreisfreie Stadt	Gelsenkirchen	Bochum
5513	509	63	37	Emscher-Lippe	Gelsenkirchen, kreisfreie Stadt	Gelsenkirchen	Bochum
5911	504	72	37	Bochum/Hagen	Bochum, kreisfreie Stadt	Bochum	Bochum
5562	509	63	37	Emscher-Lippe	Recklinghausen, Landkreis	Gelsenkirchen	Bochum
5913	506	73	38	Dortmund	Dortmund, kreisfreie Stadt	Dortmund	Dortmund
5978	506	73	38	Dortmund	Unna, Landkreis	Dortmund	Dortmund
5915	506	73	38	Dortmund	Hamm, kreisfreie Stadt	Dortmund	Dortmund
5954	504	53	39	Bochum/Hagen	Ennepe-Ruhr-Kreis	Schwelm	Hagen
5962	504	75	39	Bochum/Hagen	Märkischer Kreis	Lüdenscheid	Hagen
5914	504	74	39	Bochum/Hagen	Hagen, kreisfreie Stadt	Hagen	Hagen
5970	513	77	40	Siegen	Siegen-Wittgenstein, Landkreis	Siegen	Siegen
5974	502	79	41	Arnsberg	Soest, Landkreis	Soest	Soest
5958	502	76	41	Arnsberg	Hochsauerlandkreis	Meschede	Soest
5774	512	71	41	Paderborn	Paderborn, Landkreis	Paderborn	Soest
6437	605	95	42	Starkenburg	Odenwaldkreis	Erbach	Darmstadt
6411	605	94	42	Starkenburg	Darmstadt, kreisfreie Stadt	Darmstadt	Darmstadt
6432	605	94	42	Starkenburg	Darmstadt-Dieburg, Landkreis	Darmstadt	Darmstadt
6438	604	92	43	Rhein-Main	Offenbach, Landkreis	Frankfurt/Main	Frankfurt am Main
6433	605	92	43	Starkenburg	Groß-Gerau, Landkreis	Frankfurt/Main	Frankfurt am Main
6435	604	93	43	Rhein-Main	Main-Kinzig-Kreis	Hanau	Frankfurt am Main
6412	604	92	43	Rhein-Main	Frankfurt am Main, kreisfreie Stadt	Frankfurt/Main	Frankfurt am Main
6413	604	92	43	Rhein-Main	Offenbach am Main, kreisfreie Stadt	Frankfurt/Main	Frankfurt am Main
6434	604	92	43	Rhein-Main	Hochtaunuskreis	Frankfurt/Main	Frankfurt am Main
6440	604	92	43	Rhein-Main	Wetteraukreis	Frankfurt/Main	Frankfurt am Main
6436	604	92	43	Rhein-Main	Main-Taunus-Kreis	Frankfurt/Main	Frankfurt am Main
6531	601	89	44	Mittelhessen	Gießen, Landkreis	Gießen	Gießen
6534	601	85	44	Mittelhessen	Marburg-Biedenkopf, Landkreis	Marburg	Gießen
6532	601	88	44	Mittelhessen	Lahn-Dill-Kreis	Wetzlar	Gießen
6533	601	90	45	Mittelhessen	Limburg-Weilburg, Landkreis	Limburg	Limburg-Weil- burg
6439	604	91	45	Rhein-Main	Rheingau-Taunus-Kreis	Wiesbaden	Limburg-Weil- burg
6633	602	81	46	Nordhessen	Kassel, Landkreis	Kassel	Kassel
6611	602	81	46	Nordhessen	Kassel, kreisfreie Stadt	Kassel	Kassel
6634	602	83	46	Nordhessen	Schwalm-Eder-Kreis	Schwalm-Eder	Kassel
6636	602	82	46	Nordhessen	Werra-Meißner-Kreis	Eschwege	Kassel
6535	601	86	47	Mittelhessen	Vogelsbergkreis	Lauterbach	Fulda
6631	603	87	47	Osthessen	Fulda, Landkreis	Fulda	Fulda
6632	603	84	47	Osthessen	Hersfeld-Rotenburg, Landkreis	Hersfeld	Fulda
6635	602	80	48	Nordhessen	Waldeck-Frankenberg, Landkreis	Korbach	Waldeck-Fran-kenberg
7141	701	100	49	Mittelrhein-Westerwald	Rhein-Lahn-Kreis	Koblenz	Koblenz
7143	701	97	49	Mittelrhein-Westerwald	Westerwaldkreis	Montabaur	Koblenz
7111	701	100	49	Mittelrhein-Westerwald	Koblenz, kreisfreie Stadt	Koblenz	Koblenz
7140	701	104	49	Mittelrhein-Westerwald	Rhein-Hunsrück-Kreis	Simmern	Koblenz
7137	701	100	49	Mittelrhein-Westerwald	Mayen-Koblenz, Landkreis	Koblenz	Koblenz
7138	701	98	49	Mittelrhein-Westerwald	Neuwied, Landkreis	Neuwied	Koblenz
7135	701	103	49	Mittelrhein-Westerwald	Cochem-Zell, Landkreis	Cochem	Koblenz
7132	701	96	50	Mittelrhein-Westerwald	Altenkirchen (Westerwald), Landkreis	Altenkirchen	Altenkirchen

7134	702	102	51	Rheinhessen-Nahe	Birkenfeld, Landkreis	Idar-Oberstein	Bad Kreuznach
7133	702	101	51	Rheinhessen-Nahe	Bad Kreuznach, Landkreis	Bad Kreuznach	Bad Kreuznach
7232	704	108	52	Trier	Eifelkreis Bitburg-Prüm	Bitburg	Bitburg
7233	704	107	53	Trier	Vulkaneifel, Landkreis	Daun	Vulkaneifel
7211	704	105	54	Trier	Trier, kreisfreie Stadt	Trier	Trier
7235	704	105	54	Trier	Trier-Saarburg, Landkreis	Trier	Trier
7231	704	106	54	Trier	Bernkastel-Wittlich, Landkreis	Bernkastel-Wittlich	Trier
7335	705	109	55	Westpfalz	Kaiserslautern, Landkreis	Kaiserslautern	Kaiserslautern
7336	705	109	55	Westpfalz	Kusel, Landkreis	Kaiserslautern	Kaiserslautern
7333	705	109	55	Westpfalz	Donnersbergkreis	Kaiserslautern	Kaiserslautern
7312	705	109	55	Westpfalz	Kaiserslautern, kreisfreie Stadt	Kaiserslautern	Kaiserslautern
7313	703	110	56	Rheinpfalz	Landau in der Pfalz, kreisfreie Stadt	Landau	Landau
7337	703	110	56	Rheinpfalz	Südliche Weinstraße, Landkreis	Landau	Landau
7334	703	115	56	Rheinpfalz	Germersheim, Landkreis	Germersheim	Landau
8222	812	130	57	Rhein-Neckar	Mannheim, kreisfreie Stadt	Mannheim	Ludwigshafen
7318	703	114	57	Rheinpfalz	Speyer, kreisfreie Stadt	Ludwigshafen	Ludwigshafen
7311	703	114	57	Rheinpfalz	Frankenthal (Pfalz), kreisfreie Stadt	Ludwigshafen	Ludwigshafen
7319	702	112	57	Rheinhessen-Nahe	Worms, kreisfreie Stadt	Alzey-Worms	Ludwigshafen
7316	703	114	57	Rheinpfalz	Neustadt an der Weinstraße, kreisfreie Stadt	Ludwigshafen	Ludwigshafen
7314	703	114	57	Rheinpfalz	Ludwigshafen am Rhein, kreisfreie Stadt	Ludwigshafen	Ludwigshafen
7338	703	114	57	Rheinpfalz	Rhein-Pfalz-Kreis	Ludwigshafen	Ludwigshafen
7332	703	114	57	Rheinpfalz	Bad Dürkheim, Landkreis	Ludwigshafen	Ludwigshafen
7315	702	111	58	Rheinhessen-Nahe	Mainz, kreisfreie Stadt	Mainz	Mainz
6414	604	91	58	Rhein-Main	Wiesbaden, kreisfreie Stadt	Wiesbaden	Mainz
7331	702	112	58	Rheinhessen-Nahe	Alzey-Worms, Landkreis	Alzey-Worms	Mainz
7339	702	111	58	Rheinhessen-Nahe	Mainz-Bingen, Landkreis	Mainz	Mainz
8116	810	120	59	Stuttgart	Esslingen, Landkreis	Stuttgart	Stuttgart
8119	810	120	59	Stuttgart	Rems-Murr-Kreis	Stuttgart	Stuttgart
8111	810	120	59	Stuttgart	Stuttgart, kreisfreie Stadt	Stuttgart	Stuttgart
8118	810	120	59	Stuttgart	Ludwigsburg, Landkreis	Stuttgart	Stuttgart
8115	810	120	60	Stuttgart	Böblingen, Landkreis	Stuttgart	Böblingen
8235	807	133	60	Nordschwarzwald	Calw, Landkreis	Calw	Böblingen
8237	807	134	60	Nordschwarzwald	Freudenstadt, Landkreis	Freudenstadt	Böblingen
8117	810	121	61	Stuttgart	Göppingen, Landkreis	Göppingen	Göppingen
8121	803	122	62	Heilbronn-Franken	Heilbronn, kreisfreie Stadt	Heilbronn	Heilbronn
8126	803	123	62	Heilbronn-Franken	Hohenlohekreis	Schwäbisch Hall	Heilbronn
8225	812	131	62	Rhein-Neckar	Neckar-Odenwald-Kreis	Mosbach	Heilbronn
8125	803	122	62	Heilbronn-Franken	Heilbronn, Landkreis	Heilbronn	Heilbronn
8127	803	123	63	Heilbronn-Franken	Schwäbisch Hall, Landkreis	Schwäbisch Hall	Schwäbisch Hall
8136	808	126	64	Ostwürttemberg	Ostalbkreis	Aalen	Heidenheim
8135	808	125	64	Ostwürttemberg	Heidenheim, Landkreis	Heidenheim	Heidenheim
9773	902	198	64	Augsburg	Dillingen an der Donau, Landkreis	Dillingen	Heidenheim
8216	805	127	65	Mittlerer Oberrhein	Rastatt, Landkreis	Baden-Baden	Karlsruhe
8212	805	128	65	Mittlerer Oberrhein	Karlsruhe, kreisfreie Stadt	Karlsruhe	Karlsruhe
8211	805	127	65	Mittlerer Oberrhein	Baden-Baden, kreisfreie Stadt	Baden-Baden	Karlsruhe
8215	805	128	65	Mittlerer Oberrhein	Karlsruhe, Landkreis	Karlsruhe	Karlsruhe
6431	605	130	66	Starkenburg	Bergstraße, Landkreis	Mannheim	Heidelberg
8226	812	129	66	Rhein-Neckar	Rhein-Neckar-Kreis	Heidelberg	Heidelberg
8221	812	129	66	Rhein-Neckar	Heidelberg, kreisfreie Stadt	Heidelberg	Heidelberg
8236	807	132	67	Nordschwarzwald	Enzkreis	Pforzheim	Pforzheim
8231	807	132	67	Nordschwarzwald	Pforzheim, kreisfreie Stadt	Pforzheim	Pforzheim

8311	811	135	68	Südlicher Oberrhein	Freiburg im Breisgau, kreisfreie Stadt	Freiburg	Freiburg
8316	811	135	68	Südlicher Oberrhein	Emmendingen, Landkreis	Freiburg	Freiburg
8315	811	135	68	Südlicher Oberrhein	Breisgau-Hochschwarzwald, Landkreis	Freiburg	Freiburg
8317	811	136	69	Südlicher Oberrhein	Ortenaukreis	Offenburg	Ortenaukreis
8327	809	139	70	Schwarzwald-Baar-Heuberg	Tuttlingen, Landkreis	Tuttlingen	Rottweil
8326	809	138	70	Schwarzwald-Baar-Heuberg	Schwarzwald-Baar-Kreis	Villingen-Schwenningen	Rottweil
8325	809	137	70	Schwarzwald-Baar-Heuberg	Rottweil, Landkreis	Rottweil	Rottweil
8335	804	140	71	Hochrhein-Bodensee	Konstanz, Landkreis	Konstanz	Konstanz
8336	804	141	72	Hochrhein-Bodensee	Lörrach, Landkreis	Lörrach	Lörrach
8337	804	142	73	Hochrhein-Bodensee	Waldshut, Landkreis	Waldshut	Waldshut
8415	806	143	74	Neckar-Alb	Reutlingen, Landkreis	Reutlingen/Tübingen	Reutlingen
8416	806	143	74	Neckar-Alb	Tübingen, Landkreis	Reutlingen/Tübingen	Reutlingen
8417	806	144	75	Neckar-Alb	Zollernalbkreis	Balingen	Zollernalbkreis
8421	802	145	76	Donau-Iller (BW)	Ulm, kreisfreie Stadt	Ulm	Ulm
8425	802	145	76	Donau-Iller (BW)	Alb-Donau-Kreis	Ulm	Ulm
9774	904	199	76	Donau-Iller (BY)	Günzburg, Landkreis	Günzburg	Ulm
9775	904	145	76	Donau-Iller (BY)	Neu-Ulm, Landkreis	Ulm	Ulm
8435	801	147	77	Bodensee-Oberschwaben	Bodenseekreis	Friedrichshafen	Ravensburg
8426	802	146	77	Donau-Iller (BW)	Biberach, Landkreis	Biberach	Ravensburg
8436	801	148	77	Bodensee-Oberschwaben	Ravensburg, Landkreis	Ravensburg	Ravensburg
9776	901	204	77	Allgäu	Lindau (Bodensee), Landkreis	Lindau	Ravensburg
8437	801	149	78	Bodensee-Oberschwaben	Sigmaringen, Landkreis	Sigmaringen	Sigmaringen
9161	907	160	79	Ingolstadt	Ingolstadt, kreisfreie Stadt	Ingolstadt	Ingolstadt
9186	907	160	79	Ingolstadt	Pfaffenhofen an der Ilm, Landkreis	Ingolstadt	Ingolstadt
9185	907	160	79	Ingolstadt	Neuburg-Schrobenhausen, Landkreis	Ingolstadt	Ingolstadt
9176	907	160	79	Ingolstadt	Eichstätt, Landkreis	Ingolstadt	Ingolstadt
9182	913	155	80	Oberland	Miesbach, Landkreis	Bad Tölz	München
9175	910	159	80	München	Ebersberg, Landkreis	München	München
9177	910	159	80	München	Erding, Landkreis	München	München
9181	910	158	80	München	Landsberg am Lech, Landkreis	Landsberg	München
9179	910	159	80	München	Fürstenfeldbruck, Landkreis	München	München
9184	910	159	80	München	München, Landkreis	München	München
9173	913	155	80	Oberland	Bad Tölz-Wolfratshausen, Landkreis	Bad Tölz	München
9178	910	159	80	München	Freising, Landkreis	München	München
9162	910	159	80	München	München, kreisfreie Stadt	München	München
9174	910	159	80	München	Dachau, Landkreis	München	München
9188	910	159	80	München	Starnberg, Landkreis	München	München
9183	916	153	81	Südostoberbayern	Mühldorf am Inn, Landkreis	Mühldorf	Altötting
9277	908	164	81	Landshut	Rottal-Inn, Landkreis	Eggenfelden/Pfarrkirchen	Altötting
9171	916	152	81	Südostoberbayern	Altötting, Landkreis	Burghausen	Altötting
9189	916	151	82	Südostoberbayern	Traunstein, Landkreis	Traunstein	Traunstein
9172	916	150	82	Südostoberbayern	Berchtesgadener Land, Landkreis	Bad Reichenhall	Traunstein
9187	916	154	82	Südostoberbayern	Rosenheim, Landkreis	Rosenheim	Traunstein
9163	916	154	82	Südostoberbayern	Rosenheim, kreisfreie Stadt	Rosenheim	Traunstein
9180	913	156	83	Oberland	Garmisch-Partenkirchen, Landkreis	Garmisch-Partenkirchen	Weilheim- Schongau
9190	913	157	83	Oberland	Weilheim-Schongau, Landkreis	Weilheim	Weilheim- Schongau
9276	905	167	84	Donau-Wald	Regen, Landkreis	Regen-Zwiesel	Deggendorf
9271	905	168	84	Donau-Wald	Deggendorf, Landkreis	Deggendorf	Deggendorf
9272	905	166	85	Donau-Wald	Freyung-Grafenau, Landkreis	Freyung	Freyung-Gra- fenau
9275	905	165	86	Donau-Wald	Passau, Landkreis	Passau	Passau
9262	905	165	86	Donau-Wald	Passau, kreisfreie Stadt	Passau	Passau

9261	908	162	87	Landshut	Landshut, kreisfreie Stadt	Landshut	Landshut
9263	905	169	87	Donau-Wald	Straubing, kreisfreie Stadt	Straubing	Landshut
9274	908	162	87	Landshut	Landshut, Landkreis	Landshut	Landshut
9279	908	163	87	Landshut	Dingolfing-Landau, Landkreis	Dingolfing	Landshut
9278	905	169	87	Donau-Wald	Straubing-Bogen, Landkreis	Straubing	Landshut
9372	915	170	88	Regensburg	Cham, Landkreis	Cham	Cham
9374	914	175	89	Oberpfalz-Nord	Neustadt an der Waldnaab, Landkreis	Weiden	Amberg
9371	914	173	89	Oberpfalz-Nord	Amberg-Sulzbach, Landkreis	Amberg	Amberg
9377	914	176	89	Oberpfalz-Nord	Tirschenreuth, Landkreis	Marktredwitz	Amberg
9363	914	175	89	Oberpfalz-Nord	Weiden in der Oberpfalz, kreisfreie Stadt	Weiden	Amberg
9361	914	173	89	Oberpfalz-Nord	Amberg, kreisfreie Stadt	Amberg	Amberg
9376	914	172	90	Oberpfalz-Nord	Schwandorf, Landkreis	Schwandorf	Regensburg
9375	915	171	90	Regensburg	Regensburg, Landkreis	Regensburg	Regensburg
9362	915	171	90	Regensburg	Regensburg, kreisfreie Stadt	Regensburg	Regensburg
9273	915	161	90	Regensburg	Kelheim, Landkreis	Kelheim-Mainburg	Regensburg
9461	912	179	91	Oberfranken-West	Bamberg, kreisfreie Stadt	Bamberg	Bamberg
9674	909	192	91	Main-Rhön	Haßberge, Landkreis	Haßfurt	Bamberg
9471	912	179	91	Oberfranken-West	Bamberg, Landkreis	Bamberg	Bamberg
9462	911	178	92	Oberfranken-Ost	Bayreuth, kreisfreie Stadt	Bayreuth	Bayreuth
9477	911	180	92	Oberfranken-Ost	Kulmbach, Landkreis	Kulmbach	Bayreuth
9472	911	178	92	Oberfranken-Ost	Bayreuth, Landkreis	Bayreuth	Bayreuth
9473	912	182	93	Oberfranken-West	Coburg, Landkreis	Coburg	Coburg
16072	1604	255	93	Südthüringen	Sonneberg, Landkreis	Sonneberg	Coburg
9478	912	183	93	Oberfranken-West	Lichtenfels, Landkreis	Lichtenfels	Coburg
9463	912	182	93	Oberfranken-West	Coburg, kreisfreie Stadt	Coburg	Coburg
14523	1403	224	94	Südsachsen	Vogtlandkreis	Vogtlandkreis	Hof
9479	911	176	94	Oberfranken-Ost	Wunsiedel im Fichtelgebirge, Landkreis	Marktredwitz	Hof
9464	911	177	94	Oberfranken-Ost	Hof, kreisfreie Stadt	Hof	Hof
9475	911	177	94	Oberfranken-Ost	Hof, Landkreis	Hof	Hof
9476	912	181	95	Oberfranken-West	Kronach, Landkreis	Kronach	Kronach
9474	912	184	96	Oberfranken-West	Forchheim, Landkreis	Erlangen	Erlangen
9572	906	184	96	Industrieregion Mittelfranken	Erlangen-Höchstadt, Landkreis	Erlangen	Erlangen
9575	917	188	96	Westmittelfranken	Neustadt an der Aisch-Bad Windsheim, Landkreis	Neustadt/Aisch	Erlangen
9562	906	184	96	Industrieregion Mittelfranken	Erlangen, kreisfreie Stadt	Erlangen	Erlangen
9563	906	185	97	Industrieregion Mittelfranken	Fürth, kreisfreie Stadt	Nürnberg	Nürnberg
9576	906	185	97	Industrieregion Mittelfranken	Roth, Landkreis	Nürnberg	Nürnberg
9573	906	185	97	Industrieregion Mittelfranken	Fürth, Landkreis	Nürnberg	Nürnberg
9564	906	185	97	Industrieregion Mittelfranken	Nürnberg, kreisfreie Stadt	Nürnberg	Nürnberg
9373	915	174	97	Regensburg	Neumarkt in der Oberpfalz, Landkreis	Neumarkt	Nürnberg
9565	906	185	97	Industrieregion Mittelfranken	Schwabach, kreisfreie Stadt	Nürnberg	Nürnberg
9574	906	185	97	Industrieregion Mittelfranken	Nürnberger Land, Landkreis	Nürnberg	Nürnberg
9571	917	187	98	Westmittelfranken	Ansbach, Landkreis	Ansbach	Ansbach
9561	917	187	98	Westmittelfranken	Ansbach, kreisfreie Stadt	Ansbach	Ansbach
9577	917	186	99	Westmittelfranken	Weißenburg-Gunzenhausen, Landkreis	Weißenburg-Gunzenhausen	Weißenburg- Gunzenhausen
9676	903	196	100	Bayerischer Untermain	Miltenberg, Landkreis	Aschaffenburg	Aschaffenburg
9661	903	196	100	Bayerischer Untermain	Aschaffenburg, kreisfreie Stadt	Aschaffenburg	Aschaffenburg
9671	903	196	100	Bayerischer Untermain	Aschaffenburg, Landkreis	Aschaffenburg	Aschaffenburg
9678	909	191	101	Main-Rhön	Schweinfurt, Landkreis	Schweinfurt	Schweinfurt
9672	909	194	101	Main-Rhön	Bad Kissingen, Landkreis	Bad Kissingen	Schweinfurt
9673	909	193	101	Main-Rhön	Rhön-Grabfeld, Landkreis	Bad Neustadt/Saale	Schweinfurt

9662	909	191	101	Main-Rhön	Schweinfurt, kreisfreie Stadt	Schweinfurt	Schweinfurt
9663	918	190	102	Würzburg	Würzburg, kreisfreie Stadt	Würzburg	Würzburg
9677	918	195	102	Würzburg	Main-Spessart, Landkreis	Lohr am Main	Würzburg
9675	918	189	102	Würzburg	Kitzingen, Landkreis	Kitzingen	Würzburg
8128	803	124	102	Heilbronn-Franken	Main-Tauber-Kreis	Tauberbischofsheim	Würzburg
9679	918	190	102	Würzburg	Würzburg, Landkreis	Würzburg	Würzburg
9761	902	200	103	Augsburg	Augsburg, kreisfreie Stadt	Augsburg	Augsburg
9772	902	200	103	Augsburg	Augsburg, Landkreis	Augsburg	Augsburg
9771	902	200	103	Augsburg	Aichach-Friedberg, Landkreis	Augsburg	Augsburg
9778	904	201	104	Donau-Iller (BY)	Unterallgäu, Landkreis	Memmingen	Memmingen
9764	904	201	104	Donau-Iller (BY)	Memmingen, kreisfreie Stadt	Memmingen	Memmingen
9779	902	197	105	Augsburg	Donau-Ries, Landkreis	Donauwörth-Nördlingen	Donau-Ries
9780	901	203	106	Allgäu	Oberallgäu, Landkreis	Kempten	Kempten
9763	901	203	106	Allgäu	Kempten (Allgäu), kreisfreie Stadt	Kempten	Kempten
9777	901	202	106	Allgäu	Ostallgäu, Landkreis	Kaufbeuren	Kempten
9762	901	202	106	Allgäu	Kaufbeuren, kreisfreie Stadt	Kaufbeuren	Kempten
10044	1001	118	107	Saar	Saarlouis, Landkreis	Saarbrücken	Saarbrücken
10041	1001	118	107	Saar	Regionalverband Saarbrücken, Landkreis	Saarbrücken	Saarbrücken
10042	1001	116	107	Saar	Merzig-Wadern, Landkreis	Merzig	Saarbrücken
10043	1001	118	107	Saar	Neunkirchen, Landkreis	Saarbrücken	Saarbrücken
10046	1001	117	107	Saar	Sankt Wendel, Landkreis	St. Wendel	Saarbrücken
10045	1001	119	108	Saar	Saarpfalz-Kreis	Homburg/Saar	Pirmasens
7340	705	113	108	Westpfalz	Südwestpfalz, Landkreis	Pirmasens	Pirmasens
7317	705	113	108	Westpfalz	Pirmasens, kreisfreie Stadt	Pirmasens	Pirmasens
7320	705	113	108	Westpfalz	Zweibrücken, kreisfreie Stadt	Pirmasens	Pirmasens
11000	1101	205	109	Berlin	Berlin, kreisfreie Stadt	Berlin	Berlin
12054	1201	206	109	Havelland-Fläming	Potsdam, kreisfreie Stadt	Potsdam-Brandenburg	Berlin
12060	1205	209	109	Uckermark-Barnim	Barnim, Landkreis	Eberswalde	Berlin
12061	1202	210	109	Lausitz-Spreewald	Dahme-Spreewald, Landkreis	Luckenwalde	Berlin
12053	1203	208	110	Oderland-Spree	Frankfurt (Oder), kreisfreie Stadt	Frankfurt/Oder	Frankfurt (Oder)
12067	1203	208	110	Oderland-Spree	Oder-Spree, Landkreis	Frankfurt/Oder	Frankfurt (Oder)
12062	1202	211	111	Lausitz-Spreewald	Elbe-Elster, Landkreis	Finsterwalde	Elbe-Elster
12066	1202	207	111	Lausitz-Spreewald	Oberspreewald-Lausitz, Landkreis	Cottbus	Elbe-Elster
12063	1201	206	112	Havelland-Fläming	Havelland, Landkreis	Potsdam-Brandenburg	Havelland
12064	1203	208	113	Oderland-Spree	Märkisch-Oderland, Landkreis	Frankfurt/Oder	Märkisch-Oder- land
12065	1204	212	114	Prignitz-Oberhavel	Oberhavel, Landkreis	Oranienburg	Oberhavel
12068	1204	213	115	Prignitz-Oberhavel	Ostprignitz-Ruppin, Landkreis	Neuruppin	Ostprignitz- Ruppin
12051	1201	206	116	Havelland-Fläming	Brandenburg an der Havel, kreisfreie Stadt	Potsdam-Brandenburg	Potsdam-Mittel-mark
12069	1201	206	116	Havelland-Fläming	Potsdam-Mittelmark, Landkreis	Potsdam-Brandenburg	Potsdam-Mittel-mark
12070	1204	214	117	Prignitz-Oberhavel	Prignitz, Landkreis	Perleberg	Prignitz
12071	1202	207	118	Lausitz-Spreewald	Spree-Neiße, Landkreis	Cottbus	Cottbus
12052	1202	207	118	Lausitz-Spreewald	Cottbus, kreisfreie Stadt	Cottbus	Cottbus
12072	1201	210	119	Havelland-Fläming	Teltow-Fläming, Landkreis	Luckenwalde	Teltow-Fläming
12073	1205	215	120	Uckermark-Barnim	Uckermark, Landkreis	Prenzlau	Uckermark
13076	1304	217	121	Westmecklenburg	Ludwigslust-Parchim, Landkreis	Schwerin	Schwerin
13074	1304	217	121	Westmecklenburg	Nordwestmecklenburg, Landkreis	Schwerin	Schwerin
13004	1304	217	121	Westmecklenburg	Schwerin, kreisfreie Stadt	Schwerin	Schwerin
13071	1301	218	122	Mecklenburgische Seenplatte	Mecklenburgische Seenplatte, Landkreis	Mecklenburgische Seenplatte	Mecklenburgi- sche Seenplatte
13003	1302	216	123	Mittleres Mecklenburg/Rostock	Rostock, kreisfreie Stadt	Rostock	Rostock
13072	1302	216	123	Mittleres Mecklenburg/Rostock	Rostock, Landkreis	Rostock	Rostock
13073	1303	219	124	Vorpommern	Vorpommern-Rügen, Landkreis	Nordvorpommern	Nordvorpom- mern

13075	1303	220	125	Vorpommern	Vorpommern-Greifswald, Landkreis	Südvorpommern	Südvorpommern
14524	1403	225	126	Südsachsen	Zwickau, Landkreis	Zwickau	Chemnitz
14522	1403	223	126	Südsachsen	Mittelsachsen, Landkreis	Mittelsachsen	Chemnitz
14521	1403	222	126	Südsachsen	Erzgebirgskreis	Erzgebirgskreis	Chemnitz
14511	1403	221	126	Südsachsen	Chemnitz, kreisfreie Stadt	Chemnitz	Chemnitz
14627	1401	229	127	Oberes Elbtal/Osterzgebirge	Meißen, Landkreis	Meißen	Dresden
14628	1401	226	127	Oberes Elbtal/Osterzgebirge	Sächsische Schweiz-Osterzgebirge, Landkreis	Dresden	Dresden
14612	1401	226	127	Oberes Elbtal/Osterzgebirge	Dresden, kreisfreie Stadt	Dresden	Dresden
14625	1402	227	128	Oberlausitz-Niederschlesien	Bautzen, Landkreis	Bautzen	Bautzen
14626	1402	228	128	Oberlausitz-Niederschlesien	Görlitz, Landkreis	Görlitz	Bautzen
14730	1404	230	129	Westsachsen	Nordsachsen, Landkreis	Leipzig	Leipzig
14713	1404	230	129	Westsachsen	Leipzig, kreisfreie Stadt	Leipzig	Leipzig
14729	1404	230	129	Westsachsen	Leipzig, Landkreis	Leipzig	Leipzig
15001	1502	231	130	Anhalt-Bitterfeld-Wittenberg	Dessau-Roßlau, kreisfreie Stadt	Dessau-Roßlau	Dessau-Roßlau
15091	1502	241	130	Anhalt-Bitterfeld-Wittenberg	Wittenberg, Landkreis	Wittenberg	Dessau-Roßlau
15082	1502	235	130	Anhalt-Bitterfeld-Wittenberg	Anhalt-Bitterfeld, Landkreis	Anhalt-Bitterfeld	Dessau-Roßlau
15003	1504	233	131	Magdeburg	Magdeburg, kreisfreie Stadt	Magdeburg	Magdeburg
15086	1504	233	131	Magdeburg	Jerichower Land, Landkreis	Magdeburg	Magdeburg
15089	1504	239	131	Magdeburg	Salzlandkreis	Salzlandkreis	Magdeburg
15083	1504	233	131	Magdeburg	Börde, Landkreis	Magdeburg	Magdeburg
15084	1503	236	132	Halle/S.	Burgenlandkreis	Burgenlandkreis	Halle
15002	1503	232	132	Halle/S.	Halle (Saale), kreisfreie Stadt	Halle	Halle
15088	1503	232	132	Halle/S.	Saalekreis	Halle	Halle
15087	1503	238	132	Halle/S.	Mansfeld-Südharz, Landkreis	Mansfeld-Südharz	Halle
15090	1501	240	133	Altmark	Stendal, Landkreis	Stendal	Stendal
16068	1601	242	134	Mittelthüringen	Sömmerda, Landkreis	Erfurt	Erfurt
16071	1601	246	134	Mittelthüringen	Weimarer Land, Landkreis	Weimar	Erfurt
16051	1601	242	134	Mittelthüringen	Erfurt, kreisfreie Stadt	Erfurt	Erfurt
16067	1601	253	134	Mittelthüringen	Gotha, Landkreis	Gotha	Erfurt
16070	1601	254	134	Mittelthüringen	Ilm-Kreis	Arnstadt	Erfurt
16055	1601	246	134	Mittelthüringen	Weimar, kreisfreie Stadt	Weimar	Erfurt
16076	1603	243	135	Ostthüringen	Greiz, Landkreis	Gera	Gera
16052	1603	243	135	Ostthüringen	Gera, kreisfreie Stadt	Gera	Gera
16077	1603	258	135	Ostthüringen	Altenburger Land, Landkreis	Altenburg	Gera
16053	1603	244	136	Ostthüringen	Jena, kreisfreie Stadt	Jena	Jena
16074	1603	244	136	Ostthüringen	Saale-Holzland-Kreis	Jena	Jena
16065	1602	251	137	Nordthüringen	Kyffhäuserkreis	Sondershausen	Nordhausen
16062	1602	249	137	Nordthüringen	Nordhausen, Landkreis	Nordhausen	Nordhausen
16063	1604	247	138	Südthüringen	Wartburgkreis	Eisenach	Eisenach
16056	1604	247	138	Südthüringen	Eisenach, kreisfreie Stadt	Eisenach	Eisenach
16064	1602	250	139	Nordthüringen	Unstrut-Hainich-Kreis	Mühlhausen	Unstrut-Hainich
16069	1604	245	140	Südthüringen	Hildburghausen, Landkreis	Suhl	Suhl
16054	1604	245	140	Südthüringen	Suhl, kreisfreie Stadt	Suhl	Suhl
16066	1604	252	140	Südthüringen	Schmalkalden-Meiningen, Landkreis	Meiningen	Suhl
16073	1603	256	141	Ostthüringen	Saalfeld-Rudolstadt, Landkreis	Saalfeld	Saalfeld- Rudolstadt
16075	1603	257	141	Ostthüringen	Saale-Orla-Kreis	Pößneck	Saalfeld- Rudolstadt

Note: Table classifying District Kreise (401)/ Labour market regions, Arbeitsmarktregion AMR (256)/ Regional labor markets, RLM(141)/ Spatial Planning regions, Raumordnungsregion, ROR (96). RLM- Göttingen- Goslar, that is 8 and 9 have to be considered one unit while carrying out the analysis.