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# Immigration and Regional Economic Development

A Case Study in post-World War Two Baden-Württemberg

by

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# Abstract

The thesis investigates how the inflow of ethnic Germans, into western Germany, influenced the sectoral development. During and after the Second World War Germany experienced a huge inflow of ethnic Germans who lived in eastern Europe before the War. The study focused on the federal state of Baden-Württemberg which was split into a French and American occupation zone. This resulted in different immigration regimes, influencing the share of expellees in the two regions. This quasi-natural experiment is used to establish a new instrumental variable approach to measure the impact of a locally, uneven labor supply shock. To measure the economic development, I created a panel data set on the administrative district level spanning from 1926 to 1970. The results are suggesting a substantially, positive impact on the regional economy as a whole, while results are too ambiguous to confirm the effects on sectoral change.

Keywords: immigration, refugee, economic growth, post-war Germany

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# 1 Introduction

The population of these areas will also have to be resettled in the habitable parts of the country. Already currently a big number of refugees are also internally displaced persons, so have just fled to another part of the same country (UNHCR, 2019). The total amount is estimated by the United Nations High Commissioner for Refugees (2019) at around 38 million in the year 2019. So, insights on how the inflow of a very homogenous workforce influences the receiving region's economic development is vital for policy decisions on how to deal and distribute refugees. This is the case for present times and will most likely gain importance in the future. The European Union Investigating the effects of the If the sea levels are rising, big metropolitan areas becoming uninhabitable for example. Neumann et al. (2015) project in their study that the number of people living in areas threatened by rising sea levels will increase until 2060. Especially in Asia and Africa. They estimate that for example in China more than 200 million people will be at high risk of hazards due to the increased likelihood of floods and rising sea levels. In Nigeria and Egypt, the projected people affected reach still over 50 million each. Another report for Europe is estimating that still, 1.6 to 3.9 million people are at risk if no action is done to secure coastal lines (Vousdoukas et al., 2020).

The theory introduced in this thesis says that a big shock in labor supply should increase the attractiveness for capital investments in a region because of the higher stock of labor in this region. The purpose of this research is to see if this was the case for the Federal German Republic (FRG) founded after the Second world war. This region saw a huge inflow of ethnic Germans at the end and after the Second world war (Connor, 2007).

The study aims to add evidence in the field of research, which is looking at the direct macroeconomic impact of migration. For this, a new instrumental variable (IV) approach will be used to extend the research done by Braun and Kvasnicka (2014) and Peters (2019) which both looked at the macroeconomic impact of the expellees inflow into West Germany after the Second World War using a different methodology. To estimate the effects of immigration on the economic development of the administrative regions in the federal state I created a panel data set, spanning from the year 1926 to 1970.

The structure of the thesis is as follows. First, the expulsion will be described in more detail to get a clear picture of the condition the refugees were facing. The forces which initiated the exodus and a to get a picture of the scale. The second step will introduce the related literature regarding the long-term macroeconomic effects of migration. This is done by showing existing research and introducing a theoretical framework that explains the mechanisms of how migration can influence the economy. The afterward method and the data used in this research will be presented. Followed by the presentation of the results and a discussion of the implication for the theory and the existing findings in this field.

## 2 The expulsion of ethnic Germans

This chapter aims to introduce the historical setting the research is looking at. There were severe groups of ethnic Germans in eastern and south-eastern Europe mainly in today's territory of Poland, the Czech Republic, Slovakia, Hungary, and Romania (Connor, 2007). Some foundations of settlements can be traced back to the 13th century (Connor, 2007). Connor (2007) grouped the flight of ethnic Germans in three main phases where at the end around 7.9 million people settled on the territory of the FRG which was a share of 16.5% of the total population.

The causes of the first wave also is an explanation, why the refugees have chosen the more western parts of Germany to resettle. This phase happened in the last year of the war when the Soviet army entered the German territory after its victory at Stalingrad in October 1944 (Connor, 2007). The brutality with which the Soviets were advancing, induced ethnic Germans in the Polish and eastern German regions to flee from them westwards, and then the Soviet army reached south-eastern Europe the same happened there (Connor, 2007).

The second phase was called by Connor (2007), the wild expulsion. This was a phenomenon that started at the end of the war in Poland and Czechoslovakia and lasted seven months (Douglas, 2012). At this time Polish and Czechoslovakian authorities started to draw the remaining German minorities out of their country with no planning but the more brutal force (Douglas, 2012). These actions were communicated as revenge for the terrors under the nazi regime and were often and carried out by official bodies of the governments, accompanied by purges from the local population were many ethnic Germans where killed (Douglas, 2012).

The last phase can be seen as a reaction to the second one. Here the British and Americans tried to organize the expulsion to solve the humanitarian crisis that the wild expulsion has become (Douglas, 2012). This was also somewhat accomplished in the year 1946 but the scope of population movement (still 4 million people had to be expelled in this third phase) and the lack of infrastructure resulted still in harsh conditions for the displaced people during the process (Connor, 2012).

Summing up, the expulsion of ethnic German communities that could trace back their routes in these regions sometimes centuries backward was mostly done by force and in an inhumane fashion. This clearly shows that all of this was involuntary and that most likely the refugees did not have control other the location they ended up. A more precise elaboration on the distribution of the expellees will be given when introducing the methodology for the analysis of this paper since it is a crucial part of the instrument used.

### 3 Literature/Theoretical Review

In the next chapter, I will introduce the theory on how migration is influencing the economic development in the receiving country. For this, a specific factors model from the discipline of international trade will be introduced because it can explain how an exogenous shock in labor supply influences the production of goods in a country (Braun & Kvasnicka, 2014). This theoretical framework will be flanked by theories on the assimilation of migrants in the receiving region and the causes of migration itself. They will help to strengthen some key assumptions in the specific factors model.

According to Borjas (2019) studies on macro-economic consequences of migration are still scarce so that the direct link between economic growth and migration is still not quantified. Borjas (2019) argues that high-skilled immigration leads to sustainable economic growth in the long run that would create a net benefit of migration. He argues that the increase in human capital stock which comes with high skilled migrants will lead to external effects in innovation and productivity. These gains would overcompensate lower wages which are a short-term result of a supply shock in the labor market (Borjas, 2019). To Borjas (2019), substantial economic growth will only be induced by highly qualified migrants. So, this study may contribute to these elaborations because the skill level did not vary significantly between immigrants and natives in the case of the expulsion of ethnic Germans after the Second World War. It can function as a control case where most effects cannot be accounted to skill differences in the different groups.

The expellees who came to Germany were not different from native Germans and for that also an almost perfect substitute at the labor market. This assumption stands against contributions from other researcher looking at other events of mass migration where it is considered that immigrants have different skill sets than their native counterparts (Borjas, 1995; Hornung, 2014; Dustmann, Fabbri & Preston, 2005; Ottaviano & Peri, 2005; Ottaviano & Peri, 2012; Borjas, 2019). That you can make an exception in the case of ethnic Germans after the Second world war is agreed on by most of the literature (Braun & Weber, 2021; Peters, 2019; Braun & Kvasnicka, 2014). Additionally, to similarities in skills, the populations were also very similar with regards to other demographic indicators. When comparing the total population of natives and expellees it appears that both groups are similar in age structure, marital rates, and education (Braun & Kvasnicka, 2014).

But there are also suggestions implying that there was a skill difference between the expellees and the native population. Semrad (2015) observed that for the case of Bavaria, there was a difference in the level of education between the native population and the Sudeten which settled mostly in this federal state. She shows that a higher share of expellees had secondary education because the Sudetenland was more industrialized at this time than Bavaria. This advantage in education also led to spillover effects resulting in a statistically significant rise in secondary education induced by the movement of the Sudeten Germans. So, while most of the research is

showing that the total populations are close substitutes to each other, Semrad's research implies that differences can occur when looking at a more regional case. Since this research is also looking at a limited regional area the possibility be kept in mind

### 3.1 Literature on economic growth and immigration

Now, this chapter summarizes the research which is looking at the effects of immigration on the economic development of the receiving country.

One study looks at the long-run economic effects of the Age of Mass Migration from 1860 to 1920 in the United States. Sequeira, Nunn and Qian (2017) did first look at the short-run effects and found that regions with a higher inflow of immigrants experienced higher rates in industrialization as well as increased production in agriculture and patenting. When examining these effects until the year 2000 they find that the positive effects were very persistent. Using a 2SLS model they estimate positive effects of immigration share for income per capita, urbanization and education level at the 1% statistical significance level. As well as a reduction of poverty and unemployment at the 5% level (Sequeira, Nunn & Qian, 2017).

Hornung (2014) examines how the resettlement of the French Huguenots after 1685, in Prussia, helped the Kingdom to industrialize. The Huguenots were mostly, highly skilled and brought new production technologies for the textile industry with them (Hornung, 2014). This possible technological diffusion is also the explanation Hornung (2014) provides why the share of Huguenots had a positive and statistically significant impact on the number of textile firms in 1769 and 1802. These two studies provide the longest time frame of the effects of immigration on economic performance in the receiving country. In both cases, an important part of the explanation is that high skilled migrants brought knowledge of superior production technologies with them (Sequeira, Nunn & Qian, 2017; Hornung, 2014).

There are also studies looking studying the inflow of expellees in West Germany and the impact on the economy it had. Peters (2019) looked at how the resettlement of ethnic Germans influenced the share in manufacturing employment and GDP per capita. Until 1966 overall GDP growth per capita increased by 37.9% per one percent share of refugees (Peters, 2019). Braun and Kvasnicka (2014) could also show that expellee inflow had a positive, statistically significant impact on the change from an agricultural sector to a more productive manufacturing sector. This sectoral change away from agriculture to a manufacturing sector is a crucial part of the economic development of post-war Europe (Haupt, Lains & Schön, 2010). Consequently, observing this change in Germany also tells a lot about the overall economic development. So, both studies presented in this paragraph show that migration helped the economic development of Germany after the war.

Overall, the view studies looking at the direct impact of immigration on economic growth predict a positive relationship. I want to extend this research by also focusing on the case of post-war Germany. To get new insights I extend the time frame until 1970 and I will introduce a

new instrumental variable that allows for a different analysis. Since the evidence is still scarce on this topic, I argue that this longer time frame and the new approach will add a valuable part to the research on this topic.

Consequently, the question this thesis will try to answer is how the instream of migrants is affecting the regional economic development in southern Germany from a dominantly agrarian economy to a highly productive, industrial region. The research question is as follows:

*How did immigration inflow influence the sectoral development in the regions of Baden-Württemberg?*

To answer this question the following hypotheses will be created. How y

**Hypothesis one:** The output in the non-agricultural industry should increase more, in the high inflow region.

**Hypothesis two:** The output in the agricultural industry will not be affected by the inflow of refugees.

## 3.2 Economic development and sectoral change explained by a specific factors model

Now the theoretical model on how immigration will induce the development of different sectors in an economy will be introduced. Additional

To explain the long-term impact of an exogenous labor supply shock on sectoral development, I will lean on the model of Braun and Kvasnicka (2014). It will also be a specific factors model, inspired by the work of Samuelson (1971). All actors in this model are supposed to be rational actors who are making their decisions on a cost-benefit analysis and always want to maximize their utility. The model will describe an economy with two sectors, agriculture (A) and non-agriculture (N). There will be three input factors. The first is labor (L), the second land (Z), and the last one is capital (K). The agriculture sector uses labor and land, while the non-agricultural sector uses labor and capital as can be seen in equation (1) and (2)

$$Q_n = AK^\alpha L_n^{1-\alpha} \quad (1)$$

$$Q_a = BZ^\beta L_a^{1-\beta} \quad (2)$$

The model has two identical regions with the same production functions. It will answer the question, how the unequal sized inflow of migrants affected the economic development. The

next section will introduce a theoretical specific factors model of production based on the work of Ricardo, Viner, and Ohlin. The model will consider an open economy because this allows for a specialization in a specific good, because the country can trade with others to get the goods it does not produce anymore but are still requested by its population (Samuelson, 1971).

The production functions (1) and (2) are written out as a Cobb-Douglas function, while Braun and Kvasnicka (2014) were not specifying the form of the production function. This form of production function has constant returns to scale, diminishing returns for each production factor, and the exponents  $\alpha$  and  $\beta$  determine the optimal input ratio of the factors of production (Bodvarsson & Van den Berg, 2009).  $\alpha$  and  $\beta$  can also be described as the production technology of the specific sector (Gandolfo, 2014) since it determines the optimal shares of the two respective production factors. The productivity of the different input factors can then be shown by the first derivative of equations (1) and (2), if markets are competitive (Bodvarsson & Van den Berg, 2009), and are shown in the equations (3) to (6).

$$\frac{\delta Q_n}{\delta L_n} = AK^\alpha L_n^{-\alpha} * (1 - \alpha) = (1 - \alpha) * A \left( \frac{K}{L_n} \right)^\alpha = w_n (3)$$

$$\frac{\delta Q_n}{\delta K} = AK^{\alpha-1} L_n^{1-\alpha} * \alpha = \alpha A \left( \frac{K}{L_n} \right)^{\alpha-1} = r_n (4)$$

$$\frac{\delta Q_a}{\delta L_a} = BK^\beta L_n^{-\beta} * (1 - \beta) = (1 - \beta) * B \left( \frac{Z}{L_a} \right)^\beta = w_a (5)$$

$$\frac{\delta Q_n}{\delta Z} = BK^{\beta-1} L_n^{1-\beta} * \beta = \beta B \left( \frac{Z}{L_a} \right)^{\beta-1} = r_a (6)$$

Source: Bodvarsson and Van den Berg (2009)

What equation (3) and (5) are showing, is that if the labor supply  $L_n$  and  $L_a$  is increasing, wages  $w_n$  and  $w_a$  are going down, given everything else is held constant. The opposite is happening for the return of the other production factors  $r_n$  and  $r_a$ . For capital- and land an increase in labor supply means higher returns. Since the shock in factor prices only happened in the high inflow region also factor prices are only changing in this region. This implies that if everything is else is held constant in both regions, wages would now be higher in the low inflow region, while the returns to land and capital would be higher in the high inflow region. These higher rates of return would create an incentive for workers to migrate into the low inflow region and for more investments into capital and land in the high inflow region. How the workers behave after such a shock in labor supply determines how the regions are developing over time.

The persistence of the population shock is crucial in the long run for the economic development of the two regions (Peters, 2019). This is also in line with the elaborations of the last paragraph. The attractiveness for the high inflow region for new capital investments is highly dependent

on the fact that the population shock is not eradicated by internal immigration, which is also induced by the lower wages in the high inflow region. Therefore, there must be some force preventing workers to migrate to the region with higher wages to create these different regional development trajectories.

These frictions in interregional mobility are due to the high costs of migration (Borjas & Chiswick, 2019). In a more general case, Borjas and Chiswick (2019) are arguing that natives have higher costs to migrate than immigrants since the latter already “paid” them. So, relocating due to higher wages in another region is more likely for immigrants. This is for example because they already left their social ties behind them and did not have time to invest in new ones. Relocating ones more is for this reason not so costly for these migrants, and they will benefit more from a higher paid job in another region. For the case of post-war FRG, evidence is pointing however in the opposite direction. Braun and Weber (2021) are showing that natives were more likely to relocate to low inflow regions after the initial population shock. Overall, it seems to be that the costs of internal migration were high. Falck et al. (2012) found that the correlation on the residence of expellees between 1950 and 1961 is still 0.82. Peters (2019) still finds a correlation of 0.601 for the same time frame. Regional mobility of migrants was still not strong 15 years after the war. A possible explanation for this is that the combination of movement restrictions until 1950 and the quick recovery of wages in the early 1960’s to prewar level in high inflow regions (Braun & Weber, 2021). First, the refugees could not reallocate settlement, and when the restriction was lifted, the incentive was already smaller again.

Another key point when looking at economic development is then how regions can adjust to the potential persistent labor supply shock. Braun and Kvasnicka (2014) are assuming the technological change in the non-agricultural sector is the main driver of an increase in productivity. Elaborating this thought further, the source of this technological change is not clearly defined by Braun and Kvasnicka (2014). It is not entirely clear if the technological change is an exogenous force or if it is influenced by the population shock itself. Since the aim of these theoretical elaborations should be to explain the possible causal effects of migration on economic development that model falls short of explaining it. Possible technological change induced by the migrants is not likely in this case. One of the main contributors to the adoption of new production technology is however assumed to be a shift in average skills in the working population (Acemoglu, 1998). So if a working population gets more skilled, the incentives to invest in new technologies are increasing. This means vice versa that if the skill level is not significantly changing with the immigration flow there should not be an incentive for adaption of new production technology coming from the migration inflow itself. Another explanation is that highly skilled labor does bring knowledge of new production technologies with them as already shown in the case study of Hornung (2014), and Sequeira, Nunn and Qian (2017). Since the German expellees were, at least on average, not higher skilled than their native counterparts, a possible causal effect between technological change and immigration is unlikely.

It is more suitable to assume that the input factor capital is variable. Peters (2019) also assumes this when constructing a long-term, regional growth model. his analysis will use data from 1926 to 1970, so it seems plausible that investments into capital are possible. As a result, the theoretical model for this analysis also has elements of the case described by Bodvarsson and Van den Berg (2009) with homogenous labor and variable capital. The higher factor prices for capital will stimulate the inflow of capital until the endowment ratio is optimal once again (Bodvarsson

& Van den Berg, 2009), which is determined by the production technology in equation (1) and (2). This equalization is only possible if the small country assumption holds, which says that the increase in demand for capital in the small country does not change the price for capital on the world market (Bodvarsson & Van den Berg, 2009). Since this research only looks at the economy of Germany, this assumption holds. Translated to this case, this means that high inflow regions are more attractive for investments due to the bigger labor force. Due to this, the production should increase quicker.

The small country assumption is also considered true by others (Bodvarsson & Van den Berg, 2009; Peters, 2019; Braun & Kvasnicka, 2014). This assumption means that the regions observed are so small that the change in demand on capital does not change the world price for capital (Braun & Kvasnicka, 2014). The price for capital is the equivalent of its return from equation (4) (Bodvarsson & Van den Berg, 2009). By having a higher labor supply in the one region the price for capital is higher than the world price. This is the incentive for capital investments in this region. There was no strong regional remigration in the first few decades and the population shock seems to be persistent within labor markets (Braun et al., 2020) The employment assimilation of the expellees was also quick so that the full potential of the population shock could be realized in the long run. The capital stock in the high inflow region will increase until it reached the same equilibrium ratio as before (Bodvarsson & Van den Berg, 2009). After this process, the production level should be higher in the high inflow region.

### 3.3 Why people move

To complete this model, one also must look at the theory on why people migrate. This theory will support the crucial assumption from the specific factors model that both regions are identical. If the regions were not identical in their production function, the effects of a labor supply shock cannot be predicted because they would react differently to the same amount of migration inflow. The following elaborations will show that this can only be assumed under special circumstances.

The theory on general migration considers a push and pull framework. This framework says that incentives to migrate can be provided by the source country which is called push factors, or the receiving country, also known as pull factors (Bodvarsson & Van den Berg, 2009). Migrants are calculating the costs and benefits of settling in a new location, based on these push and pull factors (Bodvarsson & Van den Berg, 2009). A pull factor would be, for example, the economic prosperity of the receiving region, or a better justice system (Bodvarsson & Van den Berg, 2009). Push factors are, for example, no economic perspective or political instability (Bodvarsson & Van den Berg, 2009). In this framework, it is clear to see that if migrants can make their own decisions, they would choose the most prosperous regions. As a result, the high inflow region would have developed better also without the higher migration.

Since the expulsion of ethnic Germans after the war is considered to be a case of forced migration the problem of selected regions is not a problem for this research. At the same time, there is no clear definition of where forced migration ends and voluntary starts (Bodvarsson & Van



den Berg, 2009; Fiddian-Qasmiyeh et al., 2014). The expulsion of the ethnic Germans from eastern Europe after WW2, however, is clearly considered as a case of forced migration (Becker & Ferrara, 2019; Bauer, Braun & Kvasnicka, 2013; Braun & Mahmoud, 2014; Braun & Weber, 2016; Braun & Dwenger, 2017; Chevalier et al., 2018; Peters, 2019). In the case of forced migration, the illustrated push and pull framework is not well suited. This is because forced migration is considered as independent from an individual cost benefit calculation about a net gain of the migration itself (Becker & Ferrara, 2019; Bodvarsson & Van den Berg, 2009). In other words, no pull factors are influencing the decision if and where to migrate.

From an econometric perspective, this independence is favorable because it can solve the problem with endogeneity regarding the self-selection of the migrants and the destination location (Becker & Ferrara, 2019). On the one hand, Becker and Ferrara (2019) are saying that people who are forced to migrate do not have done a proper evaluation as induced by the push and pull framework of involuntary migration. It says that refugees are not influenced by the economic prosperity in the receiving countries. This implies that the number of migrants in the different regions was not higher due to economic prosperity in the first place.

Concluding can be said that the distribution of the ethnic Germans in 1950 was not influenced by the economic prosperity of regions. Therefore, the model with two equal regions as proposed is a plausible approximation concerning economic indicators.

### 3.4 Assimilation and its function in economic development

Assimilation is also a key aspect when researching economic growth because it determines how much the overall productivity of the workforce is increasing (Borjas, 2019). This implication is very straightforward. If the productivity level and/or the participation rate is lower than the one of natives, one would have to depreciate the real number of migrants with regards to the actual increase in the effective labor force. The assimilation of the expellees in the West German economy is for that of great importance for the theoretical framework developed because it determines the assumption of how much the inflow is increasing the effective number of labor supply.

The first who looked at economic assimilation was Chiswick (1978), followed by Borjas (1985). The basic definition by Alba and Nee (1997) says that migrants who assimilate do get some more equal to their native counterparts in economic outcomes like wages unemployment rates, but they also adapt to the culture of the country they are now living in.

There is research looking at the economic assimilation of expellees in the FRG after World War Two. Falck, Heblich and Link (2012) can show that, shortly after the arrival in 1950, the chances of being unemployed were twice as high for expellees compared to natives. This difference diminished completely until 1960. The largest contribution to this development was ascribed to the economic boom that Western Germany was experiencing in the post-war period (Falck, Heblich & Link, 2012). A more precise estimation of the timing was done by Braun and

Weber (2021). With their annual and dynamic modeling, they were able to show that unemployment of expellees was almost zero in 1964.

Another study contradicts these findings. Bauer, Braun and Kvasnicka (2013) are finding that expellees had still higher unemployment numbers and earned less money. The smallest difference was in the group of expellees that worked in agriculture before the war. To the authors, this is because most of them started working in other higher-paid occupations after they arrive. The evidence on the economic assimilation of expellees after the war is a bit conflicting. One fact that can be said however is that it took a while for the migrants to assimilate with their native counterparts in economic terms. The time when the integration of these people was successful is still in question.

# 4 Methodology

The next chapter will introduce the used methodology. To estimate the effects of immigration on the regional sectoral development an IV approach will be used. The assumption needed for a valide estimate will be discussed here. Afterward, the data used will be presneted.

## 4.1 Research Approach

The decision of the French to restrict migration into their occupation will be seen as a quasi-natural experiment. More specifically, the research will focus on the federal state of Baden-Württemberg. The feature here is that the border of the American and French occupation zone ran through the middle of this federal state and directly at the border of the administrative district (Braun et al., 2020; Schumann, 2014). The administrative districts are the observed statistical units and can be seen as an equivalent to American counties. The German federal states have substantial legislative, and executive powers and own budgets. Due to this, observing regions in a single federal state has the advantage that one does not have to control for different economic policies on the federal state level. This splits Baden-Württemberg into a northern region with a high inflow of migrants and a southern region with a low inflow.

To measure the impact of the refugee inflow on economic development an IV approach will be used. The advantage of this method is that it can get rid of omitted variable bias, simultaneity bias, and possible measurement errors in the regressor, in this instance  $ex\_share_t$  (Angrist & Pischke, 2008). While all three phenomena are elaborated in more in detail below, the consequence of each of them is similar. In each case,  $ex\_share_t$  is not independent of the error term  $u_{it}$  (Angrist & Pischke, 2008). This means that the measured effect will not be the real causal effect which occurred in reality (Wooldridge, 2015). By doing a simple naïve ordinary least square (OLS) regression like equation (1) one would fall into one of these traps. This will result in a biased estimate of the effect of the expellee inflow onto the economic performance  $y_{it}$ .

## 4.2 Research Design

### 4.2.1 Choosing an IV

The next chapter will firstly introduce the basic function of an IV. Afterward, the chosen model with the IV will be introduced. Following this, the historical circumstances which can explain the function of the instrument will be explained. At least the validity of the instrument will be

demonstrated. The instrument will be the binary variable which indicates if a region is in the French or the American occupation zone.

The basic principle behind the IV approach can be best demonstrated with equations (7), (8), and (9). If  $\theta$  in equation (7) gets naively estimated the error term looks like equation (9) and is then correlated with  $ex\_share_{r1950}$  described above this OLS estimator will suffer from omitted variable bias. The real-world model in this case would be equation (8). So  $E[ex\_share_{1950}|u_{rt}] \neq 0$ . The error term would look as followed.

$$\ln\_GPD_{n_{rt}} = \alpha + \theta ex\_share\_post_{rt} + u_{rt} \quad (7)$$

$$\ln\_GPD_{n_{rt}} = \hat{\alpha} + \hat{\xi} ex\_share_{r1950} + \hat{\delta} A'_r + \varepsilon_{rt} \quad (8)$$

$$u_{rt} = A'_r \delta + \varepsilon_{rt} \quad (9)$$

$A'_r \delta$  is the vector of all the relevant omitted control variables, also including  $relative_{rt}$  and the group dummies  $Z'_r$ , and  $\varepsilon_{rt}$  is the real error term and  $E[ex\_share_{r1950}|\varepsilon_{rt}] = 0$  (Angrist & Pischke, 2008). The IV tackles this problem by splitting the variation of  $ex\_share_{1950}$  into two parts one not correlated with  $u_{rt}$  and one correlated with  $u_{rt}$ , isolating the helpful uncorrelated part of  $ex\_share_{r1950}$ . By including the IV, the estimator will be unbiased again because it isolates  $\varepsilon_{rt}$  in equation (3) (Angrist & Pischke, 2008).

#### 4.2.2 The 2SLS model

The model, estimating the impact of the migration inflow on the production in the non-agricultural sector, will be a two stage least squares (2SLS) model with region fixed effects. This fixed effects approach is recommended if the panel data set is a collection of specific statistical units and not a random sample of a population (Baltagi, 2021). The 2SLS method is also well suited if the model has also other covariates (Angrist & Pischke, 2008). Equations (7), (10), and (11) are demonstrating the function of the 2SLS approach. One must substitute the first stage equation (10) into the OLS regression (1) which results in equation (11) where  $\hat{\theta}$  is a consistent estimator if the requirement for the IV is fulfilled (Angrist & Pischke, 2008).

$$ex\_share\_post_{rt} = \hat{\beta}_{11} occup\_zone\_post_{rt} + \hat{\kappa}_{11} relative_{rt} + \hat{\mu} Z'_r + \hat{\pi}_{1rt} \quad (10)$$

$$\ln\_GPD_{n_{rt}} = \hat{\theta} ex\_share\_post_{rt} + \hat{\beta}_{21} relative_{rt} + \hat{\mu} Z'_r + \hat{\varepsilon}_{rt} \quad (11)$$

The variable  $ex\_share\_post_{rt}$  is the share of refugees in region r, at time t. Before the year 1950 the first date after the war, the value is zero. Since the value of refugees was only observed in the 1950 census, the data set does not contain information on how these ratios are developing over time. To deal with this, the assumption is made that the share remains constant over the study period. The share of expellees is quite stable until the 1960s (Braun & Kvasnicka, 2014; Braun & Weber, 2021) and the population shock was persistent at a lower level least in the region at the occupation zone border until 1970 (Schumann, 2014). This will create some bias since it is shown that the difference got a little bit smaller after the initial shock in 1950 (Schumann, 2014).

The variable  $relative_{rt}$  is the relative output size of the agricultural sector with regards to the non-agricultural sector. Braun and Kvasnicka (2014) predict that more rural regions with a relatively bigger agricultural sector might also experience a faster development in the non-agricultural sector even without a higher inflow of migrants. Additionally, more rural regions also experienced less destruction through the war and that may also explain a faster relative development (Braun & Kvasnicka, 2014). The variable measures the magnitude of agriculture and due to this is a proxy on how rural a region is. So, it captures the phenomena described by Braun and Kvasnicka well.

The basic approach for testing Hypothesis 1 is the same for Hypothesis 2. It just switches the endogenous variables which now measure the real GDP of the agricultural sector. Because both hypotheses are about different economic sectors it seems to be suitable to use the basic approach twice. The model for hypothesis two is for this reason equation (12):

$$\ln\_GPD\_a_{rt} = \widehat{\theta}ex\_share\_post_{rt} + \widehat{\beta}_{21}relative_{rt} + \widehat{\mu}Z'_{rt} + \widehat{\varepsilon}_{rt} \quad (12)$$

The instrument used in this thesis will draw on some political decisions done by the allied forces. There were two major events that led to the uneven inflow of migrants into Baden-Württemberg. First, the location of the border between the French and the American occupation zone. The border was drawn along the over-regional highway linking Karlsruhe, Stuttgart, and Ulm. This was mainly due to the Americans who wanted to have full access to this crucial supply line (Mosely, 1950). Mosely (1950) also reports that the French and English would have preferred to get some of the main industrial parts of Germany into their occupation zone. The Americans who just wanted to have a corridor from the north-western ports to their south-eastern territories pushed their demands through the negotiations. This also shows that there was no cherry-picking of the most productive German regions. The distribution happened predominantly because of military factors.

The second decision was the one of the French to not participate in the dispersion of the refugees arriving after the end of the war. This refusal was based on the fact that France was not part of the negotiations at the Potsdam Conference (Moseley, 1950). At this conference, the borders of the occupation zone were finalized, and the joining of the French would have delayed an agreement significantly (Mosely, 1950). Additionally, the members of the conference agreed on the new German territory. Because the Germans in the eastern parts of the old German Reich had to be expelled to the new German territories the British and Americans declared themselves to let them resettle in their occupation zones. Since the French were not invited to participate in the negotiations, they felt not bound to this agreement and refused to let any expellees into their territory which weren't already there to this date (Schumann, 2014). It appears that the French declining any responsibility for the distribution process of the German refugees was mainly due to the political process.

In addition, it must be said that these negotiations were only relevant for the third phase of the expulsion. In the first two, refugees phased no restrictions in movement (Douglas, 2012). This is the reason why the French zone also experienced immigration. But since almost half of the total movement happened in phase three, the region experienced far less immigration. I argue this is why the mean share of expellees in the French zone was 10.59% as shown in table 1. The

movement into the region was just stopped at a certain point and afterward people that would have settled there now stayed at the other side of the border.

Summing this up, the basic function of the IV is that it influences the likelihood of a region to experience a higher inflow of expellees. The two territories were just chosen due to the route of a major road in this area. Because the French restricted access to their territory, for migrants that came after the war, the chances of getting more expellees went basically to zero. This decision was motivated just because of the political process. That there had to be some inflow, can be seen by looking at the numbers in table 1. Column 1, reporting the share of refugees with respect to the native population, for all regions in the data set, shows that there was a sizable share also in the French occupation zone, but significantly less than in the American zone. I argue that the instrument was at least randomly assigned with respect to the economic perspectives and the decision of the French to restrict entry was also not part of an economic policy.

*Table 1: Differences in inflow rates of occupation zone and first stage estimates*

VARIABLES	(1) total state	(2) total state without city districts	(3) border regions
Occupation zone	8.297*** (1.028)	10.24*** (0.805)	11.42*** (1.136)
Constant	10.59*** (0.712)	10.82*** (0.536)	11.16*** (0.776)
French mean	10.59	10.82	11.16
US mean	18.89	21.06	22.58
Observations	73	63	15
R-squared	0.478	0.727	0.886

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Own calculations for data source see table 2

After introducing the IV formally, now the key assumptions needed for a valid IV will be tested. For this, it is important to think about whether the effect of the instrument, induced on the endogenous variable, is always equal or it may vary across the statistical units (Angrist and Pischke, 2008). This defines the assumption needed to be fulfilled to get a consistent estimator (Angrist & Pischke, 2008). In the heterogeneous case, it is crucial to think about the four cases of compliers, never-takers, defiers, and always-takers (Angrist & Pischke, 2008). Angrist and Pischke (2008) define them the following way:

*Compliers*: Observations that act according to the treatment.

*Never-takers*: Observation that does not get the treatment even if it is in the treatment group.

*Defiers*: Observation who behave the opposite to compliers.

*Always-takers*: Observation that does get treated independently of the group it is in.

The only possible case in this scenario are never-taker regions. Regions that would have low inflow rates independent from the occupation zone they are in. The defier and always-taker cases are not possible because the movement to the French zone was restricted. To recap, the effect of being in the French or American occupation zone is resulting in a higher chance of experiencing a higher inflow of migrants. It cannot be assured that a region in the French occupation zone would have experienced a higher inflow if it would have been in the American zone. When observing the findings of Braun et al. (2020) one can see that non-urban regions with low inflow rates also existed in the American and British zone close to the state of Baden-Württemberg. As a consequence, there is a possibility of a never-taker and a homogenous treatment effect is not likely.

As it appears that the research design suffers from heterogenous treatment only the local average treatment effect (LATE) can be estimated if the following assumptions hold (Imbens & Angrist, 1994).

### **Independence**

The independence assumption says that the instrument “is as good as randomly assigned” (Angrist & Pischke, 2008, p. 112). This means that the instrument is independent of the economic potential of a region and the number of migrants that came into it. The military considerations were most crucial for the location of the border and attempts of the French to pick the most prosperous regions were denied by the Americans (Mosely, 1950). Due to these facts, I think the instrument is as good as randomly assigned and the independence assumption holds.

### **Exclusion restriction**

The exclusion restriction means, transferred to this framework, that a region being part of the French or American occupation zone does affect the distribution of migrants but is not correlated with any other endogenous variable influencing the development of the manufacturing sector in region  $r$ . I argue that this IV does not have this problem. First, the state of Baden-Württemberg had no shared border with the former German Democratic Republic. The northern US-occupied part is closer to this border, but it should be already so far away that it does not have a significant influence on any region in Baden-Württemberg. This view gets strengthened by the fact that Redding and Sturm (2008) did not include any parts of Baden-Württemberg in the treatment group when they try to observe how the abrupt cap of trading opportunities to the east influenced economic development in West Germany.

Second, all regions are in the same federal state. There cannot be different policies because of the design of the data set. The last factor, which may lead to a violation of the exclusion restriction is a potential different behavior of the French and Americans with regards to resource extraction and economic policies in their respective zones. The period the foreign authorities in the different zones could make their own administrative decisions is from 1945 to 1948; after this, the western occupation zones got a unified treatment (Adelshäuser, 2011). One main point is the form of reparation which was agreed on in the Potsdam Conference. Here the treaty was that reparations had to be done in form of goods instead of money (Adelshäuser, 2011). It also was said that extractions must be paid for at the world price of the good. In reality, the victorious powers could pay with a discount of around 20 %, which was also done by everybody but most

extensively used by the French (Adelshauer, 2011). The French needed the production of their occupied territory to build back their own economy. But they also had a bigger incentive to trade with their zone, while the Americans were not investing in their territory much unless it was not helping the military (Adelshauer, 2011). The French extracted more resources but also traded more than the Americans. Since it is not possible to measure which influenced the respective economy more it has to be assumed that the different approaches lead to a similar result overall.

### **First stage**

Another key assumption is that the IV must have a significant first stage. This means that there has to be a significant correlation between the instrument and endogenous variable which also is statically significant (Angrist & Pischke, 2008). Table 1 also shows the existence of such an impactful first stage. Column 3 shows that the difference in expellee's inflow was highest when just looking at the occupation zone border. Column 2 represents the means and resulting differences when excluding the pure city districts. These city districts behaved differently with regards to migrant inflow since housing space was scarce due to wartime destruction (Braun et al., 2020). All differences are statistically significant at the 1% level. While the mean inflow rate in the border region is twice as high on the American side. The differences get smaller when looking at the entire state of Baden-Württemberg. Still, they remain substantial. It can be said that for any subgroup of the data set the first stage assumption holds.

### **Monotonicity assumption**

This assumption also concerns the instrument and implies that it must have the same effect on all observations (Imbens & Angrist, 1994). So, is it possible that a region in the American zone would have a lower chance of having a high inflow rate of migrants? This is unlikely since immigration was only restricted in the French zone. This implies that the chances for a high inflow rate got universally higher by being in the American zone.

### **4.2.3 Alternative approach**

There is also another IV that is used in the context of the uneven distribution of expellees in the FRG. The instrument used in the literature is the distance between sending and the receiving region (Braun & Mahmoud, 2014; Braun & Kvasnicka, 2014; Peters, 2019). The idea behind this is that refugees did not want to travel too far and were more likely to resettle close to their old home region (Braun & Mahmoud, 2014; Braun & Kvasnicka, 2014). The likelihood of settling in a specific region gets lower the more distance lays between the regions. As Braun and Kvasnicka (2014) are showing with the example of the Sudeten Germans who settled in high numbers in Bavarian regions with a close distance to the Sudetenland in Czechoslovakia. But they were not found in high numbers in the northern parts of Germany. This instrument however has some major disadvantages.

The main flaw of this other approach is that it may violate the exclusion restriction. Peters (2019) is, in contrast to Braun and Mahmoud (2014), and Braun and Kvasnicka (2014), acknowledging this. He points out, referring to the work of Redding and Sturm (2008) that there



is a clear correlation between economic performance and proximity to the inner German border (Iron Curtain). This violates the exclusion restriction, which says the IV “is correlated with the causal variable of interest [...], but uncorrelated with any other determinants of the dependent variable” (Angrist & Pischke, p. 85). Proximity to the Iron Curtain had a negative effect on the economic performance of a region (Redding & Sturm, 2008) but these regions were also the closest to the old German territories so they also had the highest chances of high refugee inflow. This is not a problem with the used instrument in this thesis. No administrative region in Baden-Württemberg is near the inner German border and Redding and Sturm (2008) are also not including any of them in their treatment group when estimating the effects of proximity to it. As a consequence, I do not think that the occupation zone instrument is violating the exclusion restriction as the instrument used by the other researchers did.

The LATE theorem, states that under the assumptions of independence, the exclusion restriction, the first stage, and monotonicity, an instrument “can be used to estimate the average causal effect on the affected group” (Angrist & Pischke, 2008, p. 115). This means that the LATE theorem ensures the internal validity, but not the external validity. This must be kept in mind when interpreting the results in this thesis. Interpretation on the general effect of migration on economic development must be made with caution. So after showing that all assumptions hold, the instrument used in this thesis will be internally valid and results are most likely not biased.

## 4.3 Data

The following chapter will give an overview of the used data set and will discuss the validity of the sources used.

The basis for this analysis is a panel data set, which is separated into a pre-war period and a post-war period. I collected data from different statistical books from the official Weimarian statistical office for values before the war. For statistics after the war, I use official publications of the joint statistical, federal-state offices. A detailed list of the references of these data sources is provided in table 2. It shows the variable and the year it measures as well as the corresponding source, the year the source was published and the pages it can be found in. With these data sources, I can construct a panel data set for the economic development in the administrative district in Baden-Württemberg. This makes it possible to observe the development of the different sectors before and after the treatment. I collected data on the economic performance for

each administrative district (in German “Landkreise”) for a period from 1926 to 1970<sup>1</sup>. A yearly approach was not possible because the data was not published for the regional level needed here. After this date, a big land reform changed the borders of the administrative district in Baden-Württemberg, and it makes it unfeasible to continue the panel data set afterward.

The data had to be collected from different secondary sources listed in table 2. This table shows the name of the source, the year it was published and the pages the values can be found. The statistical reports on the economic indicators for non-agricultural (signed with a n) and the agricultural (signed with an a) reported the two sectors individually, so the values just had to be copied out of the books without further modification. This accounts for the turnover reports and the reports on GDP.

*Table 2: Sources for data set*

Variable/year	Source	year	pages
Turnover a/n 1926/27	(Statistisches-Reichsamt, 1931)	1931	250-258
Turnover a/n 1935	(Statistisches-Reichsamt, 1938)	1938	25-27
Turnover a/n 1950	(Statistisches-Bundesamt, 1955)	1955	61-65
Turnover a/n 1955	(Statistisches-Bundesamt, 1957)	1957	58-62
Regional expellees share	(Statistisches-Bundesamt, 1953)	1953	130-136
GDP a/n 1957/1961	(Statistische-Landesämter, 1968)	1964	59-61
GDP a/n 1964	(Statistische-Landesämter, 1968)	1968	57-65
GDP a/n 1968 1970	(Statistische-Landesämter, 1973)	1973	55-63

<sup>1</sup> The exact years are: 1926, 1927, 1935, 1950, 1955, 1957, 1961, 1964, 1968, 1970

It is also important that the values of the economic indicators are comparable over time. For this, I used a GDP-Deflator created by Ritschl and Spoerer (1997). I recalculated it so it was 1 for the year 1926, the starting year, and then deflated the values for the other years respectively to it. This deflator covers currency reforms and basic inflation (Ritschl & Spoerer, 1997). The values for the deflator are represented in the do-file in Appendix A

The share of expellees in Germany on the administrative district level is based on an official publication of the statistical office of Western Germany. It was a part of the Census of 1950 where refugee status was also a part of the evaluation (Statistisches-Bundesamt, 1953). The result of this census is also used by other publications when measuring the inflow of migrants (Braun & Kvasnicka, 2014; Peters, 2019; Braun et al., 2020). It seems that this is the most reliable source for this characteristic.

The other variables used in the analysis are created by me. The variable indicating if a region is in the French or the American zone was done with maps presented by Braun et al (2020) and a map provided by the Statistischem Bundesamt (1968) where the administrative districts were displayed with their names. This then got matched in the panel data set by creating a dummy variable showing where the region is located. One for being in the US zone and zero for being in the French occupation zone. The dummy variable border, which indicates if the administrative district laid directly at the occupation zone border was created with the same resources. The urban variable indicates if the statistical unit reported in the secondary resources was a district without rural parts (Kreisfreie Stadt) or with rural parts (Landkreise). This distinction is displayed in all statistical resources used for the creation of the panel data set.

One major obstacle is the fact that there is no measurement of GDP on the regional level before 1957 available. The solution to this was first propose by Vonyó (2012), who introduced turnover taxes as the best alternative option to a direct measure of the GDP. Another important advantage is that this tax is reported by major industrial sectors (Vonyó, 2012). The tax was for all sales of businesses and these total sales are defined “as domestic deliveries and other services of business for money and own consumption of the business” (Braun and Kvasnicka, 2014 p. 280). This proxy is not a perfect substitute for the direct measurement of GDP. Braun and Kvasnicka (2014) state that very small revenues do not fall under this tax and due to that, small businesses are systematically undercounted. This is over proportionally the case for agriculture. Due to this, there will be some bias from the year 1950 to 1957. This is the step where the transition from turnover to GDP is done. Since there is an undercounting, the growth rates between these years might be estimated too high. As a result, one can expect an upward bias in the results, especially when estimating the effects on the agricultural sector.

Another flaw in the data set is the lack of sector-specific employment numbers. This does not allow me to observe the changes in GDP per capita as done by others (Braun & Kvasnicka, 2014; Peters, 2019). This limits the analysis severely. Because the development in productivity per capita could not be observed, the consequences of migration on the economic structure in the regions cannot be analyzed in more detail. Because it was not possible to collect the census data for all the years, especially not on the regional level needed, the analysis must be concentrated on the consequences on growth rates.

It also appears that the values for economic performance in 1955 behave unusually. As it can be seen in figure 2 it is still way over the values of 1950 and 1957. This is unusual because when looking at the graph in figure 1 which shows the economic development of the entire FRG, such a spike did not occur. This lets one question if there are some irregularities in the data. A good explanation could not be found, however. The unusual pattern can be observed in Figure 1 where the jump in 1955 is especially visible in the graphs of the non-agricultural sector shown with the blue and green color. Comparing this with the graph in figure 1 where the development of the overall GDP in Germany is shown it appears even more strongly that this might be an artifact with unobserved reasons. Figure 3 does not show such a spike around this time. Here the growth is very steady. As a result of these findings and following Peters (2019), I exclude this year from the models.



Figure 1: Overall German real GDP over time

Source: Author's own calculations using data by Ritschl and Spoerer (1997).

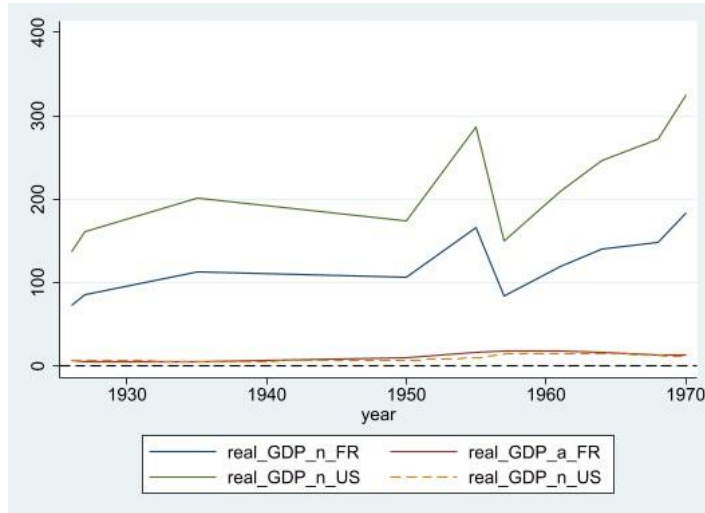


Figure 2: Real GDP by sector and occupation zone other time with the year 1955

Source: Author's own calculations using own data set.

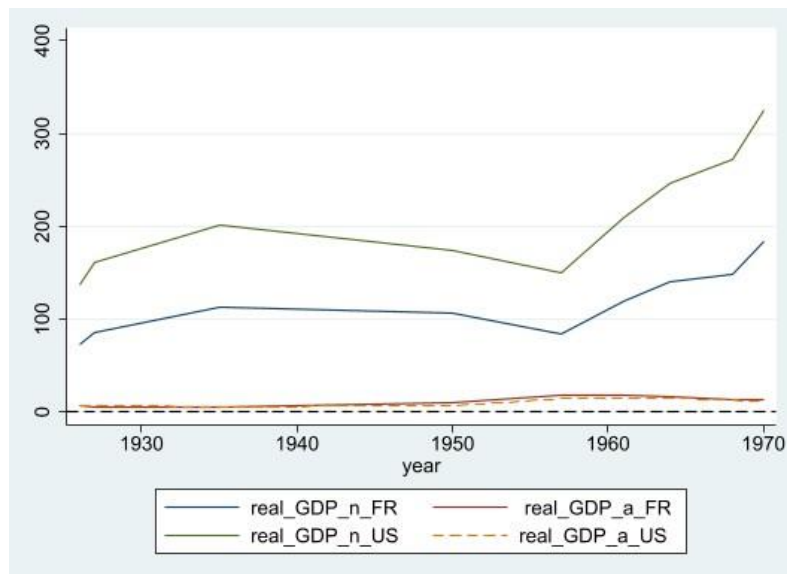


Figure 3: Real GDP by sector and occupation zone other time without the year 1955

Source: Author's own calculations using own data set.

## 4.4 Chapter Summary

This chapter described at the first the planned methodology for this thesis. It could be shown that the IV *occup\_zone* is a reliable instrument for isolating the causal effect of the uneven migration inflow on economic performance. To complete this, the 2SLS model with fixed effects, used to estimate the impact of migration inflow on sectoral development. The second part introduced the data, with which the results when get estimated. Here it appears that the measurement is not perfect, and some irregularities are appearing in it. But because they are official governmental statistics and are used by other researchers as well, it seems to be the best possible option for this research. The descriptive presentation of the development of the different sectors in the occupation zones also shows some first evidence that the prediction made in the theoretical part might be right.

## 5 Results and Discussion

In this chapter the results of the 2SLS estimates are presented. Afterward, the implications will be discussed with regards to the hypotheses and the findings of the former literature. Additionally, a sensitivity test will be done.

### 5.1 Results

This chapter will first present the results from the 2SLS model with fixed effects and interpreted for the non-agricultural sector. Afterward the same is done for the agricultural sector. Based on the theory presented it is expected that the labor supply shock will have a positive effect on the growth rates of the non-agricultural sector. Reversely the agricultural sector should not see such a correlation.

*Table 3: Main results for the effect of expellees share on non-agricultural output development*

VARIABLES	(1) Full state	(2) No urban	(3) border regions	(4) Full state	(5) No urban	(6) border regions
Share of expellees	0.0334*** (0.00699)	0.0307*** (0.00780)	0.0199 (0.0195)	0.0331*** (0.00531)	0.0312*** (0.00590)	0.0290** (0.0123)
Agricultural share				-4.956*** (0.292)	-4.902*** (0.285)	-6.591*** (0.713)
Constant	4.194*** (0.0688)	4.062*** (0.0808)	4.500*** (0.203)	4.825*** (0.0734)	4.754*** (0.0836)	5.128*** (0.123)
Observations	643	559	153	643	559	153
Number of regions	72	63	17	72	63	17
R2	0.0501	0.0943	0.0955	0.636	0.678	0.702

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Own data set

Table 3, Columns 1 to 3 are showing the results if it is not controlled for the size of agriculture in the region, while columns 4 to 6 are with a control variable. In both cases, the estimations were done with three different restrictions to the data set. Full state means that all regions in the data set are included. This also includes the pure city regions which behave differently from the

rest in terms of refugee inflow. The no-urban columns are excluding these regions and columns 3 and 6 are showing the estimates if only regions directly at the occupation zone border are included in the estimate. One first observation which can be made is that adding the control variable increases the fit of the model significantly. While the values at the first three columns lay under 0.1, adding the control variable increases the fit of the model significantly. With model 6, which has the highest R-squared, 70.2% of the variation in the data can be explained. This implies that adding the control variable increases the fit of the model significantly.

An interesting observation in this context is also that coefficients for a share of expellees are not changing significantly in size and level of statistical significance when comparing columns 1, 2, 4, and 5. A sizeable difference can only be observed in the case of the border regions. Here the model with the control variable is more even. Here it was predicted that due to the better fit of the models which include the control variable only these estimates will be interpreted in more detail.

The estimates of the impact of an increase in population due to expellee's share is as expected so that hypothesis one holds. The estimate of column 5 is 0.0312. It is statistically significant at the 1% level with robust standard errors. This means that a one-unit increase in expellees share translates into a 3.12% higher increase in production in the non-agricultural sector. Since the share of expellees has to be interpreted in percentage this means that a one-unit increase is a one percent increase in expellee's share. The mean yearly growth in production rate in the post-war period, for the same group of regions, is 5.65%. So interpreted on this mean growth, a 1% increase in expellees increases it by 0.176%. The R-squared of 0.678 shows that the model can explain 67.8% of the variation in the data set which is a good fit.

Column 4 has a slightly higher estimate for expellees share at 0.0331 and column 6 shows a slightly smaller estimate with 0.290. The first is also statistically significant at the 1% level, while the second only at the 5% level.

*Table 4: Main results on agricultural output development*

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Full state	No urban	border regions	Full state	No urban	border regions
Share of expellees	0.0536*** (0.00347)	0.0513*** (0.00353)	0.0469*** (0.00527)	0.0545*** (0.00325)	0.0551*** (0.00326)	0.0446*** (0.00515)
Agricultural share				3.142*** (0.329)	2.958*** (0.327)	1.998*** (0.567)
Constant	1.559*** (0.0416)	1.666*** (0.0770)	1.612*** (0.0672)	1.160*** (0.0573)	1.220*** (0.0620)	1.422*** (0.0841)
Observations	715	622	170	715	622	170
Number of regions	72	63	17	72	63	17
R2	0.221	0.216	0.263	0.348	0.316	0.394

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Own data set



Table 4 shows that the estimates are all around a 5% increase in agricultural output by a one percent increase in expellee's share. They are all statistically significant at the 1% level. The overall fit of this model is better than the non-agriculture counterpart when not controlling for economic characteristics in the region.

## 5.2 Discussion

That the effect in the border region is the smallest stands also against the prediction of the theory. This is because the differences in expellees share is bigger in this region than in the whole federal state as shown in table 1. One possible explanation for this is the proximity of the regions. Because in the estimates in Cullum 4 and 6 in table 3 and 4 regions are also compared that have a much greater distance to each other. So, some migrants who settled in the high inflow regions in the US side at the border might end up commuting to the low inflow region. This may be an indication that the persistent population shock observed by Schuman (2014) cannot be fully translated to the labor market. Just because a person settled in one administrative district does not guarantee that this person does not commute region.

The distinct observation, made in the last paragraph, was in my opinion mainly possible to the approach taken in this thesis. The instrument made me able to measure this clear cut at the border which would be not possible with the IV used by Braun & Kvasnicka, and Peters (2019). One major downside of this approach however to the other one is that it restricts the research to only one specific region in the FRG. While I do not believe the results are still comparable to other research on the post-war Germany case, the external validity of the results will hurt with this approach. This is in addition to the argument of Angrist and Pischke (2008) who argue the LATE estimate does not allow for conclusion in the real population. Transferred to this case it means that the implications of this research for the general effects of migration on economic development must be made with caution.

The migration inflow affected the growth of the non-agricultural sector positively. This is in line with the prediction of the first hypothesis. This speaks for the theory that the higher rates of return gave incentives for investors to invest capital in the high inflow regions. This is in line with Peter (2019) who could show that migration had a positive effect on the number of firms when comparing it to the pre-war level.

The second hypothesis predicted that the agricultural sector would not be influenced by the inflow of migrants. The 2SLS estimates also show a significant effect of migration on the agricultural output that is relatively speaking even higher than the effect on the non-agricultural sector. This leads to a neglect of the second hypothesis. This is questioning the theory of the specific factors model that assumes that the agricultural sector is not able to adjust to the labor supply shock and is not as attractive to employees because it cannot compete with the wages of the non-agricultural sector. Another explanation might be that the time frame the research is looking at also contains the phase where assimilation of the expellees was far from completed. So in times where many of them were still unemployed the supply exceeded the demand in all sectors. This would make the agricultural sector somewhat competitive even if it cannot offer

the same wages as the other. So, lower wages would still be the better option than not having work at all. As a result, more workers would end up in the agricultural sector as predicted and this would also be increasing the output in the agricultural sector. The productivity per capita would decrease consequently. In this case, it appears clearly that being able to measure the development in output per capita would help to understand these results better. Because if productivity per worker would increase in the non-agricultural sector but would decrease in the agricultural the second explanation of incomplete economic assimilation would be more likely.

It also appeared that the effect of migration on the agricultural sector was stronger in relative terms. This would speak against the theory and findings of Braun & Kvasnicka (2014) that immigration helped with the economic transition after the Second World War. But as shown in the last paragraph, some further investigation is needed to confirm the first implications of this research. Before this, it cannot be said with certainty that the results are contradicting.

Overall, the estimates show a significant positive effect of migration on economic growth. This is in line with the existing literature presented in chapter 3.1. Regions with a higher migration inflow performed better over time in the federal state of Baden-Württemberg. While the external validity of these results is not assured, they still add to the evidence predicting this overall positive effect.

### 5.3 Sensitivity test

A sensitivity test was done by redoing the main estimates with fixed effects regression not using the 2SLS approach. Because the IV should get rid of omitted variable bias, not using this approach should change the results. This would strengthen the main results because it gives an indication if the IV worked. Additionally, it could also be informative to include more control variables because it could show if the results are then getting closer again. Since it was not possible to collect more variables, this may be done in future research. Tables 5 and 6 are showing the estimates of a fixed effects model using the same variables as with the main estimates. In both cases, the estimated effect of an increase in expellees is higher than its IV counterpart. In addition to this, the direction of the results, their statistical significance and the fit of the model are very similar. This may be an indication that the 2SLS helped to reduce the bias in the estimates while the overall implications are not changing using another method.

Table 5: Fixed effects restimates of non-agricultural sector

log GDP n	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Full state	No urban	border regions	Full state	No urban	border regions
post_war_ex	0.0411*** (0.00540)	0.0401*** (0.00570)	0.0308* (0.0158)	0.0411*** (0.00388)	0.0405*** (0.00407)	0.0382*** (0.00904)
relative				-4.954*** (0.316)	-4.913*** (0.314)	-6.756*** (0.630)
Constant	4.117*** (0.0532)	3.964*** (0.0590)	4.387*** (0.165)	4.746*** (0.0627)	4.659*** (0.0694)	5.051*** (0.112)
Observations	643	559	153	643	559	153
R-squared	0.327	0.312	0.163	0.652	0.652	0.628
Number of region_num	72	63	17	72	63	17
R2	0.0501	0.0943	0.0955	0.613	0.658	0.701

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: Fixed effects restimates of agricultural sector

log GDP a	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Full state	No urban	border regions	Full state	No urban	border regions
post_war_ex	0.0592*** (0.00290)	0.0603*** (0.00298)	0.0526*** (0.00444)	0.0600*** (0.00272)	0.0608*** (0.00278)	0.0509*** (0.00432)
relative				3.163*** (0.328)	2.971*** (0.326)	1.905*** (0.561)
Constant	1.501*** (0.0366)	1.575*** (0.0393)	1.549*** (0.0594)	1.100*** (0.0538)	1.156*** (0.0588)	1.363*** (0.0795)
Observations	715	622	170	715	622	170
R-squared	0.393	0.424	0.480	0.470	0.498	0.517
Number of region_num	72	63	17	72	63	17
R2	0.221	0.216	0.263	0.347	0.315	0.383

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 6 Conclusion

The research focused on how the inflow of migrants influences the regional sectoral change in Baden-Württemberg. To observe this, the idea was to look at how the migration inflow was influencing the development of the agricultural and non-agricultural sectors. The way the regional economy is influenced got explained by a theoretical specific factors model from international trade theory and it was complemented by theories on causes of migration and assimilation.

To investigate a causal effect a 2SLS approach was chosen. The IV itself used the fact that the border of the French and American occupation zone was separating the federal state in the middle. Additional to this, the two occupation powers had different migration policies. This was the mechanism behind the Wald estimator which indicates on which side of the border a region was located. To estimate the possible effects of migration I created a panel data set spanning from the year. For this, I created a panel data set containing measurements of GDP for the different sectors and the number of refugees for every region in a time span from 1926 to 1970 using official statistics. It got also clear that the data available is not perfect because GDP had to substitute with a turnover before the year 1957 which is a good but not perfect approximation. Due to this, the results in the analysis part have to be handled with caution. Furthermore, the data set only contain the minimum needed to estimate the basic results presented in this thesis. Since it was not possible to collect for this research, the analysis is limited and did not allow to investigate conflicting results in more detail.

The instrument introduced made it possible to measure the effects of immigration in different geographical settings. Comparing the effect in the very close border regions with the entire state. The smaller effect on economic development in the border regions combined with the bigger difference in expellee's share detected possible factors which reduced the impact of the population shock. This divergence was not detected before. The research on this population shock focused on remigration but the findings in this thesis indicate that there might also be other factors that reduce the effect on the economy like commuting.

The analysis yielded mixed results. The first hypothesis holds, which shows that the inflow of migrants increased the growth in the non-agricultural sector. But the same is true for the agricultural sector so that no evidence is found for the second hypothesis. On the one hand, the evidence clearly shows that the inflow of migrants improved the economic performance of a region. On the other, it is not sufficiently clear if it also helped to induce sectoral change because the effects were significant in both sectors. Relatively speaking the effect was even stronger for the agricultural sector which indicates the opposite predicted by the theory illustrated with the specific factors model.

To investigate this question further it might be good to extend the data set as already described by sectoral employment numbers. In this way, it would be possible to observe how productivity

per capita changed. This could contribute to the findings of this thesis and might bring some more clarity in this contradicting evidence. Additional research might go in the direction of the instrument used in this research. Since it was not used before, the validity of the instrument could be used to reestimate other results using the variation of migration inflow into West Germany after the Second world war.

Another possible, future extension of this research is to focus on the border region only and include factors such as commuting. This would allow to investigate other mediating factors as just resettlement might also generate valuable policy implications.

The indication shown by this research gives a positive picture of the long-term impact of migration inflow on the economy of the regions in Baden-Württemberg. The research of such a replacement may be very relevant in the future.

# References

- Acemoglu, D. (1998). Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality, *The Quarterly Journal of Economics*, vol. 113, no. 4, pp 1055-1089
- Adelshausen, W. (2011). Deutsche Wirtschaftsgeschichte: Von 1945 Bis Zur Gegenwart, München: C.H. Beck.
- Alba, R. & Nee, V. (1997). Rethinking Assimilation Theory for a New Era of Immigration, *The International Migration Review*, vol. 31, no. 4, pp 826-874
- Angrist, J. D. & Pischke, J.-S. (2008). Mostly Harmless Econometrics: An Empiricist's Companion: Princeton university press.
- Baltagi, B. H. (2021). Econometric Analysis of Panel Data, Cham: Springer International Publishing, Imprint: Springer.
- Bauer, T. K., Braun, S. & Kvasnicka, M. (2013). The Economic Integration of Forced Migrants: Evidence for Post-War Germany, *The Economic Journal*, vol. 123, no. 571, pp 998-1024
- Becker, S. O. & Ferrara, A. (2019). Consequences of Forced Migration: A Survey of Recent Findings, *Labour Economics*, vol. 59, no. 1-16
- Bodvarsson, Ö. B. & Van den Berg, H. (2009). The Economics of Immigration: Theory and Policy, Berlin, Heidelberg: Springer Berlin Heidelberg.
- Borjas, G. J. (1995). The Economic Benefits from Immigration, *Journal of economic perspectives*, vol. 9, no. 2, pp 3-22
- Borjas, G. J. (2019). Immigration and Economic Growth. *National Bureau of Economic Research Working Paper Series*.
- Borjas, G. J. & Chiswick, B. R. (2019). Foundations of Migration Economics. in: Elsner, B. (ed.). Oxford: Oxford University Press.
- Braun, S. & Dwenger, N. (2017). The Local Environment Shapes Refugee Integration: Evidence from Post-War Germany,
- Braun, S. & Kvasnicka, M. (2014). Immigration and Structural Change: Evidence from Post-War Germany, *Journal of International Economics*, vol. 93, no. 2, pp 253-269

- Braun, S. & Mahmoud, T. O. (2014). The Employment Effects of Immigration: Evidence from the Mass Arrival of German Expellees in Postwar Germany, *The Journal of Economic History*, vol. no. 69-108
- Braun, S. & Weber, H. (2016). How Do Regional Labor Markets Adjust to Immigration? A Dynamic Analysis for Post-War Germany, vol. no.
- Braun, S. T., Kramer, A., Kvasnicka, M. & Meier, P. (2020). Local Labor Markets and the Persistence of Population Shocks: Evidence from West Germany, 1939–1970, *Journal of Economic Geography*, vol. no.
- Braun, S. T. & Weber, H. (2021). How Do Regional Labor Markets Adjust to Immigration? A Dynamic Analysis for Post-War Germany, *Journal of International Economics*, vol. 129, no. 103416
- Chevalier, A., Elser, B., Lichter, A. & Pestel, N. (2018). Immigrant Voters, Taxation and the Size of the Welfare State. *IZA Discussion Paper*.
- Connor, I. (2007). *Refugees and Expellees in Post-War Germany*, 1. publ.: Manchester Univ. Press.
- Douglas, R. M. (2012). *Orderly and Humane: The Expulsion of the Germans after the Second World War*, New Haven, London: Yale University Press.
- Dustmann, C., Fabbri, F. & Preston, I. (2005). The Impact of Immigration on the British Labour Market, *The Economic Journal*, vol. 115, no. 507, pp F324-F341
- Falck, O., Heblich, S. & Link, S. (2012). Forced Migration and the Effects of an Integration Policy in Post-Wwii Germany, *The B.E. Journal of Economic Analysis & Policy*, vol. 12, no. 1, pp
- Fiddian-Qasmiyeh, E., Loescher, G., Long, K. & Sigona, N. (2014). Introduction: Refugee and Forced Migration Studies in Transition. in: Elena Fiddian-Qasmiyeh, G. L., Katy Long, and Nando Sigona. (ed.) *The Oxford Handbook of Refugee and Forced Migration Studies*. Oxford: Oxford University Press pp 1-21
- Hornung, E. (2014). Immigration and the Diffusion of Technology: The Huguenot Diaspora in Prussia, *The American Economic Review*, vol. 104, no. 1, pp 84-122
- Houpt, S., Lains, P. & Schön, L. (2010). Sectoral Developments, 1945-200. in: Broadberry, S. & O'Rourke, K. H. (eds.) *The Cambridge Economic History of Modern Europe: Volume 2: 1870 to Present*. Cambridge: Cambridge University Press pp
- Imbens, G. W. & Angrist, J. D. (1994). Identification and Estimation of Local Average Treatment Effects, *Econometrica*, vol. 62, no. 2, pp 467-475

- Mosely, P. E. (1950). The Occupation of Germany: New Light on How the Zones Were Drawn, *Foreign Affairs*, vol. 28, no. 4, pp 580-604
- Neumann, B., Vafeidis, A. T., Zimmermann, J. & Nicholls, R. J. (2015). Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - a Global Assessment, *PLOS ONE*, vol. 10, no. 3, pp e0118571
- Ottaviano, G. I. P. & Peri, G. (2005). Immigration: Theory and Evidence from the U.S. *National Bureau of Economic Research Working Paper Series*.
- Ottaviano, G. I. P. & Peri, G. (2012). Rethinking the Effect of Immigration on Wages, *Journal of the European Economic Association*, vol. 10, no. 1, pp 152-197
- Peters, M. (2019). Market Size and Spatial Growth-Evidence from Germany S Post-War Population Expulsions. *Unpublished manuscript*.
- Redding, S. J. & Sturm, D. M. (2008). The Costs of Remoteness: Evidence from German Division and Reunification, *The American Economic Review*, vol. 98, no. 5, pp 1766-1797
- Ritschl, A. & Spoerer, M. (1997). Das Bruttosozialprodukt in Deutschland Nach Den Amtlichen Volkseinkommens- Und Sozialproduktsstatistiken 1901-1995, *Jahrbuch für Wirtschaftsgeschichte / Economic History Yearbook*, vol. 38, no. 2, pp 27-54
- Samuelson, P. A. (1971). Ohlin Was Right, *The Swedish Journal of Economics*, vol. 73, no. 4, pp 365-384
- Schumann, A. (2014). Persistence of Population Shocks: Evidence from the Occupation of West Germany after World War II, *American Economic Journal: Applied Economics*, vol. 6, no. 3, pp 189-205
- Semrad, A. (2015). Immigration and Educational Spillovers: Evidence from Sudeten German Expellees in Post-War Bavaria. *Munich Discussion Papers, Volkswirtschaftliche Fakultät, Ludwig-Maximilians-Universität München*. Munich Discussion Paper.
- Sequeira, S., Nunn, N. & Qian, N. (2017). Migrants and the Making of America: The Short- and Long-Run Effects of Immigration During the Age of Mass Migration. *National Bureau of Economic Research Working Paper Series*. National Bureau of Economic Research.
- Statistische-Landesämter (1968). Das Bruttoinlandsprodukt Der Kreisfreien Städte Und Landkreise 1957 Bis 1966, Wiesbaden: Statistische Landesämter.
- Statistische-Landesämter (1973). Das Bruttoinlandsprodukt Der Kreisfreien Städte Und Landkreise 1961, 1968 Und 1970, Wiesbaden: Statistische Landesämter.



Statistisches-Bundesamt (1953). Statistisches Taschenbuch Über Die Heimatvertriebenen in Der Bundesrepublik Deutschland Und in West-Berlin, Wiesbaden: Statistisches Bundesamt.

Statistisches-Bundesamt (1955). Die Umsätze Der Umsatzsteuerpflichtigen Und Deren Besteuerung, Stuttgart-Köln: W. Kohlhammer GmbH.

Statistisches-Bundesamt (1957). Die Umsätze Der Umsatzsteuerpflichtigen Und Deren Besteuerung: Ergebnisse Der Umsatzsteuerstatistik, Wiesbaden: W. Kohlhammer Verlag.

Statistisches-Reichsamt (1931). Umsatzsteuerstatistik Und Umsatzsteuer in Deutschland Nach Den Umsatzsteuerveranlagerung, Berlin: Statistisches Reichsamt.

Statistisches-Reichsamt (1938). Umsatzsteuerstatistik 1935: 1. Teil Hauptergebnisse; Einzelergebnisse Für Die Landwirtschaft Und Die Gewerbeabteilung "Übriges Gewerbe", Berlin: Paul Schmidt.

UNHCR. (2019). Global Trends: Forced Displacement in 2019. UNHCR.

Vonyó, T. (2012). The Bombing of Germany: The Economic Geography of War-Induced Dislocation in West German Industry, *European Review of Economic History*, vol. 16, no. 1, pp 97-118

Vousdoukas, M. I., Mentaschi, L., Hinkel, J., Ward, P. J., Mongelli, I., Ciscar, J.-C. & Feyen, L. (2020). Economic Motivation for Raising Coastal Flood Defenses in Europe, *Nature Communications*, vol. 11, no. 1, pp 2119

Wooldridge, J. M. (2015). Introductory Econometrics: A Modern Approach: Cengage learning.

# Appendix A

The Do-file and the two data sets used are not included but can be requested if needed.