ERASMUS UNIVERSITY ROTTERDAM

Master Thesis Strategy Economics

Is minimum wage legislation effective? FDI activity difference-in-differences analysis in Germany and France

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Abstract

The goal of this thesis is to investigate the degree to which minimum wage is an effective measure to the economy. We observe a gap in the past literature between inward FDI and minimum wage relationship. The reason for such a relationship to exist is explained through theory. A natural experiment setting where minimum wage was introduced in Germany in 2015 will be exploited by performing difference-in-differences approach. The results suggest that introducing minimum wage is associated with 1) the decrease in size of the foreign entities; 2) the increase in the number of foreign direct investments made in the future following the introduction of legislation; 3) the net increase in annual labor costs for multinationals.

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1. Introduction

One of the most important and popular conflicts when it comes to economics history is the one between Keynesian and Neoclassical schools of thought. At the time of the Great Depression in 1930 many neoclassical economists argued that the way to address the crisis is to let the market work itself out, without government intervention. Keynesian economists thought that the market alone was unlikely to provide a sufficient level of demand, and that government intervention was necessary. One of the main issues that the schools did not agree upon was the minimum wage policy. The controversy of minimum wage policy dates to 19th century when New Zealand introduced a national minimum wage (in 1894). The reason behind the need for such a policy was the exploitation of workers where their employers would underpay them. At the time new policy was controversial because employers and business owners argued that it would lead to increased costs and job losses. Ever since, the debate continued. The first minimum wage law in U.S. enacted in the state of Massachusetts in 1912, where the constitutionality of the law was challenged. Since then, more and more states in the U.S. have introduced minimum wage policies. It took more than 30 years for the next milestone in the debate which is represented by famous George j. Stigler article "The Economics of Minimum Wage Legislation" in 1946. This is because it was the earliest study to systematically examine the impact of minimum wage laws on employment empirically. Stigler argued that minimum wage laws could have negative effects on employment by increasing the labor costs for employers and reducing demand for labor. His findings were aligned with the neoclassical school of thought, and they would further shape the debate on minimum wage. 50 years later Card et al. (1994) found that the increase in minimum wage led to no loss of employment in the fast-food industry. More recently, in 2021 David Card wins the Nobel Prize in Economics for challenging conventional economic theory, leaving us with a better understanding of how economic policies affect the labor market. In general, the late 1980s and the period spanning from 1990 to 2000 literature has taken up more dimensions when it comes to evaluating minimum wage law efficiency. Namely, it is not only employment that is the determinant of the economy. According to Cahuc and Michel (1996), although the consequences of minimum wage legislation may appear simple in theory, they are often much more complex. For instance, minimum wage laws have been implemented in many economies, yet these economies do not appear to be less efficient or experience slower growth compared to those without minimum wage laws. This is because the distortions it introduces into the economy can interact with other

distortions to create unintended consequences that may have positive effects on growth and economic efficiency. The authors suggest that the legislation may have positive effects on the growth rate of the economy via an increase in the proportion of skilled workers relative to non-skilled workers. What is intriguing about the topic is that, despite the existence of these kinds of studies, many of which have been widely accepted by academics, the debate about minimum wage policy has not been discarded yet. In fact, in 2020, one of the issues discussed in the U.S. presidential debates between D. Trump and J. Biden was minimum wage. This shows that this topic is still strongly debated, even beyond academia. Additionally, there are approximately 90 countries with a national minimum wage policy in place as of 2021 according to the International Labor Organization. Which leads us to question the efficiency of such legislation. From the literature we know that the cost of wages is an important determinant of inward foreign direct investments (Blomström, Globerman & Kokko 2002; Chen & Devereux, 2003; Head, Ries, & Swenson, 1995). However, the topic of foreign direct investment (FDI) relationship with minimum wage legislation has not received much attention. Thus, in this thesis we will try to fill this gap in the literature and in general address the efficiency of minimum wage legislation through studying the effects it has on inward FDIs and domestic economy.

Most of the EU countries have had minimum wage in place for a long time, however, Germany has only introduced it in 2015. We will exploit this by taking a difference-in-differences approach and using the scenario as a natural experiment. We choose France as a counterfactual country because of its proximity to Germany and because they share similar relevant economic variables. We will test the hypotheses that question if minimum wage attracts FDIs into the country and does it reduce employment for multinationals (MNEs). As a robustness check we use annual employment cost as a variable of interest. The reason for these hypotheses is that it will let us form a broader view about the efficiency of the minimum wage. In other words, after researching this topic we will understand if minimum wage is a tool that should be avoided or is it perhaps something that most of the countries should employ. We conclude that introducing minimum wage can be an effective measure and that it does not reduce the population employed. Rather, we find that it does reduce employment in the MNEs, but it increases the number of MNEs that enter the market. In other words, the people employed in MNEs are more spread out throughout the companies. Additionally, the annual labor costs for MNEs increase due to the introduction of minimum wage. Which leads the host (domestic) economy net-gaining in terms of GDP.

2. Literature review

In this section we cover the evolution of the minimum wage and FDI literature. Thesis contribution to literature is discussed and hypotheses introduced.

2.1 Evolution of minimum wage and FDI literature

Arguably most countries in the world today have minimum wage legislation in place. A minimum wage has many purposes such as: poverty alleviation, promoting social justice, preventing wage competition (race to the bottom scenario in which employers continuously lower wages to cut costs). Overall, the main reason it was introduced originally was to protect workers and ensure that they receive fair compensation for their labor. Although we do know the original reason for the introduction of minimum wage, we should not neglect the reasons of today. Some examples of other minimum wage purposes and reasons to study it in general are included in **Table 1**. To better assess whether the minimum legislation is an effective measure for the efficient economy, in this chapter we will partially summarize what has been done in the past by the economists of the world in addition, a brief summary of literature on foreign direct investments will be included. We will review the older theory and some of the papers from the 20th century, as well as some of the more recent studies. At the end of this chapter we will conclude what is the gap in the literature and construct the hypotheses to try to fill this gap.

The winner of the Noble prize split Card and Krueger (1994) argued that minimum wage legislation is an effective measure to prevent employee exploitation as they have found it does not reduce employment through various measures in the fast-food sector. However, there also have been some contradictory studies after the Card and Krueger (1994). For example, Neumark and Wascher (2000) argue that Card and Krueger (1994) paper is not without flaws and they find contradictory evidence that supports the conventional theory of ineffectiveness of minimum wage. They claim that using a more extensive dataset reveals substantial negative employment effects, contradicting the initial findings. Neumark et al. (2013) assert that Allegretto et al.'s (2011) study, which concluded that minimum wage increases in the United States do not lead to significant negative employment effects, suffers from potential limitations and does not adequately capture the full scope of available evidence. The authors argue that when examining a wider range of studies and taking into account methodological differences, there is substantial evidence suggesting that higher minimum wages can have adverse effects on employment, particularly for low-skilled workers.

Table 1. Minimum wage use and reasons to study it.

Minimum wages intended purpose	Why study minimum wage
• Worker well-being: minimum wage policies aim to protect the well-being of low-wage workers by ensuring they receive fair compensation for their labor	• Studying minimum wage helps assess whether these policies effectively improve workers' living standards, reduce poverty, and address income inequality.
• Labor market dynamics: minimum wage policies can have significant implications for labor market dynamics.	• Researching minimum wage helps understand how changes in wage floors affect employment levels, job creation, labor supply, and labor demand. It sheds light on the trade-offs of such policies.
• Economic inequality: minimum wage is often viewed as a tool to address economic inequality.	• Studying minimum wage helps evaluate its impact on income distribution and the extent to which it helps narrow the gap between low-wage and higher-wage workers.
• Policy Evaluation: Minimum wage policies are implemented by governments to achieve specific goals.	• Studying minimum wage allows policymakers to evaluate the effectiveness of these policies.
• Business and Market Effects: Minimum wage policies can influence business operations, market competition, and economic productivity.	• Researching minimum wage provides insights into how firms adjust to higher labor costs, the potential effects on prices, profitability, firm behavior, and market dynamics.
• Social and Political Implications: Minimum wage is a topic with social and political implications. It involves considerations of fairness, social justice, and the role of government in regulating labor markets.	• Studying minimum wage contributes to broader societal discussions on economic policy, social welfare, and the relationship between employers and workers.

They contend that the overall body of research points to potential negative consequences of minimum wage policies, and caution against relying solely on specific studies with opposing findings. In summary, Neumark, Salas, and Wascher's paper adds to the ongoing discussion regarding the impact of minimum wage policies in the United States. Their response challenges the conclusions of Allegretto et al.(2011) and highlights the significance of considering a broader range of evidence, which suggests potential negative effects on employment resulting from minimum wage increases. Additionally, according to Davis and Trebilcock (1999, p. 88), there are three main arguments against the effectiveness of minimum wage laws. First, in certain situations, raising the minimum wage can potentially lead to increased unemployment. Consequently, it is unclear whether such laws are beneficial for the poor, as those who retain their jobs may experience improvements while those who lose their jobs may face greater hardship. Second, minimum wage laws can have long-term negative impacts on the development and well-being of the poor. Third, even if it could be demonstrated that increasing the minimum wage is socially beneficial, there are challenges with effectively enforcing such laws, rendering them ineffective. In support of the arguments presented by Davis and Trebilcock, a study conducted in Costa Rica revealed that a significant proportion of workers covered by minimum wage legislation were earning less than the legally mandated minimum. Similarly, in sectors not covered by the law, a comparable proportion of workers faced similar circumstances. In summary, although there does seem to be a significant difference between the effect minimum wage on employment has in between different sectors, there is not a conclusive general effect yet.

It can be argued that today we are getting more studies than ever on how minimum wage legislation efficiency is measured indirectly rather than directly. For example, T. MaCurdy (2015) showcases that minimum wage produces a value-added tax effect on consumer prices. These findings contradict the displaying of minimum wage policy as antipoverty idea. The paper by Fan et al. (2018) examines the relationship between minimum wage and conducting an outward foreign direct investment (FDI) from China. According to Fan et al. (2018) there is also a growing number of papers that examine the effects of minimum wage increase in China on the performance of firms there. One example is Long and Yang (2016) who find a negative effect of minimum wages on profitability. Given the nature of these studies, we can assume that the minimum wage, whether positive or negative, plays a significant role in the economy. Despite the potential importance of minimum wage policies for attracting or deterring foreign direct investment (FDI) inflows, the

literature on this topic remains relatively scarce. Although there have been studies examining the impact of labor costs on FDI location decisions, the specific role of minimum wage policies has not been extensively explored. Additionally, some of the evidence from FDI inflow literature suggest that economic growth have no significant impact on FDI inflows and that trade openness, infrastructure development, political stability and human capital play a significant role in attracting FDIs (Lokesha and Leelavathy 2012). We argue that minimum wage and inward FDI share some of the determinants according to traditional theory. Labor costs and skills (Feenstra and Hanson (1997)): higher wages can increase the cost of production for firms and make investment in a particular country less attractive, while lower wages can lower the cost of production and increase the attractiveness of a country for investment.

Taxation incentives (Alfaro et al. (2004)): although taxation is not directly related to wages, it is an important factor in determining the overall cost of doing business, including the cost of labor. For example, tax incentives that reduce labor costs for firms could potentially increase FDI inflows. Various recent studies find that tax differentials influence an MNE's decision on where to locate its activities, although they do not seem to affect the decision to invest. For example, differences in the average tax rate influence the choice by US MNEs of where to locate in Europe, conditional on them having already decided to invest in Europe (Devereux and Griffith 1998, 2002). There is no complete consensus on how strong the tax effect is, although, according to Hines (1999), an elasticity of FDI with respect to taxes of minus 0.6 is a typical result in much of the literature. According to the Dunning OLI paradigm (Dunning (1980)), which is a theory explaining the determinants of foreign direct investment (FDI), the effect of minimum wage changes on inward FDI can be understood by examining the three main factors: ownership advantages, location advantages, and internalization advantages:

Ownership advantages: This refers to the competitive advantages that multinational corporations (MNCs) possess, such as advanced technology, managerial expertise, or strong brands. Minimum wage changes may have a limited impact on ownership advantages, as they are typically related to factors other than labor costs. Therefore, the effect of minimum wage changes on inward FDI through ownership advantages is likely to be minimal.

Location advantages: This factor considers the attractiveness of a particular location for foreign investment, including factors like market size, infrastructure, political stability, and labor costs.

Minimum wage changes can impact the labor cost component of location advantages. If a country raises its minimum wage, it could increase labor costs for firms operating in that country. This increase in labor costs may make the location less attractive for low-skilled labor-intensive industries. In such cases, inward FDI may be discouraged or reduced due to the higher cost structure.

Internalization advantages: Internalization refers to the extent to which firms choose to internalize their activities through FDI rather than relying on market transactions. Minimum wage changes may affect the decision to internalize certain activities. Higher minimum wages can make outsourcing or subcontracting less cost-effective, encouraging MNCs to set up their own subsidiaries in countries with lower labor costs. In this case, inward FDI may increase as firms opt for internalization to maintain control over their operations and mitigate the impact of minimum wage changes.

Additionally, we include **Table 2** for summarized mechanisms through which minimum wage can affect inward FDI. Some of the other known FDI inflow inducing factors in the literature that could potentially be related to minimum wage are included in the appendix. (**Table 1A**). According to Navaretti and Venables (2004) book "**Multinational Firms in the World Economy**": "*The case of Ireland is an example of a deliberate and successful policy effort to attract MNEs. But Ireland became known as the Celtic Tiger not just because it offered the lowest tax rates in Europe: it was a doorway to the EU market, it was able to attract and expand a highly skilled, English-speaking, and relatively cheap labor force, and it made major infrastructure improvements. Probably, on balance, subsidies are rarely sufficient to attract investments, decisions are also being taken on labor force, infrastructure, and market access. Certainly, subsidies should not be considered by developing countries as a shortcut to bypass other structural constraints hindering inflows of FDI.*" In essence it is prominent on why a minimum wage legislation would be a factor for inward FDIs.

Only the most productive firms become multinationals (Aitken and Harrison (1999), Helpman, Melitz, and Yeaple (2004) and Amiti and Konings (2007)). MNEs are never found to perform worse than national firms, even when the most rigorous econometric procedures are performed (Griffith 1999; Benfratello and Sembenelli 2002; Conyon et al. 002; Barba Navaretti and Castellani 2003). It is reasonable to assume that labor costs are important for multinationals.

Moreover, Ye et al. (2015) finds that 11% of the workers at multinational enterprises (MNEs) are directly affected by the local minimum wage, although multinational firms in general are considered more productive and pay on average a higher wage. Coherent with these findings is Chen and Moore (2010) who argue that countries with higher uncertainty exhibit a greater proportion of multinationals relative to domestic firms. The reason for this is the fact that higher uncertainty requires higher productivity to stay in the market. Fan et al. (2018) study the effects of an increase in minimum wage on conducting and outward FDI. They build on Helpman (2004) theoretical framework which suggests that an increase in wage in the home country increases the incentive for firms to conduct outward FDI simply because of the labor costs. In other words, if a company had an incentive to build a production plant in another country before the increase of minimum wage in home country, it should have an even stronger incentive to do so after the increase. Fan et al. also find evidence for this reasoning empirically, namely, they find that the increase in minimum wage can explain about 32.3% of the growth in outward FDI from China in their sample period. From this stem the question about inward FDI.

2.2 The hypotheses

If the minimum wage is so prominent, it must be effective, but is it the case? In summary, we have mixed evidence for the minimum wage effect on employment. There does seem to be a significant difference of the effect size between industries, but the general effect is not yet conclusive. Additionally, there is a gap in the literature as papers on minimum wage and inward FDI are scarce when it comes to European countries. In this thesis we will study if the effectiveness of the legislation come in a form of deterring foreign direct investments while keeping the jobs within-country which leads to our first proposition:

- *H1: Introducing a minimum wage decreases the size of multinational firms in the country.*

The first proposition will help us figure out the intensive margin of the effect of minimum wage on FDI. We cover general employment trends for countries' populations in the data section. On the other hand, if the labor cost is a key determinant of inward FDI, then we argue that minimum wage introduction plays a role in deterring inward FDI. To study the extensive margin of minimum wage on inward FDI the second hypothesis is proposed as follows:

- *H2: Introducing minimum wage decreases inward FDI in the country.*

Table 2. *Through which mechanisms can minimum wage affect the inflow of FDIs?*

• Labor Costs: Minimum wage policies increase the cost of labor for businesses operating in the country. Higher labor costs can make the host country less attractive for foreign investors, particularly those seeking locations with lower wage levels. If the minimum wage is significantly higher than in neighboring or competitor countries, it may discourage foreign companies from establishing operations or expanding their investments in the country.
• Competitiveness: Higher minimum wages can affect the competitiveness of industries in the host country. If the minimum wage exceeds the productivity levels of certain sectors or industries, it may erode their competitiveness in the global market. Foreign investors may opt to invest in countries with lower labor costs to maintain cost competitiveness and profitability.
• Business Environment: Minimum wage policies can influence the overall business environment and investor perception. Excessive increases in minimum wages or frequent changes in minimum wage levels may create uncertainty and reduce investor confidence. Foreign investors often seek stable and predictable regulatory environments, including labor market regulations, to make long-term investment decisions.
• Substitution of Labor: Higher minimum wages can incentivize companies to substitute labor with capital-intensive technologies or automation. By reducing the reliance on labor, firms may mitigate the impact of higher labor costs. This substitution effect can have implications for job creation and employment opportunities, potentially affecting the attractiveness of the host country for FDI.
• Sectoral Impact: The impact of minimum wage policies on FDI inflow can vary across sectors. Industries with a higher share of labor-intensive activities, such as manufacturing or certain services, may be more sensitive to minimum wage changes. The potential effects on FDI inflow will depend on the composition of sectors in the host country's economy and their reliance on low-skilled labor.
• It is important to note that the relationship between minimum wage policies and FDI inflow is complex and depends on various factors, including the specific context, industry dynamics, labor market conditions, and the overall investment climate. The effects can vary across countries and over time. It is crucial to consider these factors when analyzing the potential mechanisms through which minimum wage policies can impact the inflow of FDIs.

3. Methodology

In this section we will cover the inference design, touch upon the necessary assumptions and the most captivating aspects. The hypotheses stated in the prior sections will be tested. Robustness check is included at the end.

3.1 The inference approach

We do have a natural experiment setting in Europe which comes in a form of introduction of the minimum wage in Germany. We will be exploiting this by taking the difference-in-differences approach to try to estimate a causal relationship between inward FDI and minimum wage in this thesis. The difference-in-differences approach requires two things, first, the treatment and second, a valid counterfactual. Most of the European countries have had minimum wage legislation for a while, however, Germany has only introduced it in 2015. For a valid counterfactual assumption to hold the control group units must follow the same trends as the treated ones would have followed were they not treated. It is a difficult assumption to adhere to and we will touch upon "valid counterfactual" assumption later in this section. For the control group, we have chosen France. As can be seen in the data section the countries share relatively similar trends in their economies. Additionally, the countries are relatively close in proximity to each other which does result in countries being more similar institutionally and economically (Glaeser et al. 2004). The first hypothesis of minimum wage affecting the growth rate of employment will be performed via panel data fixed effects estimator to control for country and year fixed effects. While the second hypothesis of minimum wage effects on the number of inward FDIs in the country will be performed via count data negative binomial estimator together with controlling for yearly and country fixed effects. Standard errors will be clustered at the country level as it is common practice in literature.

To test the first hypothesis of minimum wage influencing the number of employees, we will be using the following regression:

$$NrEmployees = \alpha + \gamma DE + \mu Post + \delta(DE \times Post) + \varphi_{year} + \varepsilon$$

Where *DE* is a dummy equal to 1 if the observation is from Germany and 0 if the observation is from France. *Post* is a dummy equal to 1 if the observation is from 2015 (the post period). φ_{year} represent yearly fixed effects (estimates will not be shown in the tables). The regression results for

this equation are represented in **Table 7** in the *Results* section. Additionally, we use 1-year lag for independent variables as we assume the decision on employment is made in advance.

To test the second hypothesis (minimum wage on inward FDI number), we will be using count data. In the data section, we will provide some evidence to reject equal dispersion within our sample. Additionally, we conclude the r(rho)s of fitted counts to be essentially the same (0.9897 for Poisson and 0.9665 for negative binomial). Perhaps the reason Poisson has a slight edge on the fitted counts over negative binomial is because we do observe large outliers in the sample and Poisson estimation would deal with this better. However, both BIC and AIC tests of model fit do prefer the negative binomial over Poisson (**Table 2A**), additionally, the hypothesis that the alpha of the negative binomial is equal to 0 is rejected at 1% significance level (**see negative binomial results Table 8)** which translates to further evidence for no equal dispersion. Therefore, the Poisson model will likely be too restrictive and thus we will be using the negative binomial approach in this thesis. The mentioned statistics in this paragraph are included in the appendix.

The regression for count data is the following:

$$NrInflownCompanies = \alpha + \gamma DE + \mu Post + \delta(DE \times Post) + \varphi_{year} + \varepsilon$$

The regression results are included and discussed in the *Results* section.

3.2 The valid counterfactual

For any of our analyses to capture the causal estimate we must assume two things. Firstly, the parallel trends, in other words, we must assume that Germany would have followed the same trends in any given relevant metric as France without the introduction of minimum wage. This would mean that the change in the post-period introducing a minimum wage in Germany relative to France is only due to the actual introduction. In essence, this assumption is just a restatement of the strict exogeneity assumption. We will provide some of the economic trends that are relevant to our analysis in the *Data* section, and since the actual levels of the variables do not matter, one could argue that the trends between countries looked somewhat similar. What is common in economists' practice when it comes to diff-in-diff analysis is to compare pre-treatment leads of the DD coefficient. We display this in **Table 3** for both the count data as well as the panel data. The idea is that if the year and diff-in-diff interactions are not significant, we can argue that there were no significant differences between countries in terms of the trends of the dependent variables. In

our case, the trends of inflown number of companies and multinational companies' size, namely, number of employees. We can observe some evidence for this in **Table 3** as we do have multiple non-significant and significant coefficients.

Table 3. Parallel trends. Pre-treatment leads of DD coefficient.

VARIABLES	(1) Parallel trends count (FDI counts)	(2) Parallel trends panel (Nr Employees)
2002L.year#L.DE	-2,341	678.2
	(4,033)	(921.0)
2003L.year#L.DE	-2,366	-4.742
	(4,033)	(912.9)
2004L.year#L.DE	-2,351	16.97
	(4,033)	(905.4)
2005L.year#L.DE	-2,354	58.13
	(4,033)	(895.5)
2006L.year#L.DE	-2,327	-399.9
	(4,033)	(873.0)
2007L.year#L.DE	-2,316	-945.7
	(4,033)	(853.7)
2008L.year#L.DE	-2,312	-733.8
	(4,033)	(845.7)
2009L.year#L.DE	-2,297	-1,905**
	(4,033)	(841.9)
2010L.year#L.DE	-2,185	-1,547*
	(4,033)	(832.2)
2011L.year#L.DE	-1,453	-1,794**
	(4,033)	(809.6)
2012L.year#L.DE	155.5	-1,829**
	(4,033)	(768.8)
2013L.year#L.DE	-266.5	-2,104***
	(4,033)	(726.3)
2014L.year#L.DE	-359.5	-2,286***
	(4,033)	(719.0)
2015L.year#L.DE	-100.5	-2,411***
	(4,033)	(716.6)
Observations	40	64,010
Number of country	2	2
Number of CompanyID		11,894

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

However, the test of pre-treatment similarities is not sufficient and not necessary to guarantee parallel counterfactual trends (Kahn-Lang and Lang 2019) The reason simply being that the prior treatment trends do not guarantee that the trends would have been similar post-treatment if the treatment never took place. Additionally, Kahn-Lang and Lang (2019) argue that failing to reject the similarities between prior-treatment trends between the two groups does involve other pitfalls and that most of the time cannot be solely trusted. Following Kahn-Lang and Lang 2019, we discuss the main concepts described in the paper on the parallel trends assumption which is the discussion on why the original levels in the variable of interest varies between the groups. In our case, why did the employment growth levels differ between Germany and France in the first place. In the *Data* section, we will observe many dimensions of differences in levels between countries. For example, R&D expenditure and tax levels. However, these variables have changed similarly in a trend-like fashion and that is why they should not interfere with our outcome of interest. For instance, if the tax rate has had a significant effect on the growth of employment, it also has had the same effect post-minimum-wage introduction. The second thing that must be true for our estimate to represent a causal relationship is the *stable unit treatment value assumption* (SUTVA). SUTVA means that the composition of the groups has not changed throughout the sample period. In other words, companies from France have not outsourced their activities to Germany for other than minimum wage introduction reasons and the other way around. Violation of SUTVA leads to not valid counterfactual as the treatment group is no longer the only one treated, as we do have some of the control units treated as well. In our case SUTVA is unlikely to hold. France and Germany are close in proximity and have an open border which leads to relatively low cost of re-fragmenting the composition of firms. In other words, no matter how many companies have left because of the introduced minimum wage in Germany, there is a chance that some of the companies have left because of the other companies leaving. This is truly one of the great limitations of our research because the estimate that we would get were SUTVA to not hold, is overestimated (some of the variation is explained by the companies leaving not because of the minimum wage reasons). However, there is still hope as we cannot really test the SUTVA assumption, additionally, perhaps we would still capture the sign of the effect which is important. We will come back to SUTVA in the limitations section.

4. Data

In this section we describe the data, cover its sources and the most important variables. Additionally, we include some of the statistics and important trends observed outside of the sample as well as within our sample.

4.1 Data sources and description of main variables

Throughout this thesis, we will be using ORBIS database for firm-level data variables and OECD data for country-level variables. We filter the companies that are: 1. located in Germany or France; 2. are not necessarily ultimately owned but are at least 51% owned by foreign shareholders; 3. have a known number of employees number value in the sample period which is 2000-2021. That leaves us with an unbalanced panel of 20354 firms. However, we choose to drop companies with less than 10 employees because of the fact that a company that has fewer employees is equivalent to the firm not being affected by minimum wage as much as the bigger firms regardless of the case. The reason is that in general, larger companies have an overall higher concentration of low-wage workers (Dube, Lester, and Reich (2014)). Additionally, smaller firms may not necessarily represent the economy as well as large firms. Having done that, we are left with 13668 firms in our sample. 9679 of which are German and 3989 French firms. The balance of the panel can be observed in **Table 3A** in the appendix. In addition, for later analysis (robustness checks), we will be dropping the companies that do not have a known value for the cost of employers in the sample period, which will leave us with 10674 companies. The number of inward FDIs are described in **Table 4**. We observe large difference between the variance and the mean which signal no equal dispersion.

Table 4. *summary statistics of inward FDI counts.*

Observations	42
Mean	1884.238
Variance	5572429

Histogram for the counts of inflown companies by year and by company also shows support for no equal dispersion (**figure 1**).

Figure 1. Distribution of inward FDI counts.
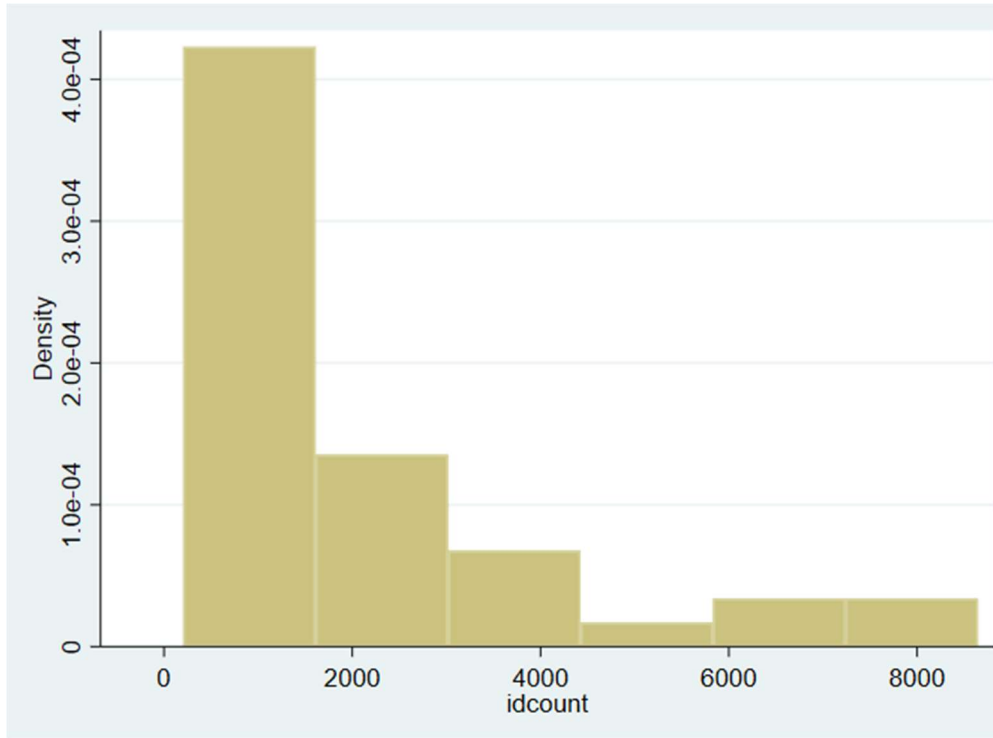
We also include the correlation matrix of the variables in **Table 5**. We do include some of the firm-level (revenue) and country-level (taxes/GDP) variables to better illustrate how Germany and France might be similar economically. How variables are measured and what they represent is explained in the appendix.

Table 5. *Correlation matrix.*

	RDasGDP	corpor~x	taxwedge	GDP	year	Revenue	nrempl~s	Minimu~e
R&DasGDP	1.0000							
corporatetax	-0.0383	1.0000						
taxwedge	0.4789	0.1777	1.0000					
GDP	0.8250	-0.1113	-0.0450	1.0000				
year	0.4549	-0.2825	-0.5122	0.8566	1.0000			
Revenue	-0.0595	0.0576	0.0470	-0.0968	-0.1138	1.0000		
nremployees	-0.0802	0.0588	0.0375	-0.1118	-0.1203	0.6533	1.0000	
MinimumWage	0.8988	-0.2153	0.2261	0.8988	0.6863	-0.0951	-0.1107	1.0000

4.2 Outside and inside sample statistics and trends

In this sub-section we will acknowledge existing trends between the countries when it comes to the factors determining the growth of employment which will help us shape the arguments for why the parallel trend assumption would or would not hold between France and Germany, additionally, we will begin to visualize what the world of FDI, and minimum wage looks like. Figure x represents the average wage between US France and Germany. **Figure 2** represents the trends of FDI inflows between Germany, France, and EU, we could see that France and Germany differentiate from the average of EU countries but do display quite similar trends compared to each other. **Figure 3** shows large differences in total employment but arguably similar trends.

Figure 2. *Average wage US Germany France. Trends between countries*
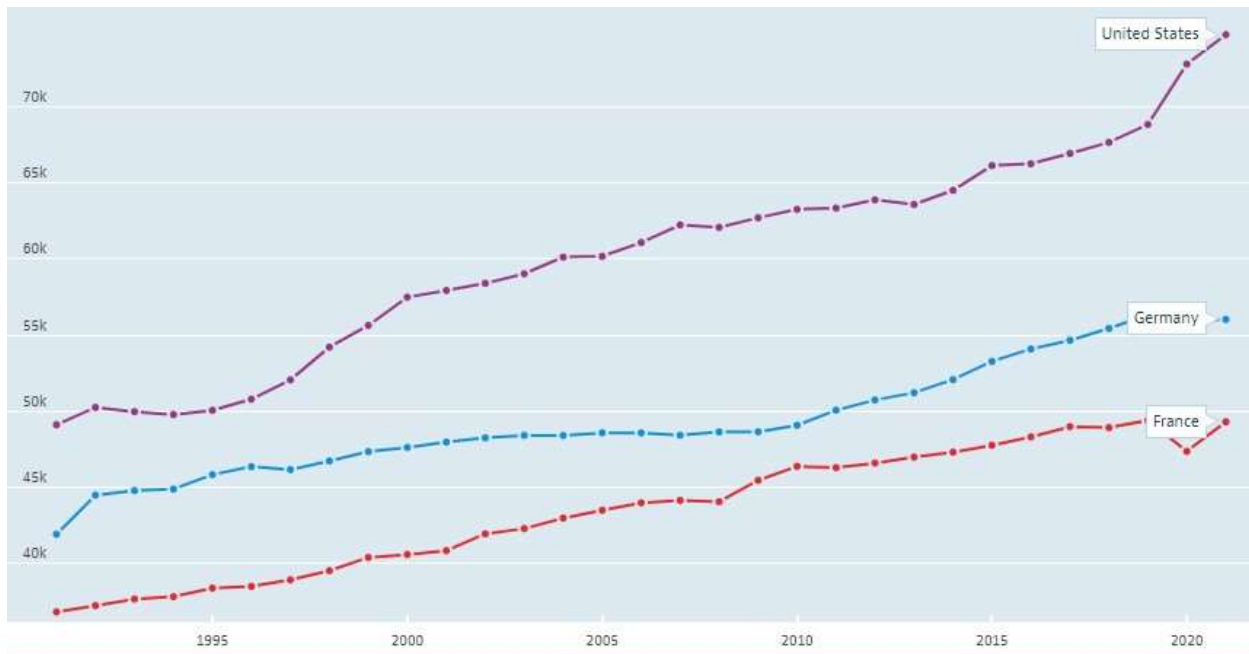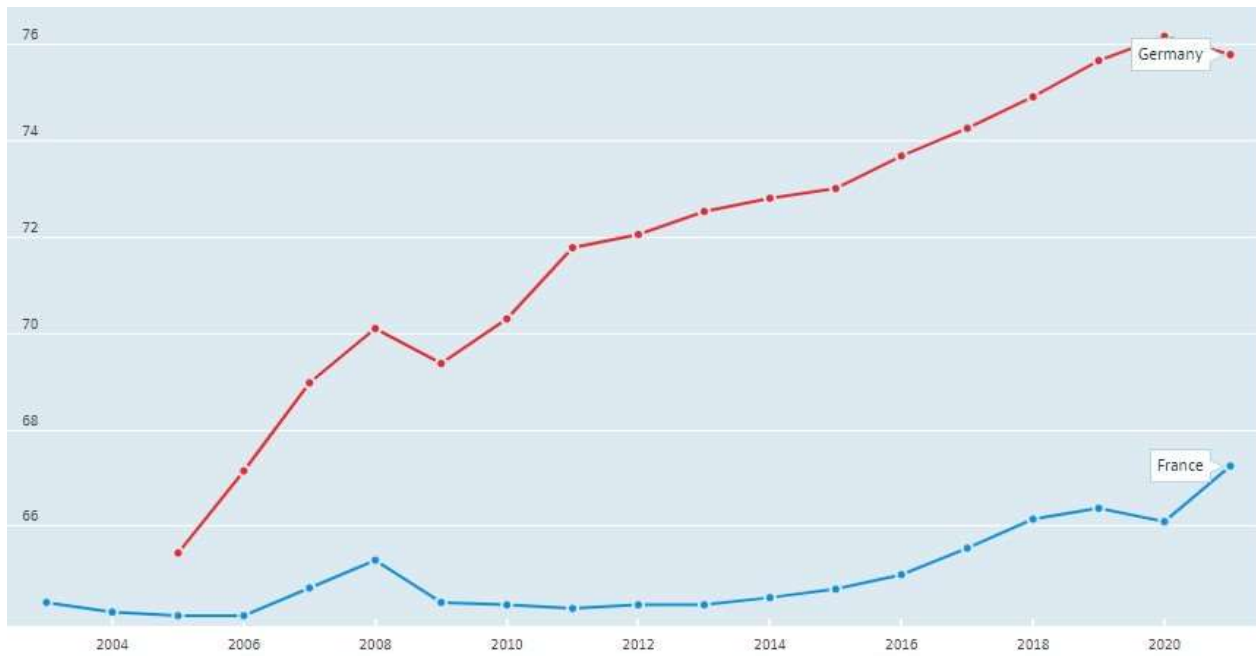

Notes: Thousands of dollars on the Y-axis and years on the X-axis.
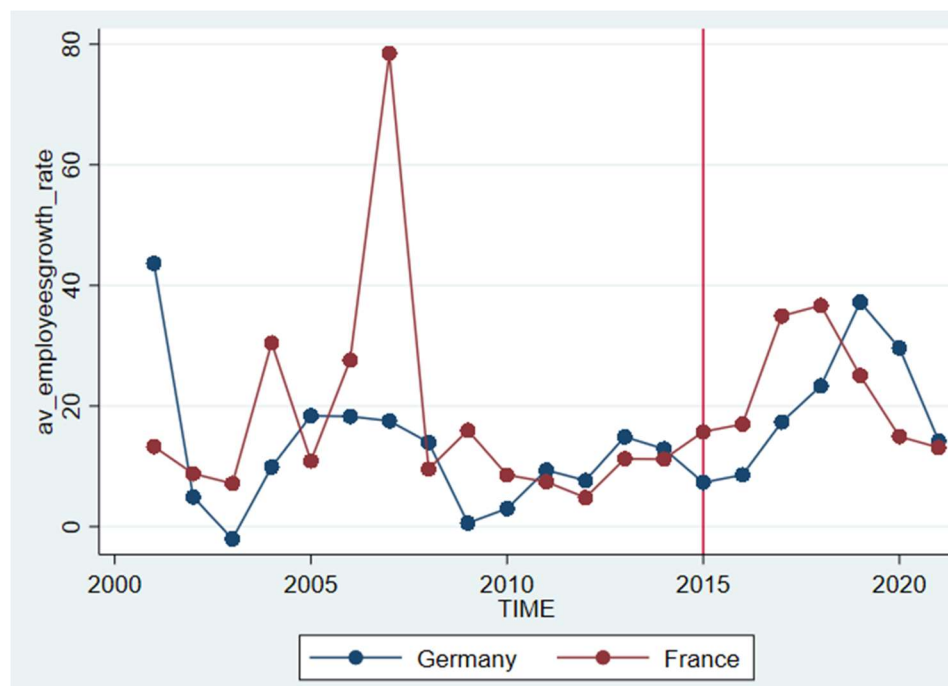
Figure 3. *FDI inflows Germany, France, EU.*
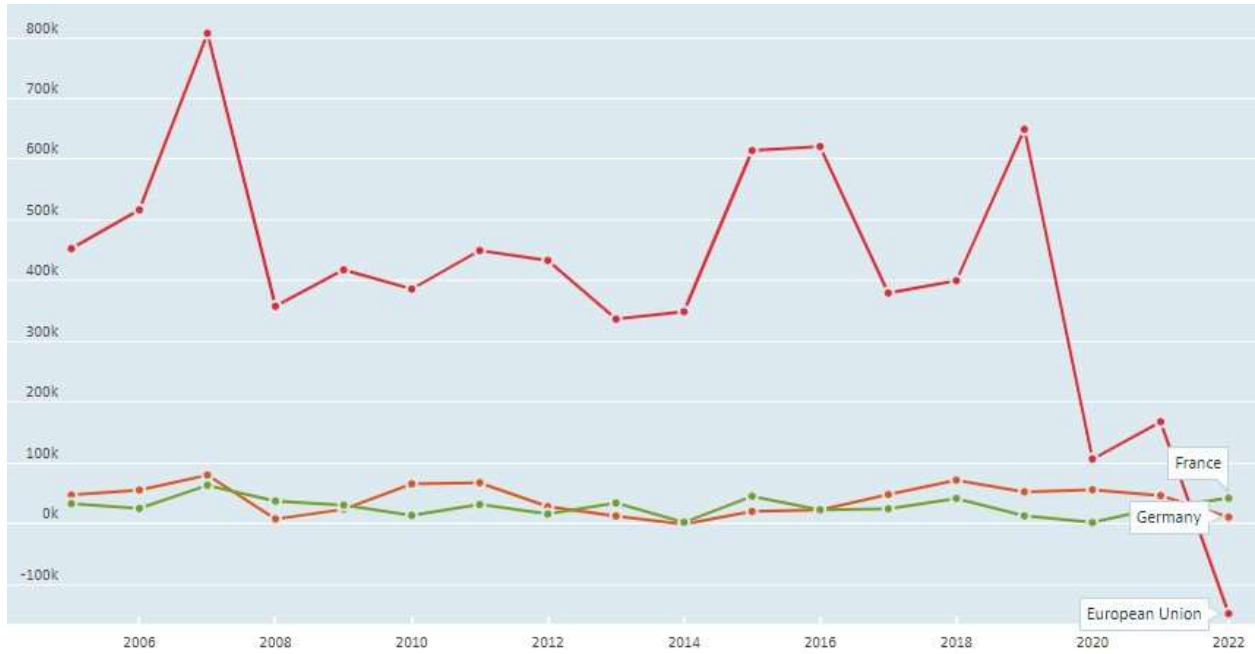
Notes: Thousands of dollars on the Y-axis, years on the X-axis.

Figure 4. *Employment levels*

Notes: Percentage of working population employed on the Y-axis, years on the X-axis.

Figure 5. *Average employment growth rate.*

Notes: Average employment growth rate in our sample on the Y-axis, years on the X-axis.

When it comes to the number of inflown companies in the two countries, we can assume it is positively correlated with the levels of minimum wage at a first glance (**figure 6).** As minimum wage increases in both countries, the number of inflown companies increases as well. However, what is interesting to note is that although the number of companies increases over time, we see a drastic decrease in the size of the companies, at least in our sample (see **figure 7**). Perhaps the jobs that could have been off-shored easily have been off-shored. For example, if the firm is fragmenting its headquarters and a call center, they might switch after the labor cost increases in one of the countries. What is also interesting about **figure 6** is that after the minimum wage introduction in Germany we can arguably see a disproportionate increase in inward FDIs in the country, relative to France. Whilst searching for sources which could back up the theory that Germans knew about the introduction of minimum wage well in-advance to 2015, the earliest date we could find is April 3td, 2014 as the national announcement introduced the plan. Earlier date sources could not be produced in our research.

Figure 6. *Minimum wage (on the left) and number of inflown companies between countries (on the right).*
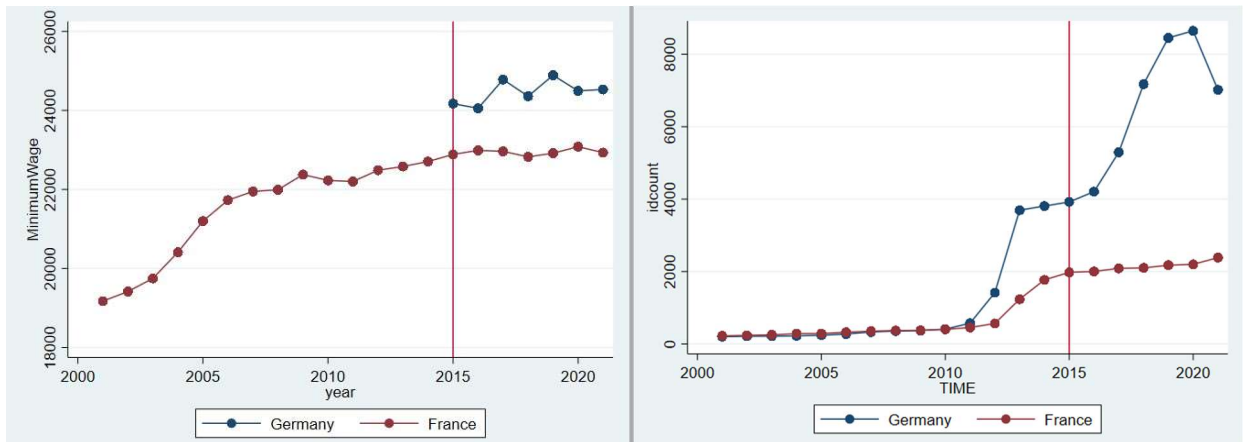
Notes: Annual minimum wage and number of inflown companies on the Y-axis respectively. Years on the X-axis.

Minimum wage was introduced, inward FDI has increased, one interesting question that stems from this is have and by how much the cost of employment changed. That is why we also include the average cost of employment in the **figure 7**. Still, we do not really find any answers as we can see that the costs of employment share relatively similar trends. Additionally, **figure 7** supports the fragmentation theory described above: companies are using the host (country in which the foreign entity exists) country subsidiaries for reasons aside from employment. As we do not really see a negative correlation in cost of employment and size of the company. The negative correlation would signal that the money is still left in the economy but it is not the case within our sample. Merely seeing how the countries compare is useful to understand if they are at all similar for parallel trends assumption. That is why we include **figure 1A** with corporate tax levels and tax wedge as well as GDP and R&D expenditure in **figure 2A** in the appendix.

Figure 7. *Average employment levels/year (on the left) and average employment cost/year (on the right) in our sample.*
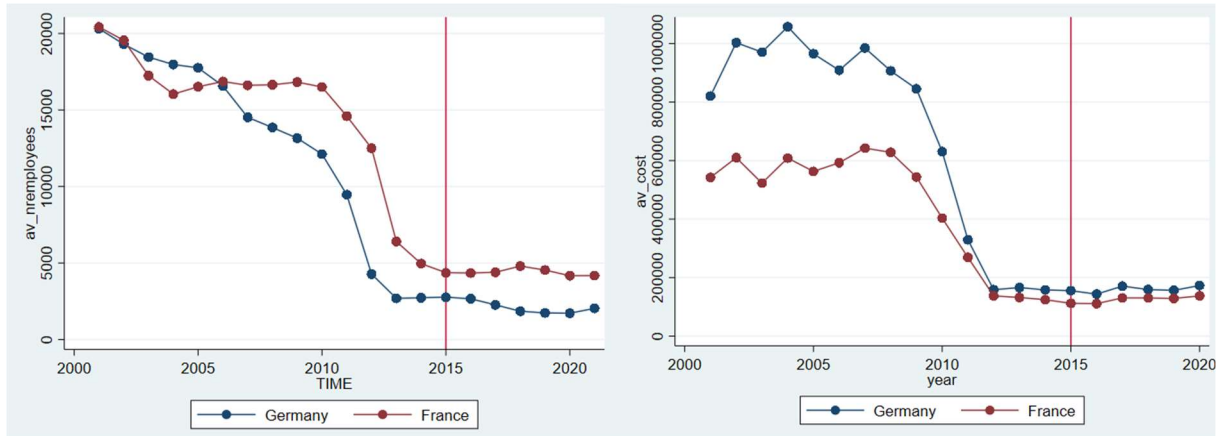
Note: Average number of employees on the left and average annual cost of employment on the right on the Y-axis.

4.3. Panel data set-up and variables descriptives.

In the case of a panel dataset the zero conditional mean assumption does not hold if either the unobserved heterogeneity is correlated with the variable of interest or/and idiosyncratic shock is correlated with the variable of interest. In practice, we do not really know which one of the cases we are facing. We can only discuss and assume that both/either one/neither one is occurring, however, it is highly unlikely that the zero conditional mean assumption holds in panel data. Therefore, the use of within-effects estimators is advised. In our case, we will be using a fixed-effects estimator. Another issue with panel data is the serial correlation. For our fixed-effects estimator we must assume that standard errors, namely, idiosyncratic shocks, must be uncorrelated in any two given time periods. This is also highly unlikely, think of a variable that influences employment growth, is changing over time, and is not included in our data. One could think of many examples but perhaps an interesting one could be health insurance cost. If the company supported health insurance for its employees in one period, it is likely that it is going to be the case in the next period, leading to a violation of serial correlation. To deal with this we will cluster the standard errors by groups, namely, by country. There is a lot of *within variation* in the units of interest in our sample (**table 5A**). We will exploit this variation when estimating our fixed effects model by time demeaning the data to eliminate unobserved heterogeneity. We also include **Table 6** for better visualization of the data.

Table 6. Summaries of variables in the sample

```
    Variable |       Obs        Mean    Std. dev.       Min        Max
-------------+----------------------------------------------------------
        year |    79,138     2016.56    4.028198       2001       2021
      RDasGDP |    79,138    2.797104    .3899071   2.024513   3.167785
 corporatetax |   79,138    5.097417    .6271053       1.66      7.632
     taxwedge |    79,138    48.92318     1.02734   46.47842   53.19645
-------------+----------------------------------------------------------
          GDP |    79,138     49848.7    7460.119   27499.54   58799.01
    CompanyID |    79,138    10170.43    5838.657          1      20325
-------------+----------------------------------------------------------
      Revenue |    58,211     2222247    1.29e+07          0    3.11e+08
  nremployees |    79,138    4011.402    23880.46         11     671205
-------------+----------------------------------------------------------
  MinimumWage |    66,798     23895.2    1001.744    19173.3    24889.4
-------------+----------------------------------------------------------
  employeesg~e |   79,138    20.10002    504.0559   -99.4549      54700
 CompanyCount |    79,138    4771.215    2827.962        203       8647
```

5. Results

In this section, we will summarize the main findings, discuss the hypotheses, and provide context to the results.

5.1 First hypothesis

The purpose of this thesis is to better understand the effects minimum wage has on the economy. To do so we have decided to differentiate the differences in levels of employment and inward FDI between post minimum wage introduction in Germany and that period of France, which had the minimum wage in place for a while. Our first hypothesis is that the introduction of minimum wage decreases the size of the multinational companies in the country, mainly because of the labor cost increases. **Table 7** represents supporting results. As we can see, multinational companies in Germany in the post-treatment period (after 2015) are associated with a -984.4 decrease in the number of employees relative to France pre-treatment period ceteris paribus, the effect is significant at a 1% level. In other words, we see that multinationals in Germany have decreased their employee number by more than companies in France relatively speaking. The coefficient is slightly lower when controlling for revenue. To put it into perspective, between 2010 and 2020 the labor force in Germany grew from 40 837.2 thousand to 43 516.7 thousand including domestic firms (OECD). What is interesting is that Germany had only increased its labor force by approximately 1000 between 2000 and 2010 (OECD). Money-wise the FDI inflows into Germany has remained relatively similar in the 20-year period, however, we do see a way larger increase in the second decade of the period. Before jumping to conclusions, we must acknowledge the 2008 crisis which is a factor in our case. The reason for this is that the only year we do see a significant decrease in the labor force is exactly 2010. This is why the changes in the levels of the labor force could not be solely attributed to the minimum wage legislation changes. However, an approximately 1000 change in the employment levels from the pre-treatment to post-treatment period is not a small estimate relatively speaking as we do observe approximately 4500 change in the last 20 years in Germany. This means that if our estimate was true, it would account for at least approximately 21% of the variation in the labor force in Germany.

Table 7. *The first specification, nr. of employers as the dependent variable, 2nd model includes lagged revenues.*

VARIABLES	(1) NrEmployees	(2) NrEmployees
L.Post	5,345***	5,522***
	(953.6)	(969.6)
L.DE	-1,456***	-341.9***
	(106.0)	(64.47)
L.Post#L.DE	-984.4***	-922.9***
	(104.5)	(81.75)
L.Revenue		0.00141***
		(0.000120)
Yearly FE	Yes	Yes
Constant	-1,163	-3,076***
	(943.4)	(1,118)
Observations	64,010	48,221
Number of CompanyID	11,894	7,624

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 The second hypothesis

The second hypothesis stated that introducing a minimum wage deters foreign direct investments in the country. We have found contradictory evidence for this hypothesis in **Table 8** as it displays the negative binomial model outcome for our diff-in-diff estimator. We can see that when controlling for year-fixed effects, Germany is associated with an increase in the company count in the post-treatment period relative to France, the effect is significant at 1% level ceteris paribus. The count data models estimate magnitudes cannot be directly interpreted, that is why we include column 3 in **Table 8** with marginal effects according to which, on average, post-treatment Germany had approximately 1851 more inward FDIs compared to pre-treatment France, the effect is significant at a 1% level ceteris paribus. For this analysis, we have aggregated the data to have one observation per year per country for the negative binomial model. However, by doing so we have eliminated our *revenue* and *number of employees* variables from the sample which would lead to the regression without "size" controls for firms. Additionally, whilst looking at the graphs in the *data* section, we concluded that the FDI inflows money-wise were relatively stable in

Germany, meaning that even though the number of FDI has increased substantially, the real investments made were not as large. However, the goal of this hypothesis was to measure the effectiveness of minimum wage. We have argued that deterring FDI inflows has both positive and negative impacts on the economy. That is why perhaps the estimate holds value to better our understanding of the change in the number of foreign entities due to introducing a minimum wage. So far, we have seen that introducing minimum wage reduces employment in multinational companies but increases the amount of inward FDI. From this stem the question if our estimates are telling the whole story. That is why as a robustness check we have decided to include a complimentary analysis of minimum wage effect on the cost of labor for foreign multinational entities.

Table 8. *The second specification, number of foreign companies as the dependent variable.*

VARIABLES	(1) Count	(2) Count	(3) Marginal effects Model 2
L.DE	0.619**	0.242***	
	(0.304)	(0.0748)	
L.Post	1.102**	2.407***	
	(0.430)	(0.211)	
L.DE#L.Post	0.587	0.951***	1851.7***
	(0.608)	(0.145)	(324.1)
Yearly FE	No	Yes	
Constant	6.589***	5.314***	
	(0.215)	(0.149)	
Observations	40	40	40

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

LR test of alpha=0: chibar2(01) = 1096.17   Prob >= chibar2 = 0.000

Note: LR test of alpha is testing the hypothesis that there is equal dispersion in the sample, as can be seen we reject the null hypothesis at 1% significance level.

5.3 Robustness checks

We have selected the number of employees as the variable of interest in the first specification. However, what we might have overlooked is the fact that employment might not

necessarily be representative of employment cost. The reason for this is the fact that the costs might not necessarily be positively and/or proportionally correlated with the number of employees. Think of a scenario where the company increases the number of low-cost employees in exchange for decreasing high-cost employees to reduce its costs. Additionally, we have argued that the key mechanism through which minimum wage can affect inward FDI is the labor cost. It could have simply been the case that although the number of employees decreased, the cost of employment increased. Leading us to believe that labor costs might play a different kind of role in terms of the number of FDI inflows. Namely, it is the indirect effect that the labor cost would have because multinationals simply reduce their number of employees every time the cost per employee increases to keep up with the competition. In other words, labor cost increases could only decrease the number of employees because it is no longer optimal to operate at the original level. But the amount of foreign direct investments into the country might not decrease at all, in fact as we have seen in **Table 8**, it might even increase. As we have argued in the literature review section, multinationals are the most productive firms after all. We illustrate the potential relationship between the increases associated with minimum wage and the three factors in **Figure 8**. In this figure, we illustrate how the changes in the number of employees might not necessarily be related to changes in inward FDI.

Figure 8. Different potential scenarios of nr. of employees/FDI changes relative to labor costs changes.

Labor cost per employee	Number of employees	Number of FDI inflows
Increases	Decreases	Decreases/Increases/Stable
Decreases	Increases	Decreases/Increases/Stable
Stable	Stable	Decreases/Increases/Stable

Note: stable stands for not changing or changing marginally.

First, we use the same sample but do drop-out companies that do not have the cost of employment in the ORBIS database. We are therefore left with 10674 companies. The regression could be represented as follows:

$$EmploymentCost = \alpha + \gamma DE + \mu Post + \delta(DE \times Post) + \varphi_{year} + \varepsilon$$

The estimates of the regression are represented in **Table 9**. As we can see, companies from Germany and in the period after 2015 are associated with 23.356 thousand more annual labor costs when compared to the pre-treatment period in France when controlling for revenue ceteris paribus, the effect is significant at 1% level (*Model 2*). This translates to multinational firms in Germany paying more for their labor force when compared to France. The average firm in our sample has approximately 4357 workers employed. If we divide our estimate (in thousands) by the average number of workers, we get that an average German multinational company employee had approximately 5360 euros more per year in the post-treatment period relative to a French employee in the pre-treatment period. When looking at the most conservative measure in Model 4, the number comes out to approximately 2187 euros per year. What is interesting to note is that in the literature review section, we have covered the average wage of Germany and France over the years in **Figure 2**. The period of 2000-2020 had a maximum amplitude of approximately 10 000 euros both in France and Germany (**OECD**), meaning that even our most conservative measure attributes to at least 21% of the annual wage variation, whereas the optimistic estimate contributes to more than 53% of the variation.

Table 9. *Annual employment cost as the dependent variable.*

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
L.Post	598,935***	603,119***	624,780***	38,486***	27,283***
	(70,673)	(71,405)	(61,178)	(1,974)	(21.81)
L.DE	11,072***	1,848***	13,809**	24,233***	6,664***
	(1,242)	(183.2)	(6,088)	(7,296)	(622.5)
L.Post#L.DE	16,981***	23,356***	17,596***	9,531***	21,372***
	(915.9)	(456.1)	(153.4)	(899.9)	(12.64)
Yearly FE	Yes	Yes	Yes	No	No
L.revenue		0.0854***	0.0348***	0.0346***	0.0848***
		(0.00129)	(0.0132)	(0.0132)	(0.00112)
L.Nremployees			34.25***	33.95***	
			(11.84)	(11.90)	
Constant	-460,577***	-525,580***	-590,842***	-22,864	33,806***
	(67,891)	(65,401)	(84,630)	(28,309)	(895.6)
Observations	89,559	77,778	65,615	65,615	77,778
Number of CompanyID	10,665	9,015	7,547	7,547	9,015

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Additionally, what is important to note is that we can observe a positive correlation between the costs of the labor and number of foreign entities entering Germany. **Figure 8** does not represent our sample accurately; it is **Figure 9** that displays how three factors are related to increases in the minimum wage.

Figure 9. The actual sample scenarios of how annual labor costs relate to the number of employees and the number of foreign entity entries.

Labor cost per employee	Number of employees	Number of FDI inflows
Increases	Decreases	Increases
Decreases	Increases	Decreases
Stable	Stable	Stable

Note: stable stands for not changing or changing marginally.

5.3 The context

We found evidence supporting our first hypothesis and contradicting evidence for our second hypothesis. Decreases in the size of the company that are associated with minimum wage increases are in line with neoclassical theory and are documented in the literature. Our findings further support this type of body of literature. Additionally, our findings are in between the lines of the theory about labor costs and inward FDI. We have found support for a positive relationship between minimum wage and inward FDI, however, we have also found support for a positive relationship between the minimum wage and employment cost. We argue that a higher cost of employment leads to smaller sizes of multinationals in terms of the number of employees. This is supported by our first inference in section 5.1. Findings are interesting because we do know that labor costs are important for fragmenting the company that is why we expected to find a linear relationship where the introduction of minimum wage leads to increases in labor costs and this in turn leads to a lower number of inflown companies in the country. However, what we did find is that the number of foreign entities has increased after introducing a minimum wage, but the new FDIs were significantly smaller in number of employees. In fact, the average number of employees in the years up to and including 2015 in our sample was ***approximately 7091***, whilst the average shrunk down to ***approximately 2556*** after the year 2015.

However, we have made strong assumptions in our research and should be careful when interpreting the results. One could argue that minimum wage introduction is not the same as minimum wage increases. For example, if a company wants to exploit its workers and chooses to outsource to a country where there is no minimum wage legislation in place. In this case, the company would perhaps leave the country after the minimum wage is introduced or reduce its employee capacity significantly. Whereas the changes would not be as substantial if it was an increase in minimum wage rather than the introduction of one. Additionally, the fact that labor cost is only one of the many factors when deciding to outsource a fragment of the company might play a role in our research. Moreover, there is a good chance that at least some of the companies do make their investment decision well in advance to our one-year lag assumption. If the companies are outsourcing to Germany for non-minimum-wage-related reasons, our estimates are upward biased. However, if as many companies do decide to leave the host (Germany) country for non-related reasons our estimates would be fine.

6. Discussion and limitations

In this section, we discuss further research developments and comment on the limitations of our research.

6.1 Discussion

We have chosen the natural experiment setting as Germany has only introduced minimum wage in 2015 whilst other European countries have had it for a long time. To gauge the causal effect, we have chosen the difference-in-differences approach as this is one of the most if not the most popular methods to use in such cases. We have found significant estimates and interesting results. Namely, we found that introducing minimum wage leads to:

1. *Multinationals reducing their number of employees by approximately 900.*
2. *Increase the number of foreign direct investments in the following years (6 years) by approximately 1851.*
3. *Increases the average cost of employee per annum by approximately 5360 euros when taking the most optimistic measures and by approximately 2187 euros when taking the most conservative approach.*

We have produced multiple arguments for why France may follow the parallel trends together with Germany when it comes to relevant variables. For example, a similar number of FDI levels trends via pre-treatment leads statistics. Additionally, we argue that if some of our assumptions were to not hold there is a chance that the estimates would be downward biased. For example, Germany might have had a stricter Covid-19 measures relative to France and the companies left the country because of that. On the other hand, we have also argued that some of the violations of our assumptions would make our estimate upward biased, which would be a problem. However, what is important to note is that the magnitude of our estimates is relatively large and perhaps would be as significant as giving out some of the variation explanation to other variables.

The answer to the research question, namely, the effectiveness of minimum wage to the economy has arguably been found. First, introducing a minimum wage does seem to increase the absolute number of foreign direct investments. However, the size of these investments has not been (conclusively) found. Although multinationals do decrease their size after the minimum wage introduction, their annual cost of employment does go up. This leads us to believe that the domestic

economy is net gaining from multinationals in terms of GDP. However, another important factor for the economy is unemployment. Looking at the total levels of employment in Germany (**Figure 4**) the percentage of the population employed does not seem to show a significant downward trend at any point in time, which leads us to believe that the jobs are staying within the domestic economy. In other words, domestic firms or new multinationals are taking over the employees that habitant multinationals cannot afford to employ anymore. Overall, we have found evidence that introducing a minimum wage is an effective measure. Namely, it does not reduce domestic economy employment, it does increase foreign direct investments. And arguably, it increases competition, at least for multinationals, as we have produced valid arguments for why multinationals must fire some of their staff because of lower profit margins due to increased labor costs. Therefore, introducing minimum wage legislation is advised for countries that have relatively low entry barriers, high economic networks, relatively high political stability, and are interested in increasing the speed at which their economy is growing.

6.2 Limitations & suggestions for future research

Any differences-in-differences study is subject to the validity of the counterfactual assumption. Our research is not an exception. We have touched upon the parallel trends assumption and have provided arguments for why it would hold. However, there are arguments for why the assumption would not hold. One example is the fact that Germany and France share different political systems. France tends to have a more interventionist approach to the economy, while Germany places more emphasis on promoting free market competition with a strong focus on exports. These are some of the factors that do contribute to the number of foreign entities' investments. However, we can also argue that many of the possible scenarios of how the countries differ economically have both upward and downward biases to our estimates thus, leading to random variation and no harm to our research. What is more important in our thesis is the second assumption of a valid counterfactual assumption which is SUTVA. We would like to bring it back here because it truly is a limiting factor in our research. Firstly, if our assumption about low entry barriers and low re-fragmenting costs due to countries being close in proximity are correct, then we cannot assure that the composition of the treatment and control group remained the same throughout the sample period. In other words, there is a good chance that companies have switched their entities from France to Germany and the other way around for reasons beyond minimum wage introduction. In such case, the treated group is no longer the only one treated. Secondly, it is

relatively fair to assume that if some of the companies have left Germany due to higher labor costs, other companies might have left because of the decrease in the economics of networks. Perhaps we can then also argue that companies leaving because of the increases in labor costs, ultimately leaves a larger market share and less competition in the country which in turn attracts inward FDI again. "We can never stop being diligent in trying to prove the SUTVA assumption" ("The Mixtape" Scott Cunningham, 2021). The problem with our research is that many of the variables that influence inward FDI, or the size of the firm are correlated with the introduction of the minimum wage and thus it is rather difficult for us to assume strict exogeneity.

We discuss two methods to try to adhere to the SUTVA assumption for further research. First, the clustering of the data into regional-level firm data. The reason for this is that being further in proximity to Germany, French firms will have a higher cost of re-deploying their fragments of the companies to Germany thus, leading to more stable composition of the treatment and control groups. However, a pitfall in our case is that the whole European Union shares relatively open borders and the proximity between the furthest point of France relative to the furthest point in Germany simply might not be enough to deter companies from changing places. Afterall, multinational companies operate on way larger margins than these types of costs. We rather stress the importance of industry as there is a body of literature that suggests that industry plays a crucial role in the effects of minimum wage on FDI (Addison, Blackburn & Cotti (2012)). The second way of addressing the valid counterfactual assumption is to use synthetic controls. The idea behind synthetic controls is to construct a synthetic control group that closely mimics the treated group before the intervention. This also captures individual firm heterogeneity. However, the difficulty in our case is the assumption of synthetic controls which is the assumption of unconfoundedness. In essence, the assumption requires that all relevant factors affecting the treated and control units are captured in the pre-treatment period, which leads to difficulties with data. In addition, the model of synthetic controls is currently an active area of research.

7. Conclusion

In this section we conclude our research.

We have discovered telling economic trends between minimum wage and inward FDIs. We have found evidence that the introduction of minimum wage reduces employment for multinational firms. Additionally, evidence that introducing minimum wage may lead to an increased number of foreign direct investments in the years following the legislation has been found. Which could be an argument for the fact that there are just as many people employed in multinational companies, but they are more spread out throughout different companies. Moreover, we do not conclude that the size of the investments does not significantly change. In other words, it is unclear to which extent do these investments contribute to the economy fully. In addition, we have found evidence that introduction of minimum wage leads to an increase of annual labor costs for multinationals. Which yields a net gain for the economy in the years following the introduction of minimum wage. In the discussion part we argue that countries that are seeking the increase of economic growth are advised to introduce minimum wage if they share similar inward FDI related characteristics to Germany, such as economy and politics. We argue that the inference approach we have taken is not sub-optimal nor the most optimal. The limitations of difference-in-differences approach most of the time if not always plays an important role in any diff-in-diff academic paper. Our research is not an exception and that is why we advise taking our research cautiously. However, what does seem to be undeniable is the fact that the relationship between inward FDI and minimum wage does exist. Perhaps the most important thing about our research is that we have found evidence that the relationship between FDI and minimum does exist. Namely, labor cost increases do lead to lower MNEs sizes, but the number of MNEs in the economy seem to increase substantially. In other words, the labor cost increases lead to higher competition as expected by theory. The findings are in-line with the less recent theory as well as the current body of literature. Although we have not captured the size of the importance of minimum wage, it is safe to assume that it does play an important role in the economy.

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9. Appendix

- Tax on corporate profits is defined as taxes levied on the net profits (gross income minus allowable tax reliefs) of enterprises. It also covers taxes levied on the capital gains of enterprises. This indicator relates to government as a whole (all government levels) and is measured in percentage both of GDP and of total taxation. (**OECD**)

Table 1A. Potential factors that potentially link inward FDI and minimum wage.

Market size and potential: countries with large and growing consumer markets often attract higher levels of FDI. Companies seek to access new customers and expand their market share (Markusen and Venables (1999)).
Economic Growth and Stability: Favorable economic conditions, such as high GDP growth rates, stable macroeconomic indicators, low inflation, and a sound legal and regulatory framework, can attract foreign investors (Alafro et al. 2004).
Natural Resources: Abundance and accessibility to natural resources, such as oil, gas, minerals, or agricultural land, can be a significant driver of FDI. Companies often invest to secure access to these resources or exploit them efficiently (Javorcik, B. S., & Spatareanu, M. (2008)).
Infrastructure: Availability of well-developed infrastructure, including transportation, communication networks, energy, and logistics, can be attractive to foreign investors as it reduces operational costs and facilitates business activities (Asiedu, E., & Lien, D. (2011)).
Human Capital and Labor Skills: A skilled workforce, access to highly educated professionals, and a strong education system can attract FDI. Companies often seek locations with skilled labor to meet their production and innovation requirements (Borensztein et al. 1998).
Political and Policy Stability: Countries with stable political environments and consistent policies that support investment, protect property rights, and enforce the rule of law tend to attract more FDI (Globerman et al. 2003).

Trade Policies and Market Access: Openness to international trade, favorable trade agreements, and access to regional or global markets can incentivize foreign companies to invest in a country (Helpman, Melitz and Yeaple 2004).
Taxation and Incentives: Favorable tax regimes, tax incentives, and investment promotion policies can attract foreign investors seeking to optimize their tax burden and gain cost advantages (Desai et al. 2006).
Technological Advancement and Innovation: Countries with advanced technology infrastructure, strong research and development capabilities, and innovation-oriented policies tend to attract FDI from companies seeking access to new technologies, knowledge, and innovation ecosystems (W. Keller 2002).
Competitive Business Environment: Factors such as low bureaucracy, ease of doing business, competition policies, and strong intellectual property protection can make a country more attractive for foreign investment (J. H. Dunning 1993).

Table 2A.

```
(obs=42)

           |  idcount    ynbhat

   idcount |   1.0000

    ynbhat |   0.9831    1.0000
```

r(rho)^2= .96654115

```
(obs=42)

           |  idcount  ypoishat

   idcount |   1.0000

  ypoishat |   0.9948    1.0000
```

r(rho)^2 = .98971684

note: ynbhat for negative binomial and ypoisohat for Poisson.

The fitted counts show evidence of both Poisson with robust standard errors and negative binomial predicting the expected number of inflown FDIs similarly with Poisson having a slight advantage (see *rho* parameter).

```
PRM              BIC=  1994.825  AIC=  1954.858  Prefer  Over  Evidence

-------------------------------------------------------------------------

  vs NBRM        BIC=   641.859  dif=  1352.966  NBRM     PRM   Very strong

                 AIC=   600.155  dif=  1354.703  NBRM     PRM

                 LRX2= 1356.703  prob=    0.000  NBRM     PRM   p=0.000

-------------------------------------------------------------------------

NBRM             BIC=   641.859  AIC=   600.155  Prefer  Over  Evidence
```

Table 3A. *Balance of companies throughout the years.*

```
   Freq.   Percent    Cum. |  Pattern

 ------------------------+-----------------------

    2247     16.44   16.44 |  ...........1111111111

    1109      8.11   24.55 |  ................11111

     733      5.36   29.92 |  .................1111

     627      4.59   34.50 |  ...............111111

     574      4.20   38.70 |  ..........1111111111.

     426      3.12   41.82 |  ............111111111

     338      2.47   44.29 |  ....................1

     336      2.46   46.75 |  111111111111111111111111

     308      2.25   49.00 |  ...................11

    6970     51.00  100.00 |  (other patterns)

 ------------------------+-----------------------

   13668    100.00         |  XXXXXXXXXXXXXXXXXXXXXX
```

Table 4 A.

- *Nremployees:* The number of employees per firm is measured in levels of employees per firm.

- *Country identifier.*

- *RDasGDP:* Research and development expenditure per country is measured as a percentage of GDP.

- *Corporatetax:* Corporate tax rate (definition is included in the appendix). Is measured in a percentage both of GDP and total taxation.

- *Taxwedge:* A tax wedge is defined as the ratio between the amount of taxes paid by an average single worker and the corresponding total labor cost for the employer. It measures the extent to which tax on labor income discourages employment. Is measured in percentage of labor cost.

- *GDP:* a level of GDP in France or Germany.

- *Company identifier.*

- *Revenue:* Operating revenue (turnover) measured in thousands of US dollars.

- *MinimumWage:* Level of minimum wage per country per year (annual income) measured in US dollars.

- *Cost:* cost of employment measured in thousands of US dollars.

Figure 1A. *Corporate tax levels (on the left) and tax wedge (on the right) between countries.*
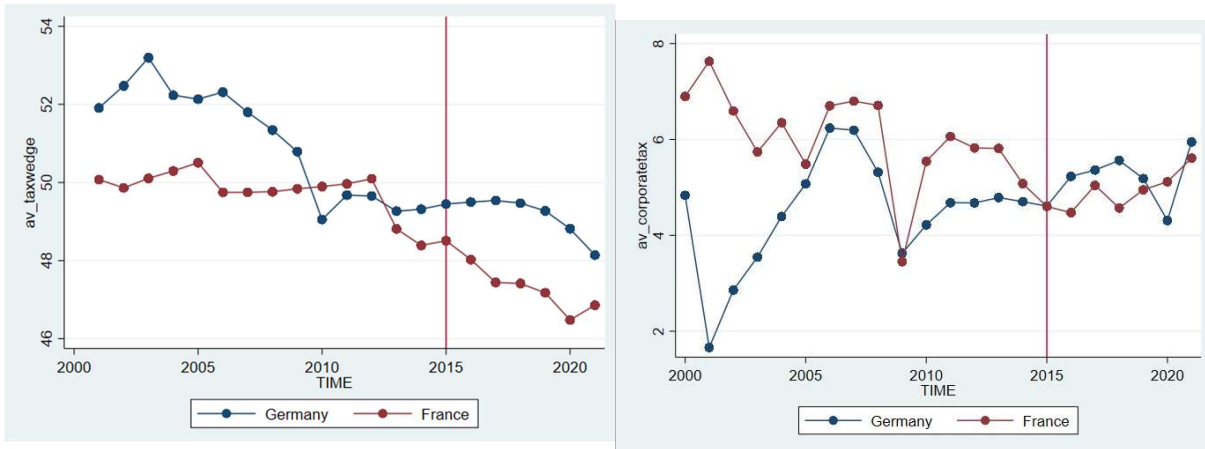

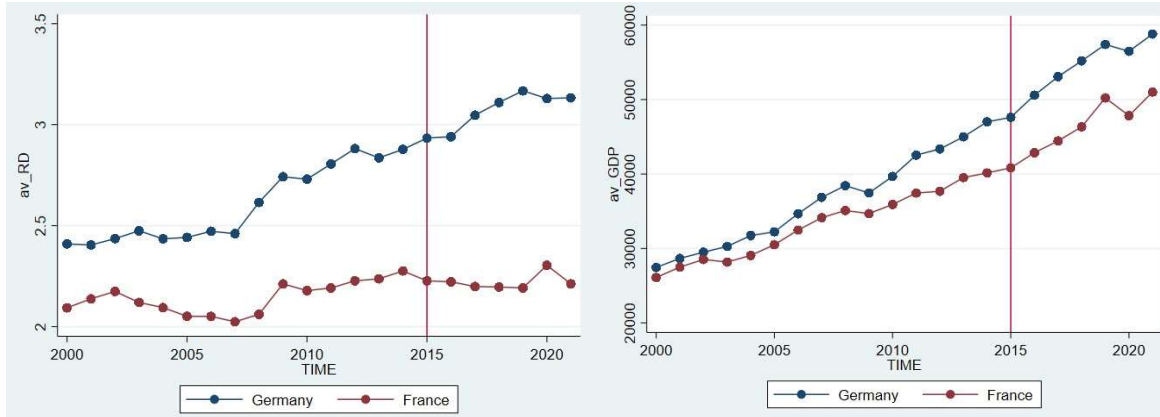**Figure 2A**. *R&D expenditure (on the left) and GDP (on the right) between countries.*

Table 5A. *Variation of employment growth rate within our sample.*

	Mean	Std. Dev.	Min	Max	Observations
Egrowthr overall	38.32011	4197.809	-99.4549	1154300	N = 79141
between		946.3965	-91.55844	60753.09	n = 12903
within		4062.099	-60721.91	1093585	T-bar = 6.13353

Note: egrowthr stands for employment growth rate.