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Employment Effects of the New Germany Minimum Wage

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Zusammenfassung

Diese Abschlussarbeit untersucht die Auswirkung des neuen deutschen Mindestlohns (GMW) auf die Beschäftigung und Lohnverteilung, insbesondere die low-tail-Ungleichheit. Das Ziel dieser Forschung war es, den Grund hinter dem Unterschied zwischen den Erwartungen und den Resultaten des vorhergenannten Mindestlohnprogramms zu finden. Diese Arbeit wendet theoretische und empirische Herangehensweisen zum Beschäftigungseffekt von Mindestlöhnen bis zu Prognosen und Strategiebewertung des GMW an. Die wichtigsten Schlüsse die man daraus ziehen kann sind, dass die Prognosen für den GMW sehr skeptisch waren und eine ungeeignete Beschäftigungselastizität, verbunden mit fehlender Beachtung des Monopsony des deutschen Arbeitsmarktes, zu Annahmen von negativen Erwartungen führte, die am Ende nicht zutrafen. Diese Forschung deutet an, dass der GMW eine sehr erfolgreiche Strategie war, die Lohnungleichheit mit wenig bis keinen negativen Auswirkungen auf die Beschäftigung zu bekämpfen.

Stichworte: Mindestlohn, Beschäftigung, Lohnungleichheit, Deutschland, Prognose

Abstract

This thesis investigates the effect of the new Germany minimum wage (GMW) on the employment and wage distribution, particularly the low tail inequality. The aim of this research was to find the reason behind the difference in expectations and results of the aforementioned minimum wage policy. The thesis applies theoretical and empirical approaches on employment effects of minimum wages to the forecasts and policy evaluations of the GMW. The main conclusions are that the forecasts for the GMW were heavily skeptical and used inappropriate employment elasticities and combined with ignoring the monopsony background of the German labor market, their assumptions lead to very negative expectations, which in the end failed to occur. This research suggests, that the GMW was a very successful policy to combat the wage inequality with little to no negative impact on employment.

Keywords: minimum wage, employment, wage inequality, Germany, forecast

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Lastly I would like to express my immense admiration for the work done by Prof. Alan Manning. My research started by reading his articles on Monopsony and his easily understandable and comprehensive view of the labor market piqued my interest to delve deeper into the topic of my thesis.

Contents

Introduction

The dust has not yet settled since the first ever minimum wage of €8.5 was set in Germany in 2015 and an increase to €8.84 is already in place since January 2017. In the current situation there are still plentiful advocates on both ends of the affiliated spectrum of opinions and the current influx of immigrants and their incorporation into the society is making the transition process even harder. There is an ongoing debate[1] if they should be partially freed from the barriers which the new minimum wage built for them, however that solution will be more than marginally affecting the rest of the German workers and the outcome is uncertain.

Despite the ongoing debates and looking forward towards the next goals, we should take a moment and analyze the situation before the minimum wage. The real effect of the minimum wage was very good above all expectations; however, the thing that should concern us is the vast majority of negative forecasts claiming the minimum wage to be a huge risk and an underestimated move. We should be alarmed why so many economists were able to miss the end result on such a huge scale, the fact that atleast neutral predictions were scarce should raise some serious questions about their methods. The aim of this thesis is to shine a light on the reason behind those discrepancies and for better context we will explore the concepts used in those estimations in the following chapters

The thesis is structured as follows. Chapter one is dedicated to alternative policies to minimum wage and compares the results and affected workers while pointing to possible substituting and complementing effects. Chapter two and three will give us the overview on the models and methods used in estimating the employment effects of the minimum wage, which we will then use in the last chapter as a comparison for the assumptions used in the aforementioned forecasts. Lastly we will conclude on the policy effect in terms of wage increases, employment shifts and wage distribution changes and deduce implications for future research.

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[1]http://www.express.co.uk/news/world/749341/Germany-scrap-minimum-wage-refugee-migrant-workers-internships

Alternatives to minimum wages

From the point of view of neoclassical economics a worker should be appropriately rewarded for his work under the assumption of perfect competition in the market. The firm has to abide the market value for workers and it hires until the marginal revenues from the additional worker is fully diminished by the marginal costs, therefore the worker is rightfully paid for his productivity. However, the premise of being paid for ones productivity does not suffice in the real world. The labor market is experiencing higher wage growth in jobs with medium to higher qualification, which consequently reflects on the costs of goods in other markets, undervaluing the real value of wages for the low qualified workers. This trend in growth of wage inequality is a real issue that has to be dealt with by carefully targeted labor market interventions.

The second important issue is that unqualified workers are often exploited by employers. We will talk about the problematic throughout the whole thesis, but it is important to know that firms employing unqualified labor are available to affect the wages and therefore differ from the prevailing market wage; we will call this market structure monopsony.

Based on the empirical research and theoretical models the latest economical consensus points at aforementioned unfairness in the market for the workers and calls for a governmental intervention.

There are several ways to help the workers on the low tail of the wage distribution, mainly by increasing earnings by setting a minimum wage (or a similar wage floor) or alternatively using subsidies to either of the demand and supply side.

The increase of earnings mainly happen through a government mandated minimum wage floor or agreed though negotiations between unions and employers. Under demand subsidies we can understand bonuses paid for employers for employing their workers. Similarly supply subsidies are ways to motivate people to work, e.g. by welfare for single parent families or reduce the tax burden of the worker. In this chapter I will describe those options and mention the current economic evaluation behind them.

1.1   Collective bargaining

The term collective bargaining refers to bargained wages between firms and unions representing the workers. However, in case of Germany, there are three possible wage bargaining regimes. First, at the industry level between a union and an employers' association. Second, negotiations between union and single firms which results in firm-level collective contract binding the workers of the firm. Third, there is the

possibility of individually negotiated contracts between firm and its worker, which is only possible when the firm is not a member of employer association or a worker is not a union member.

Collective agreements, namely the bargained wages, are not limited only to workers in unions, because that would be against the law. This design however incentivize the problem of free-riders and decreasing of union density while maintaining collective bargaining coverage, a problem which Germany decided to solve uniformly by a minimum wage.

Similarly as minimum wage, unions are directly influencing the wage level in a given industry by setting the lower bound and increasing the average wages. The implication is also a decrease in wage inequality which is a very beneficial side effect of collective bargaining similar to minimum wages.

A recent study by Fitzenberger et al. (2008) has found similar results as their predecessors, that "share of employees subject to sectoral or firm-specific collective bargaining contracts has a positive impact on the wage level", which means that unions helps to fight against the market power of employers and decrease the wage inequality. However, they also find evidence of negative wage effects of individual coverage, which is concerning, because it directly contradicts the effects of collective contracts. Together with the free-riding benefits and possibilities of individual contracts the incentives of joining a union are heavily challenged. Unions work for the better good of the majority, but their diminishing coverage is a result of single workers preferences.

All in all unions are beneficial for the labor market if their coverage and density[1] are both sufficient and are actively working on setting the appropriate working conditions. The similarities to minimum wage are obvious, however wages set by unions are more flexible in evaluating each industry independently and differently, which is also a problem, because some vulnerable industries and sectors remain uncovered by unions.

1.2   Supply subsidies

In contrast to directly bounding wages at a certain level in case of unions and minimum wage, subsidizing employment works on the basis of decreasing the tax burden or increasing the welfare benefits of targeted groups, which are in most countries low income families with children. The following facts about effects of employment subsidies are summarized from the research of David Neumark (2009) on the Earned Income Tax Credit (EITC) in the USA.

The mechanism of subsidies should be to motivate people to work by raising the effective wage without any extra rules for the employers and also to ensure a living wage to people in need, which as was said are mostly low income families with children. Because the benefits apply only for the employed without limiting the labor market the employment effects should be strictly positive, however wage subsidies in contrast to the minimum wage target mainly low income households other than low income individuals, therefore the effects are limited.

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[1]Here coverage is a superset of density, because every union worker is covered, but not every covered worker is a member of a union (e.g. free-riders)

On the other hand the effects on hours worked are ambiguous. From the perspective of workers they are motivated to work less, because the subsidies partly substitute the wage loss of time changed to leisure. The other crucial effect the subsidies can make is that the wages of targeted workers will grow slower. The reasoning is that they are more satisfied with their income and employers can ease on the wage growth which in the end will result in more market power for employers.

As seen a comparison of wage subsidies to minimum wage is very distant, both have different targets and different goal, so we should not think of them as substitutes, rather I would agree with the proposition of them being very good complements. It is indeed important to fight the in-work poverty and wage inequality from both ends - the employer and the workers side, because one does not work without the other.

1.3   Demand subsidies

Subsidizing the demand side of the equation works similarly as in the case before. Employers are incetivized to hire specific groups, this time most of the wage subsidies are targeted on unskilled youth labor and training jobs. The effect is however different, because the recipient (the worker) is getting the same earnings as his peers, but it is much more probable for him to find a job, than before. The program therefore is not to motivate people who are intentionally unemployed, but rather help find a job for troubled groups.

The policy is therefore targeting to increase the extensive margin rather than intensive margin of employment and that is where the problems arise. From the point of view of the employer it is more profitable to hire a subsidized employee or even replace some of his current employees with subsidized workers working less hours, which would indeed result in increase of extensive margin, but also decrease in intensive. The other problem is the subsidized employee label, which may create a stigma for the possible employers, marking the employees subpar. This is very different from the case of supply subsidies, where the information is hidden from the employers.

Due to very hard targeting and enforcing the proper effects of demand subsidies this type of policies are used with caution, however similarly as in the case of supply subsidies they work rather as a complement than substitute to minimum wages. One very good application of demand subsidies, which will also be handy for the topic of my thesis, came in times of the financial crisis in 2008 in Germany. Germany was not an exception from the damages to financial markets caused by the financial crisis peaking in 2008-2009, however their "damage control" was rather unique and effective, denoted as the Germany's jobs miracle[2]. They did suffer a substantial GDP decrease, however the job market survived without any deep wounds thanks to a government intervention.

The intervention was a salary subsidy, which was targeted against layoffs due to the overall unpromising financial situation for firms. Instead of layoffs the affected firms shortened the working hours of their employees and the government subsidized their pay to decrease the financial pressure from firms and also maintain the conditions for their workers. The expected side effect was also for workers to have more

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[2]Term coined by an economist and Nobel Memorial Prize in Economics laureate Paul Krugman
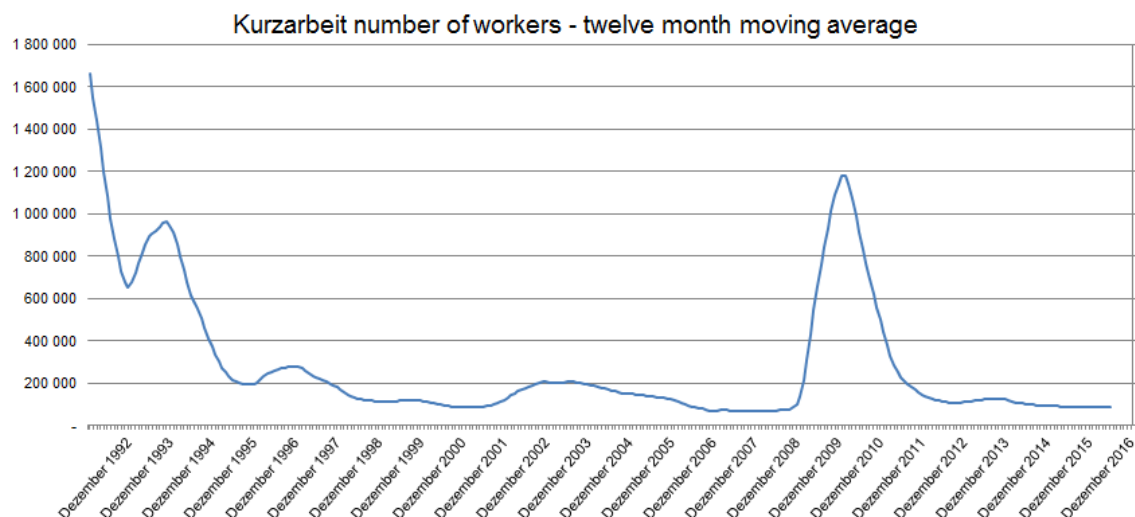
Figure 1.1: The statistic of people working Kurzarbeit jobs

Source: Bundesagentur für Arbeit

time for work related training and employers not having to find replacements after the crisis ends. Workers receiving the aforementioned government subsidies are said to be working *Kurzarbeit* as depicted on figure 1.1. We can see that during the crisis there was an enormous increase in *Kurzarbeit* jobs which was a key weapon in fighting the crisis.

To conclude we have seen different instruments designed to fight the in-work poverty, unemployment and wage dispersion. It is clear that each of them have a slightly different purpose and effect which makes most of them suitable complements. In this thesis, however, I am interested in the effects of minimum wages, which are targeted at the whole labor market, which is certainly a desirable coverage, but on the other hand they bring with them a negative aspect of cutting into the employment, which I will research in terms of theory and empirical research in the next chapters.

Economic theory

The negative employment effects of minimum wages have roots in the classical concept of supply and demand model, which I will describe in the following section. Consequently I will also research other possible models describing the behavior of the labor market, which gives us alternative views on the not so clear problematic.

2.1 Neoclassical model

The core theoretical concept and also the most basic model for describing the labor market is the neoclassical supply and demand model. The market is characterized by perfect competition of firms, homogeneous labor and perfect information on both sides. Those assumptions are not completely fulfilled in real life, both firms and workers are heterogeneous, and therefore there is not one clearing wage for the whole market. However, as we will see in the next paragraphs, we can make additional specifics to our model, which are reasonable and applicable for our narrow point of interest, i.e. the unskilled work force.

The condition on homogeneous work-force can be partly explained by assuming that every distinct profession has its own job market and also, because we will explore the effect of minimum wage, the groups of interest for us are workers which are unskilled and therefore homogeneous in their human capital.

Similarly, those other two conditions are very rational for our unskilled labor market. We can easily conclude from the homogeneity of labor, that the firms will not benefit from issuing higher than equilibrium wages - therefore the wage is determined solely by the market. Perfect information is also an intuitive property, because the firms rationally expect the workers to be homogeneous and workers can expect only the prevailing wage, which is set beforehand by firms in this type of a market.

We can see that our restrictions on the market are rational and we will rely on them to correctly interpret the forthcoming results of the model.

In figure 2.1 we can see depicted the supply function for workers in blue and demand function for firms in orange.

We can observe, that supply function $S_L(W)$ is increasing in wage, which can be rationally explained by influx of workers from other professions willing to switch for better wage and also currently economically inactive people willing to start working at the new conditions. Similarly the decreasing function $D_L(W)$ can be explained by firms maximizing their profit, because for higher wages they can afford to hire fewer workers. Without any other assumptions the market will clear at the equilibrium point E with the respective values L_E for labor and W_E for wage.
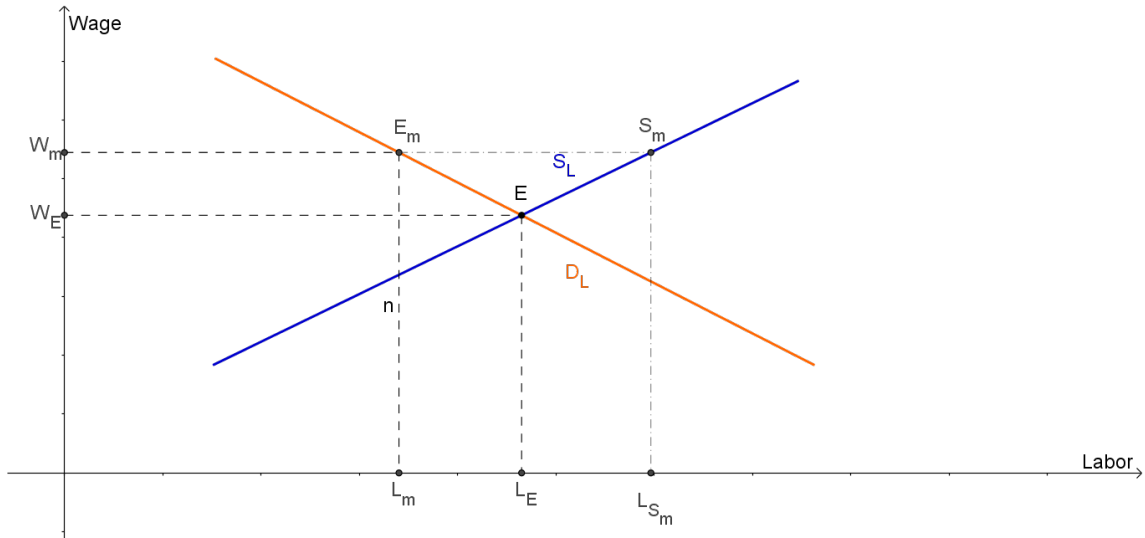
Figure 2.1: Neoclassical supply-demand model for labor markets

Now we will study the effect of a binding minimum wage W_m, where $W_m > W_E$. The old equilibrium point E is no longer attainable and the new equilibrium intersects the minimum wage with the demand function in E_m.

The new equilibrium value of labor L_m will be lower than before, because firms are not able to hire as much labor for higher wages. However, because the expected wage in the market is now W_m the associated supply of labor increases to point L_{S_m}, because for a higher wage more people are eager to work. Those can be people who were not willing to work for lower wages and instead chose to live on welfare. This increase of available work force is creating a surplus of labor $L_{S_m} - L_m$. This surplus are workers which are effectively unemployed due to the new minimum wage. We can observe that the market is not effective anymore.

On the basis of a binding minimum wage in the neoclassical model lies the economical reasoning behind the idea of negative effects of minimum wage policies. Our conclusions are based on the assumptions of perfect competition and homogeneous workers, which are reasonable for the market of unskilled (possibly also young) workers. Those types of workers are the main target of the minimum wage, but also the weakest link. The only options for a firm to adjust to higher wages administered by the government is either to lay off some of their workers or make them work less hours, where neither case positively affects the workers in the big picture.

In the next example we will see, that probably not all of our assumptions in the neoclassical model are actually reasonable, despite the straightforward rational behind them. We will introduce important market frictions on the employee side which will in turn give the employer more control over the wages and he will be the new wage setter.

2.2 Monopsonistic model

There are important underlying factors to a job that the neoclassical model does not interpret. Workers range of possible employers is limited by the distance to commute to work, their preferences do not end at the wage height and many people

depend on the stable income their job provides and can not leave the job market for an indefinite amount of time to find more appropriate employer. Those are some of the factors which make the instantaneous labor shift when wages change to seem atleast oversimplified.

Before we delve into the functionalities of the model, we should talk about why do we chose different assumptions than in the neoclassical model and if they are relevant and applicable to our case. As before our focus stays on the labor market for unskilled workers whom we still simplify to be homogeneous[1], however now we want the employees to have costs related with changing their jobs,i.e. to be in a way bound to their job. We will not specifically express those costs as a variable for a given workers utility, but we need those costs to establish frictions to the market, which are an important aspect of a job market that neoclassical model does not consider.

As we have seen, in the neoclassical model a binding minimum wage always leads to a decrease in efficiency of the market allocation and also employment, but not all of our assumptions made in the previous model are generally wise to apply in the labor market. So far we thought about the employment as a good, where the only bargain that differentiates employers between each other is the asking price (wage) they offer to buy the good for. We will explore the idea of important frictions existing in the market, that break our assumption of perfect competition and we will be able to understand better how employers barter jobs in the labor market. First observation we should make is that workers are not a flexible labor supply, because there are other preference factors at stake. One of the many reasons may be a proximity to their home or other non-work benefits they would otherwise lose, also not everyone is keen on moving their whole family for a slight pay raise. The implication of this reasoning should be that there certainly are workers which are discriminated in their earnings, because of the absence of other comparable employers. Certainly it should be clear that monopsony is not prevalent in all industries and labor markets, that would be unpleasant, but we should pay close attention to it as we will shortly see why.

To conclude, two important assumptions should arise:

- There exists market frictions which negates the perfect competition assumption

- The employers does not have to perfectly abide the market wage and they can slightly lower the wages to become more profitable while retaining the same workers

Based on the assumptions above we will build our monopsony model, where the employer uses his market power to maximize profit and still finds employees even for lower than equilibrium wages due to frictions on the workers side. In our model the employer pays the same wage to all the workers and faces an upward-sloping labor supply curve. He tries to maximize the profits therefore for the amount of labor, such that $MRP_L = MC_L$ holds, there is chosen an appropriate wage W_0, as can be seen on figure 2.2.

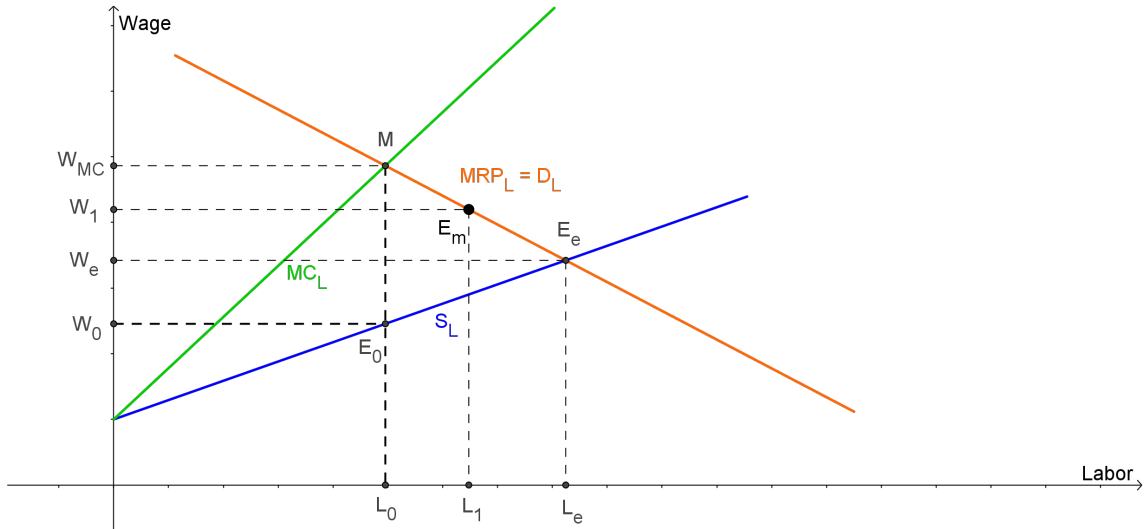[1]The same reasoning as in the previous model holds for this assumption.

Figure 2.2: Monopsony model for labor markets

The starting equilibrium E_0 is maximizing profit for employer, but for the workers there is clearly room for improvements in case of efficiency. Let us now consider different levels of binding minimum wage W_m.

- $W_m = W_e$: in this example we can see that the resulting equilibrium is point E_e which is exactly the equilibrium in the neoclassical model before binding minimum wage - the optimal solution.

- $W_m = W_1$: moving from W_e to W_1 we observe two things - the employment decreases, because our equilibrium is not optimal anymore, and the efficiency of the market decreases, there is now a dead weight loss.

- $W_m = W_{MC}$: if we compare this case with starting wage W_0 the employment stayed the same and the wages increased $\rightarrow$ if we went even higher with the bounding wage the employment could also decrease.

The monopsony model shows us that under the assumption that employers have the ability to control wages in the labor market there exists an appropriate level of minimum wage such that the both employment and market efficiency would increase. It is clear that without any wage policies the market itself is inefficient, because the employer is maximizing his profits. There exist an interval, in our case $[W_0; W_{MC}]$, where a binding minimum wage would benefit the market and the employment of workers. If the government set a minimum wage too high the effect will be negative, the employment will decrease and the market will become even less efficient.

2.3 Search model

Another means of explaining the interactions between firms and workers in the labor market is through the search and matching model. One of the attributes of search model which we have not found in the neoclassical or monopsony model is that in equilibrium we observe unemployment. The reasoning is very applicable and intuitive. We assume the employment of a given worker to be a cycle between

employment and unemployment and at any given moment there will be a positive number of people currently looking for their new job.

Similarly as in monopsony model, we will describe frictions in the market. However, now the frictions will be related to the perfect information assumption. Imagine a person in the real world to be instantly informed about all the available positions regarding his specialization with all the benefits and wage level stated and at the same time firms to have the same type of in depth information available about the possible job candidates. This scenario may as well be possible in the future, but the resemblance to our current job market is non-existent.

Instead what we observe is incomplete information on both sides of the market. Workers will not find information about all the firms advertising jobs in the market and similarly not all firms will be able to interview every candidate possible, sometimes not even all of those who applied for the job with appropriate experience and knowledge. Also, because of the incompleteness of information the job interviews exist in the first place. When a firm and worker examine the input information they have about each other[2], they can agree on sharing more information on a job interview, mainly they share more about their benefits and expectations. This additional step in information sharing we will capture in our model - when the firm and worker are actually matched they exchange information and then decide if the match is beneficial for both of them[3].

Another difference of our search model will be that matches made between workers and employers will be heterogeneic, upon matching both workers and employers will realize additional benefits brought by the pairing which were prior unknown. Wages will be chosen by wage posting of the employers, however we will see that in equilibrium we can consider the wage to be endogenously chosen in a Nash equilibrium[4]. The existence of such equilibrium wage can be easily deducted and we will also see why the equilibrium wage is different from wage maximizing employment.

We first have to understand that in the model there are two opposite forces which pushes on the equilibrium wage level. First is the willingness of workers to work for a given wage - the higher the wage the more workers wishes to work. Second is firms goal to maximize profits. Consider now that the starting wage is the wage maximizing employment. What is crucial to understand, that because we assume the whole market to be large a single employer will make insignificant impact on the supply of workers to the rest of the firms in the market and therefore he will be better off offering lower wage. This tactic would work for everyone in the market so the market wage will decrease and we can imply this logic further on until we get our equilibrium wage[5].

If we institute a minimum wage above the equilibrium wage it will be posted by all the employers - the employment will increase if at the same time the minimum wage will not exceed the wage maximizing employment. This is a very strong conclusion we can make just from the facts we have observed about the equilibrium wage in

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[2]Worker gains information from the firms bio and position description, firm from the workers CV

[3]In this we can easily describe an involuntary unemployment as a worker who would agree on the prospects of the firm, but nevertheless gets declined.

[4]Every firm incoming to the market can chose its own wage to advertise, however the best strategy will be to choose the equilibrium wage

[5]Similarly for starting wage lower than equilibrium wage
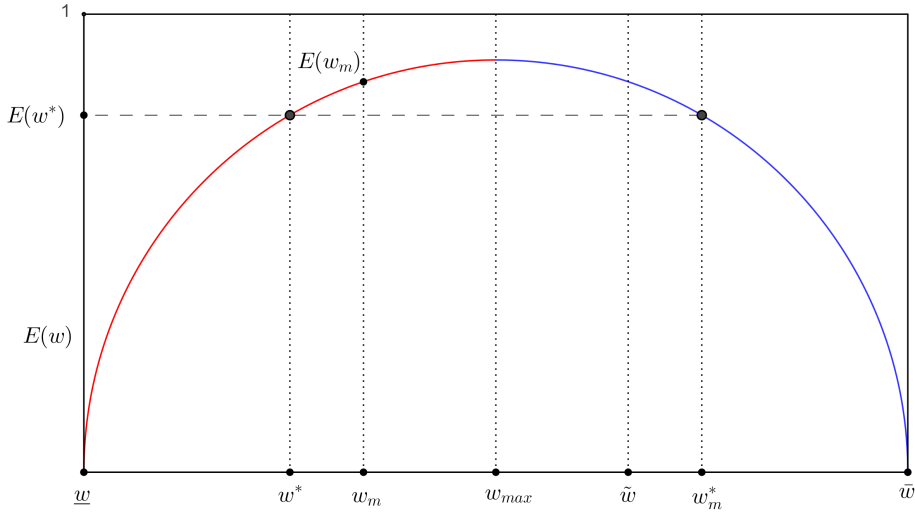
the previous paragraph.

Figure 2.3: Employment levels based on posted wage

For an explanation of the opposite forces in play for the level of employment we can take a look at figure 2.3. On the x axis is plotted the interval of possible wages and on the y axis we have an employment function $E(w)$ based on the wage level w. First thing we should notice is the curvature of the employment function, having its maximum value for w_{max} and being zero in the end of our possible interval. Consider for a minute a majority wage $\tilde{w} > w_{max}$. At that wage the employment level is lower than in equilibrium, because the firms are unwilling to hire more workers for the given wage level, the workers on the other side would be more than willing to work, because even more of them would be employed at $w = w_{max}$. If we take it to the limits, at $\overline{w}$ the willingness of firms to hire workers is zero - the workers are too expensive to generate profit. Similarly if the firms set the wages too low (at $\underline{w}$) then no workers will want to work in that conditions. We can therefore split the employment curve on two parts, where either the firms (in blue) or workers (in red) are lowering the employment, because they are unwilling to stick to the terms proposed by the other party.

We have seen in figure 2.3 why equilibrium is not in the point of maximizing employment and therefore it is clear from the graph that there exist an interval where a binding minimum wage will increase employment and that interval is $[w^*, w_m^*]$, as we can see from the graph for example for plotted w_m, the employment is higher than in equilibrium.

What we have learned so far is that if we loosen up the condition on perfect competition or perfect information we can make interesting deductions on the minimum wage policies. The market environments which does let the employer have some kind of a market power,either if it is by posting wages in imperfect information or due to frictions and heterogeneity, concludes that the employer will maximize his own profits and pay little attention to the effectiveness of the whole market and here is where a government intervention will help with an adequate minimum wage level.

Empirical research

In the previous section we have talked about economic theory, explored the various models used for mapping the incentives of both workers and employers and concluded on the results which came out of our models. However, now we will delve into the empirical research and its own answers on the minimum wage problematics.

As an introduction for this chapter I have chosen the following figure from a 2009 meta-study by Doucouliagos and Stanley.
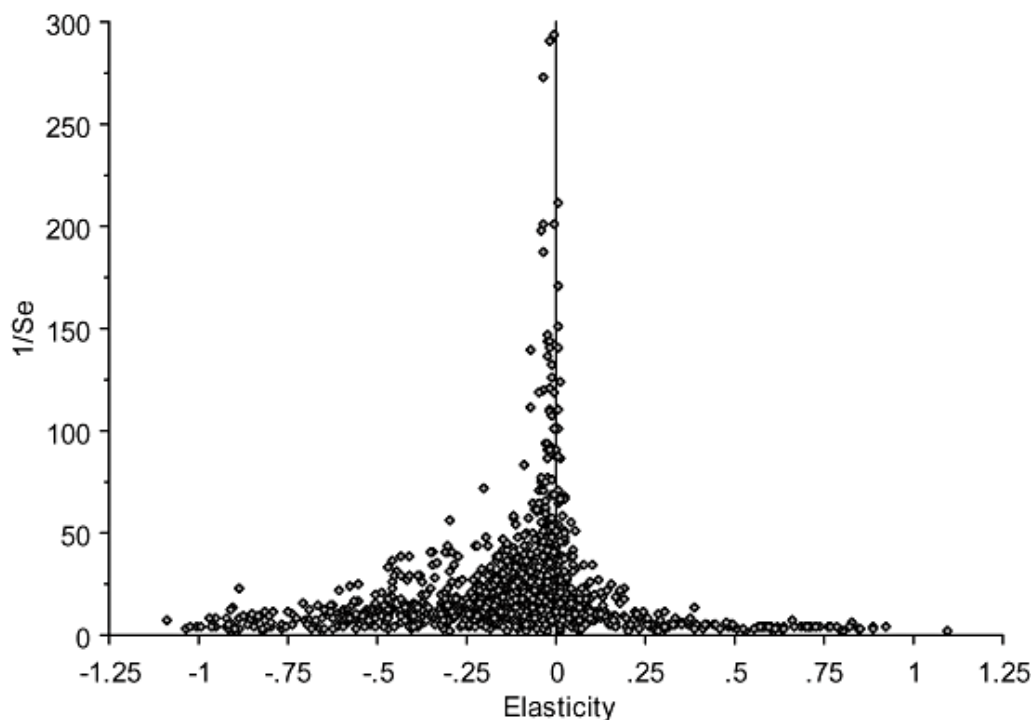
Figure 3.1: Elasticity of employment to minimum wage

Source: Doucouliagos and Stanley (2009).

In figure 3.1 we see graphed more than 1000 of employment effect estimates from 64 studies published between 1972 and 2007. The authors used a funnel plot to ensure that they do not deal with a selection bias in their meta study. On the X axis we see the estimated effect on employment and on the Y axis we have the inverse of standard deviation which can be also understood as a precision in that context.

Aside from the study having no selection bias a second very important information can be read from the graph and that is a very heavy cluster of values based around the point zero, mainly those charted effects with higher precision. Their

results held through an extensive set of checks, including limiting the analysis to effects they viewed as their best estimates of the employment impacts, controlling for correlation of estimates within each study, and controlling for correlation of estimates by each author involved in multiple studies. In the authors words on their conclusions:

> Two scenarios are consistent with this empirical research record. First, minimum wages may simply have no effect on employment... Second, minimum-wage effects might exist, but they may be too difficult to detect and/or are very small.

From the looks of this meta-study it may seem that the fundamental question is already answered, however the purpose of this section is not only showing the results of empirical studies on minimum wage policies, but mainly to lay groundwork for the last chapter of this thesis. From the figure above we should already feel that there probably is not a clear answer for the effect of an arbitrary minimum wage policy; however, we also see that despite the heavy cluster of the effects around zero, there is still a majority of negative results despite the lower accuracy. Indeed there exist an ambiguity in the economical results of the minimum wage effects, but the ambiguity is quite recent, with two major drivers behind it. The first is undoubtedly the study of Card and Krueger (1994)[1] which formed a whole new flow of minimum wage research articles since then. The second are different[2] theoretical models such as the monopsony model that give an alternative view on the labor market in line with latest research studies.

In this section I will research on the ambiguity in opinions and results between the economic experts. My starting point will be a study by David Card and Alan Krueger [3], which started a *new minimum wage* research and was the cornerstone for many economists further on.

The structure of this chapter will be as following. First, we will briefly describe the situation before the stir caused by CK. We will not delve into chronological history of minimum wage research, but rather describe the methods which were commonly used back then. Then we will study the "revolution" which CK brought into the minimum wage research and what came from it. The purpose of this chapter is not to cite every study that came from the minimum wage research, but rather show the improvements in research methods that were used in the last twenty or so years and conclude on their results.

In this chapter we will almost exclusively research studies on the data from the USA. There are several reasons for that, namely:

- Card and Krueger's study and most of the new methods were used on US data

- We are able to compare the findings easily, because they relate to similar sample

- Due to the USA being a federation there is very similar background between states and at the same time many heterogeneous regions

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[1] Which will be researched in depth in the later subsections.

[2] With divergent views from the neoclassical model.

[3] Due to heavy usage of the names of those authors I will abbreviate them to CK in the rest of the thesis

- Some of the states have their own minimum wages in addition to the federal minimum wage, which serves as another research factor

Articles in these sections are selected for the robustness of their results and their approach.

3.1 Before Card and Kruger

The minimum wage research in the United States dates back to the beginning of the 20th century, however the relevancy of the studies and corresponding methods grew stronger since the nineteen-fifties. It was due to the Fair Labor Standards Act (FLSA) being amended, which since then through numerous modifications and additions increased the minimum wage as we know it today. Without going into much details, few things are important to mention. The minimum wage was not applicable in all job markets like we know it today[4], therefore an aggregate effect was hard to estimate. Most of the research done was either on a limited group of workers, time-series based on one state and the standard methods for controlling exogenous effects were not in place.

Nevertheless, the economists were able to generate reasonable results. Most importantly the effects which still persist today are those on teenage workers. The general consensus of most economists in that time was that the elasticity for employment of workers aged between 16-19 years was between -0.1 and -0.3, i.e. a 10% increase in minimum wage was responsible in $1 - 3\%$ decrease in employment of the youth.

The main reasoning behind that finding is that with higher minimum wage the affected employers are looking for means to lower their costs and switching the youth labor for a more stable employment of the adults reduces turnover rates and associated costs. Stable in a sense that their expected retention in the employment is much higher than the retention of teenagers, because they rely more on their income. Other thing that made it easier for the economists to study the effects of youth employment is that a great minority of them are directly affected by the minimum wage therefore the effects can be studied on the job market of the youth as a whole.

This thesis focuses more on the ambiguous nature of the results from the unskilled adult labor market, but a brief introduction on the effects on youth is at hand, because of several important reasons. First, as I have stated, one of minimum wage implications is the transfer from unstable youth workers to stable adult workers. This has not only a negative effect on youth employment, but at the same time a positive effect on adult employment, however the effect is not studied in depth nor easily observable.

Second, the adult labor market is vastly different from the youth market. The percentage of workers affected by the minimum wage is generally less than 10% in the adult market and therefore we cannot simply examine the employment effects on the whole market. We need to differentiate groups directly affected by the policy. The easiest specification is to study the effects on low-wage industries which have an above-average share of low wage workers and therefore are better for observing the

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[4]Even today the minimum wage has certain exceptions, e.g. the tipped workers

effects of minimum wages. The problems with those specification however are, that we should be aware that the results from one industry cannot be generalized for the whole job market. It may be the case that we observe a decline in one industry, but the effect is not a decrease per se, but a shift in employment into a different sector.

3.1.1   Time series

To get back to the methods that were used in this era, the most standard approach was to use the basic statistical time series model such as in equation 3.1.

$$E_t = \alpha X_t + \beta MW_t + \epsilon_t \tag{3.1}$$

Here the explained variable is the employment measured, X are the control variables and MW is the variable controlling for the minimum wage level where t is the time index and ϵ are the random errors.

In the classical settings for measuring the state variations in employment the E is chosen to be the ratio of employed to total population and MW is chosen as a Kaitz index to correctly correspond for the "weight" of the minimum wage increase[5]. This classical approach was successful mainly for the youth estimates, because of the decent coverage and easily constructed control variables. However, the situation with the adult unskilled labor is quite different. The employment was usually measured on a restricted industry and the explained variable needed to correspond to that and was often chosen to be the number of workers. The problem is that the employers are not limited to decreasing the number of workers in case they need to cut off labor, but they can also institute shorter work shifts to accommodate the increase in wage costs. This effect however was not incorporated in any studies, mainly because the data was not available at the time, however it can rightfully generate concerns about the results.

3.1.2   Cross-sectional data

Another approach to study the effects of the minimum wage was using cross-sectional data. The model was very similar, see equation 3.2, but the explained variation was different.

$$E_i = \alpha X_i + \beta MW_i + \epsilon_i \tag{3.2}$$

Instead of time-series we are looking at a constant observation in time, however what changes is the i index for different states. In the time-series model the explanatory variation came from changes in the minimum wage over time, however in this case the variation is rooted in change of the average wage in between states. The regressor MW in this case consist of constant federal minimum wage for all states which is divided by average wage which is different for each state. Generally, the findings of cross-sectional studies were dependent on the controlled factors. The studies which controlled for more factors estimated smaller or insignificant effects of the minimum wage.

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[5]The Kaitz index considers the ration of minimum wage to the average wage and also the coverage of people affected by the minimum wage

3.1.3 Panel data

Minimum wage studies using state-level data vanished over time and reappeared in a new advanced form of panel data. The resurgence was caused primarily by two drivers. First was the stagnation in minimum wage increases in the 1980s which motivated various states to take the matter into their own hands and institute or increase their state minimum wages. And second was the introduction of the data from the Current Population Survey (CPS). The model looks as follows, on equation 3.3.

$$E_{it} = \alpha X_{it} + \beta MW_{it} + \gamma_i + \delta_t + \epsilon_{it} \tag{3.3}$$

The model varies through time t and also through state i with fixed effects for time denoted by δ_t and state by γ_i. The state fixed effects are there to provide protection against regional variation affecting the effect of the minimum wage.

Since its successful debut, the panel data approach became a standard in the minimum wage research. We will later see that even there is a room for improvements, but it helped overcome many critiques on the single state time-series approach, mainly the uncontrolled state heterogeneity. The results from panel data can also be more generalized due to the researched data sample containing many states.

3.2 Difference in differences

The difference in differences approach is a case of a *natural experiment* in economics. We observe the employment effects of the minimum wage on two groups of employers. One group is affected by the minimum wage and that is our treatment group and the other, not affected by the policy, is the control group. We examine those groups before and after the policy change for differences in employment levels.

The reasoning behind the soundness of our comparison is that we choose similar enough groups which, preferably, only differ in being affected by the policy. By having a control group we should eliminate all local employment shocks and affects, because they should affect both groups.

One of the most influential studies which used the difference in differences approach was paper by David Card and Alan Krueger (1994) on the impact of New Jersey's state minimum wage increase in 1992. They studied the effect on fast-food workers and as a control group they chose the neighboring state of Pennsylvania, where the minimum wage was on the same level as in New Jersey before the increase. They conducted data from roughly 400 restaurants via their own telephone survey before and after the increase went into effect and then compared the change in employment between New Jersey's and Pennsylvania's restaurants.

The employment in the model is measured by an expected value of FTE[6] employment, which considers the employment of the whole firm and accounts all full-time employees with value of 1 and part-time employees with value of 0.5. In the ex post measurements an additional value of 0 was added for closed businesses.

They found "no evidence that the rise in New Jersey's minimum wage reduced employment at fast-food restaurants in the state".[7], in fact their findings show slight

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[6]FTE = full-time-equivalent
[7]CK (1994), p. 792

growth of employment in New Jersey.

3.2.1 Card and Krueger aftermath

The reason this paper gained its place in the spotlight of the minimum wage research studies was because the authors made sure the results of their study are (or atleast seem) robust and they controlled for many specifications in their comparisons between target and control groups. Nevertheless, their study evoked many reactions about their methodology because their conclusion is in direct contradiction with the majority of analyses that were written before them.

Anomalies in Card-Krueger Data		
Restaurant/Zip Code "Block"	Number of Employees	
	February 1992	November 1992
	Full Time / Part Time	Full Time / Part Time
BURGER KING in 076XX	0 / 35	29 / 14
WENDY'S in 072XX	0 / 30	35 / 30
KENTUCKY FRIED CHICKEN in 077XX	13 / 12	1 / 10
BURGER KING in 080XX	6.5 / 20	30 / 25
KENTUCKY FRIED CHICKEN in 082XX	0 / 11	22 / 4
BURGER KING in 078XX	3 / 60	0 / 15
WENDY'S in 185XX	30 / 10	0 / 30
KENTUCKY FRIED CHICKEN in 075XX	0 / 7	14 / 0
ROY ROGERS in 189XX	27 / 12	0 / 30
BURGER KING in 190XX	50 / 35	15 / 18
KENTUCKY FRIED CHICKEN in 075XX	0 / 7	14 / 0
WENDY'S in 070XX	15 / 35	40 / 31
KENTUCKY FRIED CHICKEN in 070XX	0 / 22	25 / 15
WENDY'S in 074XX	8 / 14.5	25 / 8

Figure 3.2: Card and Krueger anomalies in employment

Source: EPI (1996)

One of the major critiques came directly from the analysts of Employment Policies Institute (EPI). They tried to mimic the results of CK by obtaining the same data via the payroll records of mentioned restaurants. However, for confidentiality reasons the zip-codes of fast-food restaurants in CK's research were partly anonimized which lead to obstacles in repeating the results. Still they were able to pinpoint several key critiques, mainly mistakes in obtaining prices and obviously wrong employment changes in figure 3.2 and they concluded that the numbers in the former study are anything but realistic. In 1997 David Neumark and William Washer published their reaction on the New Jersey study. They criticized CK's method of obtaining the data through the telephone survey and they conducted their own research in the same manner as EPI[8], i.e. via payroll records. Their results are the strict opposite of the former study, i.e. they found statistically significant decrease is employment after the New Jersey minimum wage was established using the same difference in differences method.

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[8]The used the data collected by EPI and also supplied their own data

The reasoning of CK is that their so called *nature experiments* should be superior to the classic econometric approach due to the ceteris paribus conditions being satisfied by using a control group for their measurements, however, as we have seen the data have to be carefully selected to satisfy unbiasedness. Other problem we could pinpoint about their approach is that they only chose two points in time for their effect measurements. We could easily argue that they have not shown persuasive evidence that New Jersey and Pennsylvania restaurants have both similar trends and their characteristics are satisfyingly similar. Also, how can we know that for example the seasonal trends are not stronger in New Jersey than in Pennsylvania? The policy ex-post month was chosen to be November and we can easily deduce it to have increased demand due to incoming holiday season. It would be more than reasonable to include more observational periods to confirm the results and that is why CK returned with a reply in 1998 as a working paper and later in 2000 as an article in The American Economic Review to refute the accusations of their results being faulty.

The heavy critique was directed at their use of unreliable telephone surveys, therefore this time they went with two samples of data from Bureau of Labor Statistics (BLS), a series of repeated cross-sections from the end of 1991 through 1997 and a longitudinal file that tracks a fixed sample of establishments between 1992 and 1993.

| | Means with standard deviations in parentheses: | | | | | | | | |
| | New Jersey | | | 7 Pennsylvania counties | | | 14 Pennsylvania counties | | |
	Before	After	Change	Before	After	Change	Before	After	Change
A. *BLS ES-202 Data*									
February–March 1992 to	37.2	37.6	0.41	42.5	42.4	−0.12	44.8	44.3	−0.53
November–December 1992	(19.9)	(21.0)	(9.82)	(23.2)	(23.5)	(10.94)	(53.7)	(59.9)	(12.32)
February 1992 to November 1992	37.2	37.8	0.57	42.7	42.2	−0.54	44.9	44.4	−0.58
	(19.9)	(20.9)	(10.12)	(23.8)	(23.2)	(12.82)	(53.6)	(60.4)	(13.83)
March 1992 to March 1993	37.2	34.8	−2.48	42.3	37.5	−4.80	44.7	40.7	−4.0
	(20.1)	(20.0)	(13.99)	(22.8)	(18.6)	(22.74)	(54.0)	(54.5)	(18.1)
B. *Card-Krueger Survey Data*									
February 1992 to November 1992	29.8	30.0	0.19	33.1	30.9	−2.23	NA	NA	NA
	(12.5)	(13.0)	(9.82)	(14.7)	(10.6)	(11.98)			

Figure 3.3: Comparison of descriptive statistics from BLS data and telephone survey

Source: Card and Krueger (2000)

On figure 3.3 we can see the results from the new BLS data compared to the former study sample, also with the addition of seven additional counties in Pennsylvania. The employment effects sign still persisted even with the new data for the period Feb 1992 - Nov 1992, i.e. the mean employment rose in New Jersey and decreased in Pennsylvania after the minimum wage increase. However, they also included data from March 1992 to March 1993 where both states mean employments decreased and we can hardly talk about seasonality when we, finally, compare YTD values for the same months, therefore we should note that the results coming from the former data period are not to be taken for granted. We can assume other trends or employment cycles due to seasonality to be in play, where a sufficient answer to the employment effects observed can be that Pennsylvania have higher amplitudes

regarding the variance in seasonal employments. The authors definitely did not find evidence of negative effects for New Jersey, however the two period comparison in my opinion does not stand strongly enough to conclude on positive employment effects.

Few more insights can be gathered from the table, namely we can compare the mean employment and observe, that the Pennsylvania restaurants have more employees both in the 7 and 14 counties samples than New Jersey. One thing that seems out of place is a high standard deviation in the 14 counties, which indicated that the authors have chosen a sample with proportionally higher variation in the number of employees per establishment, however we can see that the change had similar variance as the other samples, therefore the effect was comparable. The authors further examined the effects by a basic regression with only dummy variable for New Jersey and constant also they tested in some cases for other dummy variables. I will not list those findings, because they were statistically insignificant and bear no useful meaning for the conclusions.

Before we continue with their results from the other part of the study (following employment levels since 1992 till 1996) we should sum up the research on the longitudinal part of the research. CK managed to reject the accusations of the critique directed at the biasedness of their establishment sample. both the EPI and Neumark and Washer found their method of obtaining the data not eligible and therefore were concerned about the results, however as we have seen the BLS data concluded the same impact as the their former study with data obtaining method in line of Neumark and Washer.

In my opinion the differences in differences method can give us reliable results only under certain conditions. The data used have to be very carefully cleared of any bias or errors. Despite CK validated their previous findings I find that they have not fully addressed the concerns risen in the EPI critique, some of them seen in figure 3.2. Also their wording in the reply is more suggestive of neutral or uncertain result rather than a positive one, where I would argue that one of the main factors is considering more factors in play and looking at more than two time points, as we have seen the YTD results in the table above, where the consequences of looking at slightly different time interval can lead to enormously different results. I would like to stress out what should be obvious, that we cannot blindly assume that all of the trends in employment are the same in New Jersey and Pennsylvania and even if they were, the fact that the mean employment is significantly higher in Pennsylvania tells us that we are dealing with different sizes of establishments and that may take a big role in seeing different seasonal trends in employment. It is in my opinion necessary to study in greater depth the trends before and after the increase of the minimum wage a not only in two time-points at hand.

In conclusion CK managed to partially uphold their results; however, we still cannot generalize their findings for any minimum wage law to come. They chose to compare only two states and we cannot reject the possibility of a random error occurring and shifting the outcome of their research, the robustness is insufficient. We would need more observations in time or possibly more states affected and compared. However, the article renewed the interest in the difference in differences approach and set it motion many other studies, which later fixed the deficiencies of their approach and showed the problematic of minimum wage effects in new light.

3.2.2   The improved difference in differences research

The most important and influential descendant of the new research on minimum wages was the paper written by Arindrajit Dube, T. William Lester, and Michael Reich, published in 2010 [8]. The study used innovative approach which solved one of the main problems of CK's research and that is the applicability to national level. The basis of the approach is differences in differences, however their pairs for comparison were all contiguous states in the USA described by quarterly data between 1990 and 2006.

Even if we assume the results of CK's to be right and precise we still cannot dispute the critique of the difficulty to generalize their results for any policy based on the comparison of two states in a short horizon. More so even a flawless experiment will be the victim of a random error and we simply are not controlling for the error if we limit ourselves to observing only two states and one policy change. Imagine that the real effect of the minimum wage was a small decrease in employment. Random errors will distribute the observed values around the true level and if the true effect is in reality only slightly negative, then we will in many cases get different results if we only experience one observation. By that reasoning it is clear that we cannot distinguish the truthfulness of the result from a single difference in differences approach, because we cannot determine the size of the random error deviation.

Nevertheless, Dube, Lester and Reich found a way to dismiss the problematic of deficiency in observations. They used the differences in differences approach, however their observational target were not only two states, but pairs of contiguous counties in the united states with a very broad time horizon. Their research had two parts. In first part they observed restaurant employment between 1990 and 2006 in 1381 counties in the United States for which the data was available for the whole interval. They matched these employment data with the current level of the state or federal minimum wage (whichever was higher at the time) in the county in each quarter in the sample. These counties were used for the traditional approach using panel data regression. The second part consist of above mentioned difference in differences approach which span the same interval of years as in the first part, however the number of counties were lower, because they only chose counties on the state borders. Together they created 316 distinct county pairs. Out of those 288 county pairs had a minimum wage differential at some point in the whole period and those are the objects of interest for us. The methodology is very similar as in the case of CK, only generalized on a larger sample with longer period, which is very advantageous. Since we are looking at so many cases we can now be more confident in the robustness of our result against the random error. Also due to the much longer observational period of 16 years they are able to study the long-term effects of the minimum wage increase.

The results of their contiguous counties difference in differences effect are "...strong earnings effects and no employment effects of the minimum wage increases"[9]. They also identified a flaw in much of the earlier minimum wage research based on the classical panel data analysis. They showed that the problem with the large negative elasticities in the traditional setting is that they are generated through means unrelated to minimum wage policies. Their proof was by doing a placebo panel regression, where they chose contiguous counties in states where there was only a

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[9]Dube, Lester and Reich (2010) p.961

federal minimum wage throughout the whole period and switched the minimum wage for the value of the neighboring state, which changed over time. From the results they concluded that there exist spatial heterogeneity belonging to a region rather than state which is not covered in the state and time fixed effect. Similar conclusion came from their panel data analysis in comparison with the cross-states contiguous pair approach, that overall employment trends tend to vary substantially across regions with overall employment generally growing rapidly in parts of the country where minimum wages are low and vice versa in countries of the northeast where the minimum wages are generally higher.

They also argued that standard statistical analysis which do not control for a spatial correlation will derive into biased results, namely in states where the minimum wage is lower they will wrongly attribute the better employment effects to a lower minimum wage instead of a an underlying uncontrolled factor in the classical settings. They found out by replicating the standard approach and getting the same negative effects we are accustomed to, however when they also added another controls for a region in the country the final effect was not significant anymore. They conclude "The large negative elasticities in the traditional specification are generated primarily by regional and local differences in employment trends that are unrelated to minimum wage policies."[10]

We have studied only a few studies aimed to estimate the minimum wage effect, but still we should be able to generate a reasonable view of the minimum wage research. There are many econometric approaches used in minimum wage research studies, but the role of the method is only secondary. The main clue we should look for is the choice of our target industries and workers. We should be aware of possible secondary effects when delimiting ourselves on only one industry or time period. The consensus is clear, the employment effects for modest increase in the minimum wage should be insignificantly different from zero and likewise we should treat our expectations for forecasting possible effects.

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[10]Dube, Lester and Reich (2010) p.962

Forecasting the minimum wage

We have seen that the ambiguity in minimum wage effects is a complicated issue and a clear answer is not foreseeable from our current research. There exist many approaches to study it and we should not deduct any definite opinions without examining the bias of the method and that is why we have researched in the previous chapter. What we have gathered so far, that if the increase in minimum wage is modest and we control for the right variables the effect on employment should be statistically insignificant from zero, however, the question remains, how "big" is a modest increase?

In this chapter I will research on the effects of a Germany minimum wage (GMW), which was amended in 2015. Since then several studies used econometric approach to study the policy effects retrospectively and few studies tried to forecast the effect ex ante. The structure of this chapter will be as follows. I will briefly introduce the labor market environment in Germany and important changes in the recent years. Then I will introduce the claims of forecasting studies on the effect of the minimum wage and in the end I will show the results from the policy evaluation studies and compare them with the predictions.

4.1   Labor market background in Germany

In this section I would like to convey three main points, which are important for the understanding of the background on which the empirical research studies was built. Those are:

- Decreasing of union coverage since 1990s

- Hartz reforms between 2003 and 2005

Those are important factors to take in consideration when looking at the empirical studies data. We need to know how has the economy shaped in the recent years since some of the studies, mainly those forecasting the effects, look at older data which shows us different state of the economy and labor market.

4.1.1   Decreasing of union coverage

Until 2015 Germany was one of the few countries in the European Union without a legal, nationwide minimum wage. Instead, wages among the unskilled labor were the result of negotiation between the employee union and employers according to the principle of free collective bargaining. The cover of the unions were substantial,

because the results of union activities apply to most of the workers irrespective of membership. Historically Germany did not ever had a minimum wage, but a strong union presence in many industries acted as a factor protecting the rights and interests of workers.
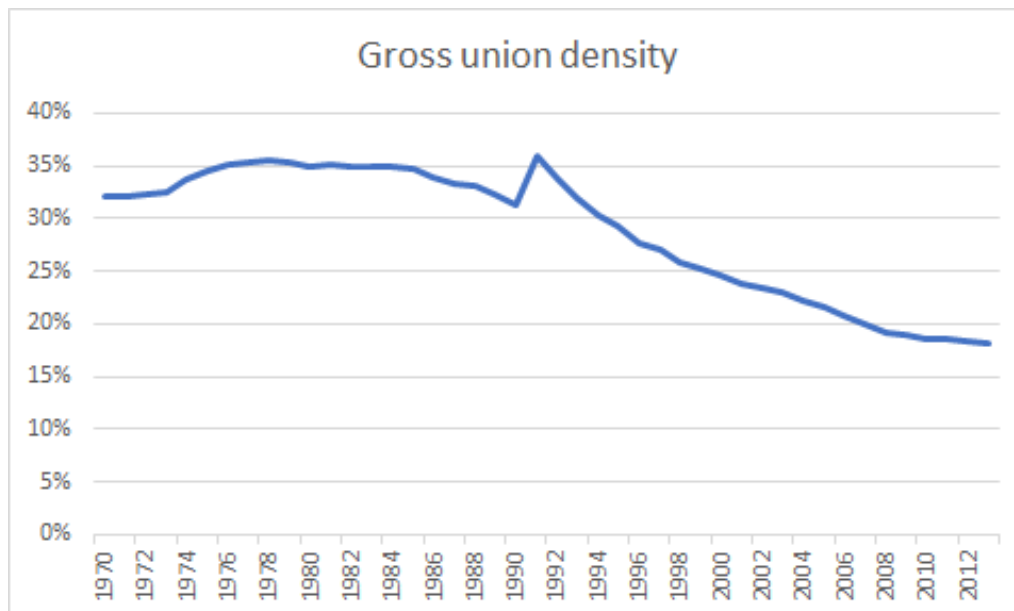

Figure 4.1: Gross union density in Germany

Source: Own calculations based on data from OECD

In figure 4.1 we see the trend for gross union density which is defined as a ratio of the number of union members and the number of employees in the German labor market. The sharp increase in the beginning of 1990 is due to the transferring of unions to the East Germany, but since then the trend is stably decreasing and many workers are left without the much needed union coverage, which is a problem to be dealt with in the long run.

There are different types of union coverage, namely industry or firm level of collective bargaining, depending on covered groups, regions or industry segments. Additional possibility is the existence of a works council, which is a complementing organization of a national level negotiated agreement for a given firm or workers. Their job is to adjust the nationally set agreements to correspond to local conditions.

Even if the percentage of affected establishments by the union density is fading in the recent years, the effects in those industries are still partially in place and we have to take them in consideration for estimating the minimum wage results.

4.1.2 Hartz reforms

Since the early 2000 Germany was facing a problem based in erosion of their union density, dysfunctional unemployment system and unnecessary labor regulation. The aid came in years 2003-2005 in a form of a reform under the guidance of Peter Hartz which helped get the labor market back in shape and fought strongly the unemployment rate. It is important to mention these labor reforms, because they helped Germany to fight unemployment rate in the forthcoming years and set the

trend till the new minimum wage in 2015 as we can see in figure 4.2. In short, before these reforms the German labor market institutions were costly and very inefficient in combating the high unemployment. The goal of the reform were to amend the employment services, activate the unemployed labor and deregulate the labor market.

One of the main parts and also the last of the Hartz reforms was to decrease the height and length of receiving the unemployment benefits and increase the requirements to receive them. The outcome of that reform is the main driver in the monotonic decline of the unemployment rate since 2005.

The second outcome which is important for my research is that one of the reforms was targeted on deregulation of so called "mini-jobs"[1]. The rules were loosened and the supply and demand for part-time jobs have increased which was one of the factors for a decrease in unemployment rate. The hike of part-time employment from 2005Q4 to 2006Q1 was 8.0% based on data obtained from Eurostat and we can trace it back to the Hartz reforms.

Figure 4.2: Germany unemployment rate between 2000 and 2016

Source: Own calculations based on data from Eurostat

In figure 4.2 we can see two trends, one increasing till the year 2005 and the other decreasing almost monotonically ever since. The reform under the guidance of Peter Hartz was clearly successful in increasing the motivation to work for the unemployment people.

One of the papers studying on the short-run effects of the Hartz reforms was an article from Jacobi, Lena and Schaffner, Sandra [14] on the substitution effects between regular and marginal employment. They found that the substitution effect is quite strong, mainly after the reforms. Another observation they made was that the wage elasticity of marginal part-time employment is much higher than its regular counterpart, therefore if we decrease the advantage in costs between marginal and

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[1]Part-time marginal employment exempt from most taxes, up to €450/month

regular employment the employers will substitute the marginal employment with regular with ease. This is a very important result and also partly a foreshadowing to the effects we will observe in the policy evaluation studies.

In my opinion the Hartz reforms were very successful in setting the labor market in motion. The fact that there was a significant decrease in unemployment,high spike in part-time employment and mini jobs and together with possible substitution between marginal and regular employment hints at a flexible and more stable labor market.

4.2   Forecasting studies

The basic approach to forecasting the effects of the minimum wage increase is pretty straightforward. We consider the forced wage increase against the assumptions from perfect competition. If we choose a realistic wage elasticity and calculate the effective increase for those workers, which are bound by the minimum wage, then we can easily deduce the percentage of workers needed to be laid off. This can be interpreted as our lower bound, because we assume the "worst" scenario of perfectly competitive markets. Similarly we could estimate effects in monopsony markets by leaving appropriate gap between the marginal cost and marginal revenue product of workers. Those are some of the approaches the following studies have taken.

4.2.1   Bachmann, R. et al. (2008)

The first researched study come from Bachmann, R. et al. (2008)[2]. They used the same data sample as in the paper from Lena Jacobi and Sandra Schaffner [14] which was mentioned earlier. They have also used the wage elasticities from the results of the former study, together with the cross-elasticities in different types of employment. Their data span up to the Q4 of 2005, which if we take a look at figure 4.2, we can clearly see, that the effects from the reforms were not yet fully in place. The effects from studies from those years should therefore be taken with caution.

Table 4.1: Estimated employment changes for €7.5 minimum wage

	Mini-Jobs	Part-time jobs	Full time jobs by qualification			Total
			Low	Average	High	
West Germany	–414 916	–43 165	–362 065	–174 021	26 317	–967 849
	(–512 321)	(–109 547)	(–403 305)	(–231 237)	(6 638)	(–1 249 772)
	(–317 510)	(23 218)	(–320 824)	(–116 805)	(45 995)	(–685 926)
East Germany	–76 821	–18 926	–26 729	–88 976	–10 129	–221 581
	(–151 954)	(–41 060)	(–28 393)	(–97 199)	(–7 142)	(–325 748)
	(–47 982)	(–13 934)	(–18 461)	(–78 007)	(–3 449)	(–161 834)
Total	–492 000	–62 000	–389 000	–263 000	16 000	–1 189 000

Data are taken from Table 4 of Bachmann, R. et al. (2008), values belonging to €7.5 minimum wage. Values in brackets denote the 95% confidence interval.

They measured different heights of the possible minimum wages, however we are

interested only in the measurement which are close to our observed reality of €8.5. If we estimate wages in 2005 based on the CPI[2] from 2015, we get very close to the value of €7.5 which was estimated in the study.

Their estimated effect on employment can be seen in table 4.1. The effects between East and West Germany differ. Both are predicted to have major job losses in mini-jobs and consequently low qualification jobs in West Germany and average qualification jobs in East Germany are following the lead. Other than the mentioned segments they further do not investigate the results other than stating the coverage of each sector and industry by the respective minimum wage. One important thing to mention is that the former study by Jacobi found that marginal employment elasticity is very high, namely almost -1 which is subsequently generating high employment losses in table 4.1 together with the lower average wages for marginal employment.

4.2.2   Knabe et al. (2014)

The second German study I would like to mention is Knabe et al. (2014) which simulated directly the effects of the €8.5 GMW. Their data comes from longitudinal study of 20 000 households based on the German SOEP 2012 data. The authors approched the problem from two perspectives, namely under the assumptions of Monopsonistic and Perfect competition labor markets. They segmented the labor market similarly as Bachmann [2] and presented their results accordingly.

Their approach was simplistic, for perfect competition they chose labor demand elasticity of -0.75 based on previous empirical studies and accordingly computed the effects on employment. However, I am not entirely convinced with this assumed value. Based on the research in chapter four we have estimated that the real wage elasticity is highly heterogeneous based on number of factors, but overall a realistic estimate should be between -0.1 and -0.4[3], therefore the estimates will be overstated.

In the second case they chose 20% difference between marginal productivity and gross salary for monopsonistic labor market, therefore workers for whom the GMW does not mean more than 20% increase in wage should see an increase in employment rather than decrease. These effects can be observed in table 4.2.

Table 4.2: Employment changes in percentages for different starting wages

Current Wage In Euro	Perfect competition	Monopsony
	Employment loss in percent	
5,00	32,8%	23,0%
5,50	27,9%	17,3%
6,00	23,0%	11,7%
6,50	18,2%	6,2%
7,00	13,6%	0,9%
7,50	9,0%	-4,4%
8,00	4,4%	-4,2%

Data are taken from Table 8 of Knabe et al. (2014), negative values means employment gains.

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[2]Customer Price Index

[3]Those numbers are confirmed as good estimates by a meta-study from Lichter, A., Peichl, A. and Siegloch, S. (2015) [16]

The effects in the table indicate a very high losses in both models for the lower wages, up to 33% in case of perfect competition and 23% in monopsony, which is a rather courageous statement, but not unforeseeable due to the model simplicity.

From the figures in table 4.2 the authors deduced the losses incurred in the aforementioned segments, which we can observe in tables 4.3 and 4.4.

Table 4.3: Employment losses in the Neoclassical model

	Germany total		West Germany		East Germany	
	Number	Share	Number	Share	Number	Share
Full-time	160 203	0,7%	86 641	0,5%	73 562	1,6%
Part-time	91 181	1,2 %	50 411	0,8 %	40 770	3,3 %
Mini-jobs	492 243	14,5 %	348 999	12,0 %	143 244	30,5 %
Seniors	87 481	11,7 %	72 063	11,7 %	15 418	11,9 %
Students	79 610	7,1 %	59 294	6,3 %	20 316	10,8 %
Total	910 717	2,6 %	617 408	2,1 %	293 309	4,5 %

Source: Table 9a of Knabe et al. (2014). Amount denotes the estimated number of workers losing their job in cause of GMW, share denotes the percentage of workers losing a job in the specific segment

The results from the Neoclassical model are similar to the effects estimated by Bachmann in 4.1, mini-job will carry most of the burden of the employment loss. The reasoning is simple, mini-jobs contain most of the low paid workers in the labor market and the mandated increase to €8.5 will be hard to sustain for most of the employers. For some workers it would mean to increase their salaries up to 100%. The question remains if the only outcome for mini-jobs will be to vanish into thin air or if they are able to transform into another type of employment - we should be able to answer this question once we have a look at the ex-post effects, however we already know that marginal employment was measured to have substitution possibilities against regular employment, therefore if the employer power is in fact very strong, the mini-jobs could almost seamlessly transform into regular employment.

For the monopsony approach we see that the effects are less than halved, but with similar proportions in-between segments, which in particular tell us that the wage distributions are broad enough in all segments, such as the monopsony estimates from table 4.2 work as diminishing factor.

We can now observe the differences between those two studies. First is the mixed effect on mini-jobs in East Germany. The underlying factor is most probably the time-frame which the authors have investigated, because the total extrapolated [4]

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[4]Based on the number and percentage of affected mini-job employees

Table 4.4: Employment losses in the Monopsony model

	Germany total		West Germany		East Germany	
	Number	Share	Number	Share	Number	Share
Full-time	41 130	0,2 %	20 426	0,1 %	20 704	0,5 %
Part-time	22 897	0,3 %	11 123	0,2 %	11 774	1,0 %
Mini-jobs	271 879	8,0 %	164 623	5,7 %	107 256	22,9 %
Seniors	58 568	7,9 %	47 895	7,8 %	10 672	8,3 %
Students	31 202	2,8 %	20 053	2,1 %	11 149	5,9 %
Total	425 676	1,2 %	264 121	0,9 %	161 555	2,5 %

Source: Table 9b of Knabe et al. (2014)

number of employees employed in mini-jobs remained unchanged [5], i.e. the change was not large enough to cause a severe effect itself. There can be several explanations, the most probable cause can be non representative sample of households or an increase in wages in mini-jobs for workers in East Germany.

Second observation we can make is the ratio of West to East Germany in affected workers. Even if the final tally of losses differs, the ratio should tell us meaningful things. If we again consider the change in time-frame between studies we can derive that the effects became stronger in East Germany over time. This is precisely the goal of the GMW in the first place, decrease the ever-growing distance between the two now united parts of Germany so the wage inequality can diminish. The comparisons we have seen very well hint at the obvious changes.

4.2.3   Deutche Bank - Gräf et al. (2014)

Last, but not least, I have chosen forecast made by the Deutsche Bank (DB further on). Naturally there were several more forecasts available for the GMW, but most of them focus on a specific subgroup or conditions of the minimum wage increase, which cannot easily be checked for correctness.
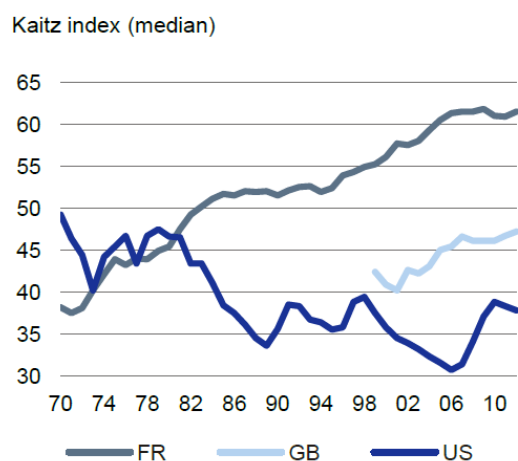

Figure 4.3: Kaitz indexes of France, US and the UK

Source: Deutsche Bank

Similarly as in the previous forecasts, DB raises several concerns for the chosen level of the GMW and deems it to be unnecessarily high. They make several comparisons, one of them with the classical minimum wage examples of United States and United Kingdom contrasted with France.

The US have a long tradition of minimum wages, both state and federal, however they often increase them irregularly which results in the pattern we see in figure 4.3 denoting the development of the Kaitz index over time. Similar bite can be also found in the UK minimum wage, but with much more stable trend, because of the continuous increments in the minimum wage. Another common ground of the duo is that the results from empirical research indicate, that both of them had incurred only marginal negative effects from their minimum wages.

On the other hand France has been increasing their minimum wage up to levels of the Kaitz index which are surpassing any country in the EU. Their minimum wage bite is enormous, affecting most of the unskilled and low skilled workers, mainly those looking for work after finishing their education. Their costly compensation is hidden in wage subsidies, which however is not a solution for a healthy economy in the long run.

For the GMW the Kaitz index will be roughly 50[6], which is currently comparable

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[5]Based on table 4.1 and table 3 in Knabe et al. (2014)

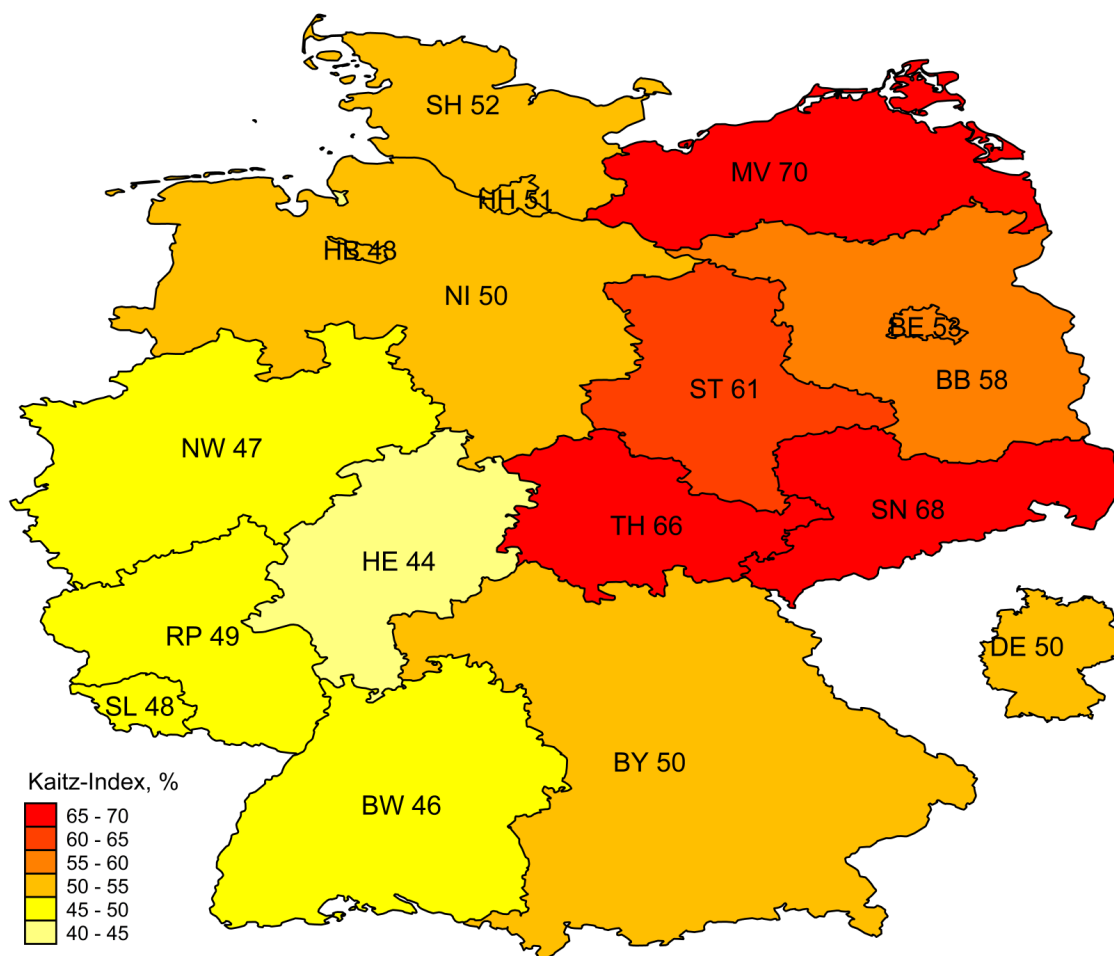[6]Table 3 in the Deutsche Bank research paper

Figure 4.4: Kaitz indexes in regions of Germany

Source: Gräf et al. (2014)

to Belgium, the Netherlands, but also the United Kingdom, whose level was deemed stable by the DB, so why exactly is the minimum wage bite too high?

The latest data from the OECD and Office for National Statistics, the official statistical institution of the UK, speak clearly. The nominal minimum wage rose since 2012 (source year for DB data) by almost 14% and at the same time the unemployment rate decreased. The Kaitz index for the current data will be more than 55%, which is a heavy contradiction against the arguments from the DB. Their premise is that the level of minimum wage, displayed in the form of Kaitz index, in the United Kingdom is the model example of a moderate and acceptable minimum wage policy and I honestly agree with their statement, however from the latest data we can observe that the level of GMW is much closer to the UK minimum wage than to France, which would effectively mean that from the Kaitz index point of view the GMW level is set satisfyingly.

Nevertheless there still may be a reason within the skepticism of the DB. Germany is palpably divided between the economical "superpower" residing in the West Germany and the unsuccessful second child fading in the distance and trying to catch on the its big brother's tempo in the East. If we take a look at figure 4.4 we can see that almost without exception the heavily affected areas lie in East Germany,

where the Kaitz index is reaches values up to 70.

The second justifiable argument, which was brought up by all of the previous forecasts, is the uncertain future of mini-jobs, which currently form an undeniable part of the German labor market. They do not bring any remarkable revenues for the government, because they are freed of most of the taxation rules, but for many people they substitute government subsidies, which would otherwise have to be paid. They are certainly desirable part of the labor market and also the weakest link of the GMW based on the forecasts.

The DB also estimated the expected employment losses, similarly as the other forecasts, based on applying the minimum wage increase to appropriate wage elasticity. They estimate three cases -0.2, -0.5 and -0.8 with expected employment loss of $-300K$, $-800K$ and $-1,3M$[7] respectively. Their go-to option is the case of $-800K$ employment loss based on relevant estimated elasticities, however without any source for the statement. As it was said before, the real elasticity[8] lies probably somewhere between -0.1 and -0.4 based on the recent meta-study by Lichter et al. (2015) [16], therefore I would rather choose the elasticity of -0.2.

Other than the total predicted employment loss they additional segment the labor market based on the industries, where the highest shock is expected to arise in the agriculture and service sector. They also mention that the employment loss will not be experienced in the short run rather in the long run, therefore their estimates should be the long run effects with little to no losses in the short run.

4.2.4 Conclusions on the forecasts

In the previous section we have seen three forecasts studies on the GMW, each based on data from slightly different period, however the results do not vary substantially. From my point of view the estimates depicted the worst case scenarios, because of the overestimated wage elasticity. In case of the DB report which based their results on the latest data sample the estimated employment loss of $-300K$ seems as the most plausible estimate given the chosen elasticity. If we then extrapolate the results of the other studies, we can expect that the biggest part of the losses will strike the mini-jobs followed by regular employment with low qualification.

Given the results from the study of Jacobi et al. 2008 we can be slightly optimistic about the future of mini-jobs after establishing the GMW, because of the high substitution effect. Another point to make is that only Knabe et al. (2014) tried to deal with the possibility of existing monopsony in the market. Their employment loss was nearly halved by that assumption alone and together with their overestimated wage elasticity the final effects can be easily close to zero atleast in West Germany.

Based on the studies it is certainly realistic to expect employment losses in the East Germany, however I would be inclined to believe that West Germany will survive the transition into the GMW without any employment casualties, atleast in the short run.

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[7]Where K and M abbreviate thousands and millions respectively

[8]The real elasticity is by reason not constant throughout the whole wage distribution and hetogeneous based on many factors, but for estimation it is reasonable to work with a constant

4.3   Policy evaluation

Finally in this section we will study the effects which came upon the GMW. There were several studies available and similarly as in the previous section I have tried to hold on to several key factors deeming the studies important. It is definitely problematic to evaluate research on very narrow subgroups of the labor market, because I would need appropriate study with the same in depth specialization in the ex post section, therefore the quantitative research spanning the whole market, albeit making simplified predictions, is more beneficial to my case. Other than for a better connection between the results of *before* and *after* my own goal is to research the end result of the GMW as a whole on the labor market of the low qualified work force.

It is important to mention that all of the studies mentioned will be studying the short term effects of the GMW and we should expect the results to be an underestimation of the whole outcome, nevertheless it can be taken into account as a decent approximation. Subsequently the long term effects are ambiguous as well, namely between the slower growth of wages and employment in the upcoming years versus additional losses incurred through the long term of special precautions of employers fighting the increased costs.

4.4   Mario Bossler, Hans-Dieter Gerner (2016)

The study by Bossler and Gerner [4] researches the after affect of the minimum wage based on the data from the IAB Establishment Panel, which surveys firm policies and personnel developments in Germany annually to June 30th.

They used the difference in differences approach, which we discussed in chapter three, on two observations from the years 2014 and 2015 and their choice for control group is straightforward - the establishments which are unaffected by the minimum wage.

In this case, however, the comparison is problematic. The approach that Card and Krueger (1994) or Dube et al. (2010) did back then was to compare two very much comparable groups, such that possibly the only difference between them will be the minimum wage increase. By artificially creating the control group with establishments which remained unaffected by the minimum wage, because all of their workers are earning higher wages than the GMW, they are most probably creating a bias. In my opinion there have to be different underlying factors in firms employing only workers over €8.5 and those employing workers below the minimum wage level.

The authors tried to explain the similar trends on figure 4.5 and also with descriptive statistics of the sample, which can be found in the original study. We can see from the graphs that the studies have similar trends in the several depicted years, but my argument still stands, the difference between the affected and unaffected establishments is more than marginal.

They further distinct between two types of firm affectedness namely extensive and intensive, where extensive is a binary variable describing firms with atleast one employee with wage below €8.5 and the latter is a percentage of workers in a firm with wage below the threshold. Naturally both of those variables are zero for the

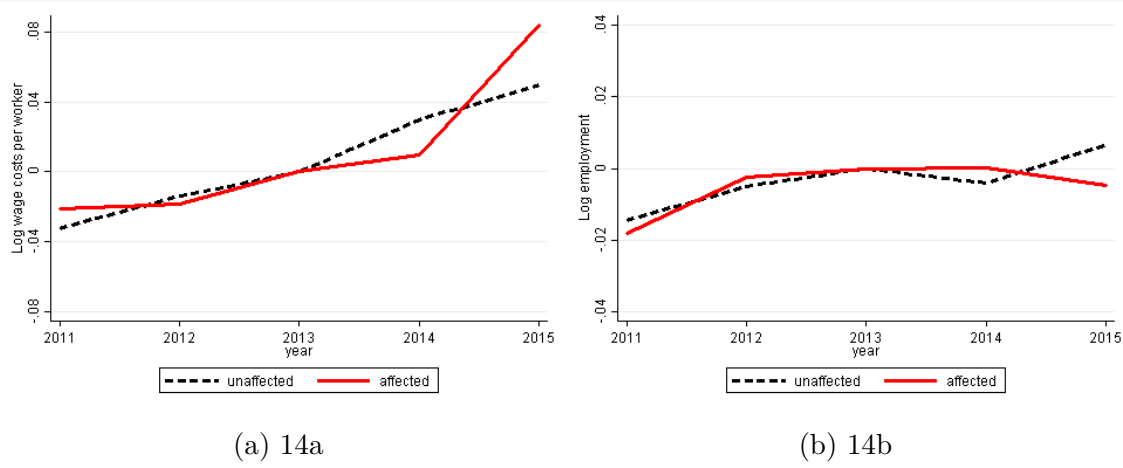(a) 14a   (b) 14b

Figure 4.5: Comparison between logs of average wages and employment

Source: Bossler (2016)

control group, because they employ zero affected employees. In case of the treatment group the average intensive affectedness is 37.8 percent.

Their goal is to estimate the value of the employment elasticity caused by the minimum wage by two step instrumental variable regressions. For controls they chose the together with fixed time and establishment effects also dummies for collective bargaining, works councils, share of full-time and female employees. For the final estimation they chosen moment estimator and two-stage least squares.

Table 4.5: Econometric results for treatment group

	Wage effect	Employment effect	Employment elasticity	
	Log wages per worker	Log employment	Moment estimator	2SLS
Panel A: Extensive margin effects (0/1)				
ToT_{DiD}	0.048 (0.010)	-0.019 (0.008)	-0.396 (0.182)	-0.266 (0.170)
$Placebo_{DiD}$	-0.016 (0.009)	0.0002 (0.0072)		
Panel B: Intensive margin effects [0,1]				
ToT_{DiD}	0.117 (0.024)	-0.035 (0.021)	-0.299 (0.194)	-0.104 (0.189)
$Placebo_{DiD}$	-0.006 (0.022)	-0.006 (0.016)		
Panel C: Differing treatment intensities				
$0 < a \leq 0.2$	0.030 (0.012)	-0.018 (0.009)		
$0.2 < a \leq 0.4$	0.048 (0.021)	-0.015 (0.015)		
$0.4 < a \leq 0.6$	0.083 (0.026)	-0.024 (0.019)		
$0.6 < a \leq 0.8$	0.059 (0.030)	-0.045 (0.024)		
$0.8 < a \leq 1$	0.089 (0.034)	0.005 (0.034)		

Data are taken from Table 2 of Bossler(2016). Coefficients are the estimated difference between treatment and control group, i.e. the policy effect. Cluster robust standard errors are in parentheses. The a denotes the intensive affectedness of regressed establishments, the estimated variable is the same, i.e.

The results from their analysis can be found in table 4.5. The ToT_{DID} abbreviates the treatment effect on the treated from the difference in differences approach. We can observe that they have successfully tested their effects on placebo period with the increase happening in 2014, the estimates are insignificant from zero. The first estimation was done with the extensive affectedness as explanatory variable. The resulting employment elasticity is almost -0.4 and -0.27 in case of the two estimation approaches. Similar result came from the intensive affectedness, however insignificant in case of 2SLS approach. Very interesting are their results on different intensive affectedness intervals. It would seem that the effect on employment was indistinguishable from zero in several of those intervals, mainly in the most affected group between 80 and 100 percent of affected workers, which would certainly atleast rationally contradict their main finding.

We should also notice that even if their effect may be slightly overestimated, given the results in the intensive part of their research, they came upon elasticities ranging in the -0.2 to -0.4 as most of the scientific works agree upon in contrast with the elasticities chosen in the forecasting studies.

Another important observation the authors make is the conditional effect on establishments with wage spillovers, i.e. those firms where wages increased even for workers above the GMW. Their result that establishments with spillover effects experience zero disemployment effects is indeed rational and we will see similar argument link with monopsony background in the following studies. Second segmentation the authors make was into East and West Germany. As we expected the employment effect in West Germany was negative, but insignificant unlike the East Germany where the employment effect came negative.

Finally, the authors extrapolated their result to the whole German labor market and concluded that the employment loss was 60 000 workers, while the average wage in affected establishments rose by almost 5% with employment decrease of 1.9%. Unfortunately, further inspection into types of employment was not done, therefore we are not able yet to draw conclusions about the mini-jobs problematic, but we can already see that the estimations in our forecasts were heavily pessimistic.

4.4.1   Alfred Garloff (2016)

The second policy evaluation come from Alfred Garloff and approached the problem from a different perspective. The regressed variable was the difference in employment for a given month between 2014 and 2015 divided into together 1410 distinct cells by region, age group and sex. Important thing to mention here is that the rage of ages included in the study span between 30 to 54 years of age. The author does not specifically indicate the reason why he did not include the whole productive population, either by choice or by limited data. That fact can severally affect the outcome, because from studies we know that a big part of the minimum wage receivers are young unqualified workers and partly also the elderly.

The econometric method used was a classical panel data regression with fixed effects for both time and cell specific effects. The most important explanatory variable is the minimum wage bite[9] effect, which is measured only for the periods after January 2015.

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[9]Defined as a percentage of people receiving less than the minimum wage in a given cell

Other than cell specification the author also recognizes the division into regular employment, which is subject to social security contributions and marginal employment which is not. From this description it is clear that part-time employment is also a part of regular employment and marginal employment should therefore be only mini-jobs.

The outcome of the regression will be the change in employment for a given cell and from that information we should be able to determine the overall effect even if the elasticity is not further regressed as in the previous case.

The first results can be seen in table 4.6.

Table 4.6: Econometric results by types of employment

	Total employment	Regular employment	Marginal employment
Panel A: Coefficient 2015			
Bite*2015	-0.003	0.045***	-0.247***
Panel B: Separate coefficients for the months before after the minimum wage introduction			
Bite*09/2014	-0.007	0.006	-0.107***
Bite*10/2014	-0.010*	0.004	-0.111***
Bite*11/2014	-0.011*	0.007	-0.128***
Bite*12/2014	-0.016**	0.006	-0.176***
Bite*01/2015	-0.012*	0.034***	-0.270***
Bite*02/2015	-0.005	0.047***	-0.274***
Bite*03/2015	0.000	0.056***	-0.300***
Bite*04/2014	-0.006	0.050***	-0.282***

Data are taken from Table 2 of Garloff (2016). Significance of estimates are denoted by stars under the classical conventions ranging from 90 to 99 percent significance. Regular employment denotes employment subject to social insurance contributions.

In the three columns we see the effect on total employment and the effects on regular and marginal employment which sums up to the total employment. Vertically the table is divided into two parts, the overall effect on the 2015 bite and monthly regressions. There are many interesting patterns to observe. In the first part the total employment effect in indistinguishable from zero, however we see that the partial effects are opposite and significant, which hints and a transformation from marginal employment into regular employment without any substantial job losses to the market.

This is a huge result, which suddenly clicks together all the little information we have gathered in this chapter so far. The study of Jacobi and Schaffner (2008) which brought us the hint of substitution effects from marginal into regular employment and despite the forecasts of high impact on mini-jobs we can rule out perfect competition from the equation, because the effect on regular employment is significantly positive.

From the months perspective in the second part of the table on table 4.6 we see that there is a clear change in the trend on the turn of the year and since the trend is again stable. In the column regarding marginal employment the change is not so sharp, probably due to anticipatory changes in the work environments.

Table 4.7: Econometric results by region and employment types

	Total employment	Regular employment	Marginal employment
Panel A: Coefficient for Western Germany			
Bite*2015	0.017**	0.082***	0.059**
Panel B: Coefficient for Eastern Germany			
Bite*2015	-0.000	0.031***	-0.171***

Data are taken from Table 3 of Garloff (2016). Significance of estimates are denoted by stars under the classical conventions ranging from 90 to 99 percent significance. Regular employment denotes employment subject to social insurance contributions.

Lastly for our analysis are important the results for East and West Germany, which are depicted in figure 4.7. The results show that in West Germany the minimum wage raised employment by a positive significant value in all types of employment. As we have expected the negative effects are stronger for East Germany, but the overall employment growth is insignificant from zero, while there is also evidence for substitution of marginal employment by regular employment.

To conclude, even if we take into consideration the incompleteness of the age factor in the sample, there are some very definite answers to our questions, whose were raised in the forecast section. First, the problematic of mini-jobs which were shown to be heavily affected by the minimum wage due to high increase in their average wages was solved in the end by transforming those jobs into either full time or part time employment. Politically this is a wanted effect, because regular employment is due to more taxing, but the if the importance of mini-jobs in the labor market is beneficial from an economist point of view is for another discussion. Second, the anticipated much stronger effect on East Germany was a relevant argument, however this study claims the effect is still insignificantly different from zero.

If we put what we have gathered from those two studies together, the true effect probably lies somewhere in the middle. Bossler and Gerner are overestimating their effect by not having a sufficiently relevant control group. Garloff on the other hand is missing relevant age groups from the sample, which is underestimating his result, because those groups carry the highest effects with them. One thing is however clear, the real effect was very minuscule with regard to the forecasts, mainly because those forecasts underestimated two things, the real wage elasticity and the possibility of significant monopsony effects in the market. In the last evaluation study I will briefly delve into the monopsonistic evaluation of the German market to uncover the reasons behind the measured effects.

4.4.2   Ronald Bachmann, Hanna Frings (2016)

Without going into too much detail I would like to mention results from research by Ronald Bachmann and Hanna Frings on the monopsonistic competition in the Germany labor market, because they are crucial as a factor for forecasts and evaluations in the labor market. We have seen the studies overestimating the real wage elasticity, however the second underestimated factor was definitely the underlying

monopsonistic competition.

The estimation approach was similar as in Manning (2003)[17], i.e. based on the dynamic model of monopsonistic competition. They model the wage elasticity of labor supply by estimating the separation rate of the individual firm from the data. The data are taken from the IAB Establishment Panel between 2000 and 2002. The period of the data is older than the Hartz reforms, therefore the results are tentative, but still more than partially important[10].

The authors find several significant estimates in line with similar research. The Collective bargaining coverage of workers, percentage of female and Non-German workers are few of factors increasing the monopsony power of the employer. They have found that East Germany have substantially higher degree of monopsonistic competition compared to the West.

The share of vacant jobs also play a big role in determining the level of monopsony. Monopsonistic employers are often having vacant positions, because they are maximizing their profit by underpaying their employees which in turn leaves them with some vacant positions. The most affected industries are hotels, restaurants , retailing and agriculture. On the other end of the spectrum are mining, utilities, manufacturing and construction.

I have only briefly mentioned the key findings we should gather from the study, however a similar basis probably should have been a part of the forecasts we have seen in the previous section. We have learned, that the East Germany is subject to stronger monopsonistic tendencies and therefore the estimated employment change from the GMW should have been lower. In the same manner there are different industries with different level of monopsony and those should be treated separately, because those closer to perfect competition will incur higher losses. I would say it is irresponsible to not account for the monopsony competition as a background for low qualification labor markets and I hope the authors will delve deeper into the market structure.

4.5   Effects on wage inequality

The last section belongs to the study of lower tail wage inequality in Germany. Similarly as in the US and the UK which were hit by the increasing inequality in the 1980s, in Germany the effects on the bottom distribution became prevalent in 1990s. Economists attribute these changes in inequality to technological change in particular the growth and separation of information and communication technology and in the US also partly by declining real value of the minimum wage[11].

In case of Germany there were similar studies on the cause of wage inequality. Unlike the US, Germany did not have minimum wage prior 2015, but in a way similar role of eroding minimum wage could have played a decreasing union coverage and with it collective agreements. The effects were studied by numerous economists. Based on the results from Dustman et al. (2009) about one third of the lower tail wage inequality can be explained by union coverage erosion[12], which decreased

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[10]Which the authors highly argue by very slow changes in the structure of labor market and high correlation with current data.

[11]In depth studied in the paper by Autor et. al (2016) [1]

[12]Which is a similar ratio as in the case of the aforementioned study by Autor et al. in the US

sharply after reunification of East and West Germany, which would partly explain the delayed effect in comparison to the US. The authors also incline to the cause of changes in labor market institutions and supply shocks to be the main determinant.

Table 4.8: Yearly wage growth in Germany by industry

Industry	West Germany	East Germany
	Yearly wage growth in percent	
Accommodation and food service	3,1%	9,1%
Construction	2,0%	7,8%
Education	1,1%	4,0%
Industry and service sector	1,7%	4,7%
Manufacturing	2,3%	4,3%
Mining and quarrying	3,4%	3,7%
Other service activities	0,3%	4,7%
Transportation and storage	1,5%	5,4%
Water supply and waste management	1,8%	2,3%
Wholesale and retail	1,4%	7,9%

Own calculations based on the data from the Genesis-Online Datenbank. Wage growths are measured from 2014Q4 to 2015Q4.

However the reasons why wage inequality increased are secondary issue. It is only important to know that wage inequality increased up until 2014 and since the passing of the GMW the trend has momentarily stopped. The explanation of the effect is simple, because in practice minimum wage should potentially have three effects. First is the indisputable wage increase for workers with preceding wage below the minimum. Second is the spillover effect for employees slightly above minimum wage, which may not be found in every industry or firm, because it is partially influenced by the market power of the employers. Third is the long term slightly negative effect on wage growth, which is still not yet studied in depth due to very hard distinguishing between business cycles and actual policy effects.

The target of our interest is the low tail wage inequality, i.e. the 20p/50p or 10p/50p ratios. I will not specifically calculate the decrease in wage inequality, but we can extract valuable information of the GMW effects based on tables 4.8 and 4.9.

In table 4.8 we can observe the yearly wage growths from the fourth quarters of 2014 and 2015. The effects of the GMW are very noticeable in East Germany. Together with the findings in previous chapter we see an enormous growth with almost no repercussions. For comparison I have added the average wage growth in 2014 to the table. We can see that the growth was stable and very similar in both stated regions.

In table 4.9 I have included the effects on worker qualification in certain industries. We can see that the GMW was tremendously helpful for fighting wage inequality in East Germany and the differences between East and West Germany.

Table 4.9: Yearly wage growth in Germany by skill level in certain industries

Qualification of worker	West Germany	East Germany
	Yearly wage growth in percent	
High	1,8%	6,0%
Middle	2,2%	8,7%
Low	2,7%	13,2%

Own calculations based on the data from the Genesis-Online Datenbank. Wage growths are measured from 2014Q4 to 2015Q4 on average wages in segments. Chosen were industries with high minimum wage bite, namely accommodation, construction and wholesale.

In conclusion there are definitely positive indicators of decreasing inequality in East Germany, however the effect for West Germany is only mild. The GMW has successfully helped mitigate the differences between both regions and partially solved the rising inequality issue.

Conclusions

The goal of this thesis was to research the methods used to estimate the effects of minimum wages on employment and then apply them on the case of the Germany minimum wage. We have analyzed the current theoretical and empirical research and concluded that the effects are insignificant from zero for appropriate increase of the minimum wage if there are not any other major factors in play.

What we have also seen is that many economists still find the model of perfect competition as a suitable instrument for modeling the changes in labor market, but the newest research points to being cautious against exaggeratedly negative results, which was the case of the expectations of many economists about the outcome of the Germany minimum wage. Not only was the short term employment effects incredibly small, despite the considerable wage increases in some industries, but also the long term effects are beginning to shine a bright light into the future of Germany. The trend of the unemployment rate is still decreasing, more people are becoming economically active and most of the mini-job workers were able to keep their job or convert to regular employment.

Despite the negative forecasts, there is still light at the end of the tunnel, because it seems that not all the experts are sticking with the opinions against minimum wages. In a joint report by the ILO, OECD, IMF and the World Bank for a G20 Conference in 2012 the authors concluded that "a statutory minimum wage set at an appropriate level may raise labor force participation at the margin, without adversely affecting demand". Similarly in June 2014, the IMF has advised the US to increase their minimum wage level [1].

The monopsony background is a real issue in many industries employing mainly unqualified workers and minimum wage is a perfect instrument in shaving off those labor market imperfections. For the future research I would advise to look more thoroughly into the solutions that employers use to put up with the mandated wage increase to find indicators of monopsony and pinpoint the exact industries which are affected by it. It is probably time for the research to progress and approach the question of how high the minimum wage can be raised without significant disemployment effects, instead of taking stance against any increase.

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