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Are Firms Paying for the Minimum Wage? Evidence from Germany

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Abstract

Following an intensive discussion, Germany introduced a nationwide minimum wage on 1 January 2015, which was set at an hourly wage of € 8.50. Undeniably, there is a significant amount of international and national literature that discusses the minimum wage, both generally and specifically, in Germany. Counterintuitively, only small, negative employment effects are identified for the German minimum wage, whereas some international studies (e.g. for the US) even found positive effects. However, only a few papers focus on different sorts of adjustment channels that firms are applying as a response to the higher labor costs. This thesis focuses on the analysis of firms' profitabilities and asks if profit margins significantly declined in highly affected industries, as a response to the nationwide minimum wage. Therefore, this paper uses a Difference-in-Difference approach that compares the ratio of pre-tax profits to revenue in industries which are more exposed than their less affected counterparts. To define the exposure of an industry to the minimum wage, the Structure of Earnings Survey of 2014 is used to calculate industry specific bite measures. Surprisingly, no significant decrease in firm's profitability can be found as a response to the German minimum wage introduction in 2015. This result is consistent over all model specifications that are used in the underlying thesis.

Keywords: Minimum wage; Germany; difference-in-difference; adjustment channels; profitability; firm-level performance.

1. Introduction

Since Card (1992) and Card and Krueger (1994) analyses of county minimum wages in New Jersey's fast-food restaurants, which reveal positive employment effects, the classical thinking about minimum wages changed to include a broader range of opinions. Before their study, there was a consensus among economists that a binding minimum wage leads to negative employment effects. However, further research focused on the market specifications and concluded that minimum wages can have positive, negative, or no effect on employment depending on the labor market structure. Many economists, especially after Card and Krueger (1994) study, tried to explain their empirical results with theoretic deviations of the standard model. Inevitably, there is no clear evidence on the different effects of minimum wages, neither on the empirical side, nor on the theoretical side.

Minimum wage research also expanded to employment, its related effects, and possible adjustment channels for firms facing higher labor costs due to the wag floor (e.g. Hirsch, Kaufman, & Zelenska, 2015). The relevance of these studies lies in the ambivalence of employment effects. If firms do not cut jobs but are still confronted with higher labor costs, they might adjust their behavior in terms of their pricing, which would mean that consumers pay for the higher wages, or through lower profits, which would be equivalent to firm owners paying for an introduction of a minimum wage. Thus, only considering employment effects when evaluating minimum wage could result in an incomplete analysis of the situation (Bruttel, Baumann, & Dütsch, 2018).

Prior to 1 January 2015, Germany was one of the few countries in the European Union without a nationwide minimum wage. This changed after two German political parties, the Christian Democratic Party (CDU) and the Social Democratic Party (SPD), agreed on a national wage floor of € 8.50 per hour. This decision came after an intensive debate, where many economists feared massive job loss, especially in Eastern regions of Germany. However, supporters saw a national minimum wage as a way to promote fair labor practices, create a positive distributional effect, and implement an instrument to reduce poverty. In the end, the two primary arguments for wage reform were the increasing gross wage inequality in Germany and the decreasing share of the working population using collective bargaining (Bossler & Gerner, 2016, Bosch, 2015).

In the four years since the German labor market reform,

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many studies focused on the employment effects. Indeed, these studies only identified small negative employment effects. Such effects included the significant decrease in the prevalence in mini jobs, and firms appear to have postponed their hiring rather than cut full time jobs (Caliendo, Schröder, & Wittbrodt, 2019). Unfortunately, other adjustment channels such as a profit decline have not received much attention in the context of the German minimum wage. Thus, this thesis aims to focus on the German minimum wage's effect on firms' profitabilities, which is defined as the ratio of pre-tax accounting profit to total firm revenue.

The key consideration leading to this analysis is, therefore, that higher labor costs are associated with lower profits if employment does not change. Therefore, it is likely that firms who do not cut jobs, face a lower profitability because of the minimum wage if they are unable to shift increased costs to their consumers through price increases. To identify a possible effect on firms' profitability ratios, this paper applies a Difference-in-Difference (DiD) approach and follows previous studies in the field of minimum wage research (e.g. Mayneris, Poncet, & Zhang, 2018, Harasztosi & Lindner, 2019, Draca, Machin, & Van Reenen, 2011). Two different datasets will be used: the Special Statistical Publication of the German Central Bank (2018), which includes the profit margins on the industry level, and the Structure of Earning Survey (2014) to compute the affectedness for each industry.

This thesis begins with an introduction into the policy context in Germany in section 2, and it will focus on key theoretical considerations on minimum wages and theoretical outcomes on firms' profits in section 3. Part 4 summarizes the empirical literature on international and national evidence, whereas section 5 gives an introduction to the data used. This is followed by a short graphical description of the data in section 6. A detailed description of the empirical strategy is given in part 7 and followed by the empirical results and interpretations in section 8. Finally, conclusions are drawn in section 9.

2. Minimum Wage in Germany: Policy context

After the agreement of the Grand Coalition, consisting of the SPD and the CDU, a statutory national minimum wage of € 8.50 per hour was introduced on January 1, 2015. Prior to 2015, only sectoral minimum wages existed, such as for hairdressers and security services (Caliendo, Fedorets, Preuß, Schröder, & Wittbrodt, 2017). Surprisingly, not all unions were in favor of the implementation of a national minimum wage and not all firms were against it. However, employer associations commonly argued against a nationwide minimum wage, as they said it would weaken the German system of collective bargaining. Nevertheless, these cases show the diversity of opinions and the divided interests among all actors in the debate (Bosch, 2015).

Normally, companies in Germany set wages through collective bargaining, where unions negotiate wages with employer associations freely and without any intervention from the government. However, the fraction of people covered by collective bargaining has been decreasing for more than 20 years. One potential reason is the voluntary participation in the collective bargaining process. Additionally, as collective bargaining coverage fell, real wages stagnated, and the wage inequality rose. Combined with the good form of the German labor market, this potentially influenced the decision to introduce the national statutory minimum wage. Furthermore, it was the German chancellor, Angela Merkel, herself who liked the idea of a minimum wage. This was first mentioned by Merkel in 2013 and led to a conflict with the coalition partner—the German liberal party (FDP)—at that time (Bossler & Gerner, 2016).

The Minimum Wage Commission (Mindestlohnkommission, 2016b) proposed further adjustments; on January 1, 2017, the minimum wage increased to € 8.84 per hour, with a future increase to € 9.19 in 2019 and € 9.34 by 2020. In 2014, around 5.5 million workers earned less than € 8.50 per hour. However, only 4 million of these workers were eligible for the nationwide minimum wage according to the Federal Statistics Agency. Most of those who did qualify were workers in the eastern regions of Germany, women, and marginal employed workers ("minijobbers") (Destatis, 2016). However, the introduction of a minimum wage came with many exceptions, and therefore, not all workers who earn less than € 8.50 were eligible. To make finding employment easier, long-term unemployed persons are allowed to work for the first six months for a wage that is below € 8.50. Another notable exception includes interns and workers under the age of 18. This exception does not extend to apprenticeship though, as the Grand Coalition introduced a separate general minimum wage for apprentices of € 515 per month in May 2019. This will be effective for new contracts as of January 1, 2020, even though this only applies to branches where no sectoral agreements exist (Bundesregierung, 2019).

As of 2019, 22 of the 28 countries in the European Union have a nationwide minimum wage. The range is quite high, as can be seen by the stark difference between the Bulgarian minimum wage of € 1.72 per hour compared to Luxemburg's € 11.97. While the German minimum wage of € 8.50 falls between these extremes, a further increase of Germany's minimum wage is highly discussed (Handelsblatt.com, 2019) as the current level of € 9.19 is considered as relatively high (Caliendo et al., 2019).

3. Theoretical Considerations

The following section of this paper will give a short overview of the most relevant labor market theories, with a particular focus on the effects of a minimum wage on market equilibrium.

The oldest and one of the most discussed theories in economics is the case of a perfectly competitive market—the neoclassical theory. In terms of labor markets, this means that firms and consumers do not have any market power; thus, the equilibrium wage w^* and employment level L^* are defined through labor demand and labor supply. Introducing a minimum wage $w_{min} > w^*$ leads to an excess of labor

supply and, therefore, to unemployment. This can be easily seen in the simplest economic model: due to an increase in wages (the price of the product labor), demand for that product falls as labor demand is a downward sloping function. Additionally, total output in the economy falls (Krasniqi, 2007). The full coverage of all workers by the minimum wage is an important underlying assumption in the neoclassical model. Stigler (1946) argues that unemployment might not rise when low-wage workers increase their productivity so that their Marginal Product of Labor (MPL) is at least as high as the introduced minimum wage (Stigler, 1946; Brown, Gilroy, & Kohen, 1982). In addition, the introduction of a binding minimum wage does not affect the level of employment. A profit-maximizing firm will increase their prices in response to the higher labor costs. As a consequence, both the firm's output and its profit decrease (Neumark & Wascher, 2008). Nonetheless, there are some expansions of the standard model, which allow for partial coverage only (e.g. Welch, 1974; Gramlich, 1976) or introduce the case of a heterogeneous worker-force—namely by distinguishing between skilled- and unskilled workers.

However, the result is different if employers have market power and the labor market is characterized by a monopsony. It was Robinson (1933) and Stigler (1946) who first established this idea. A monopsonistic labor market is characterized by only one employer (monopson) whereas there are many possible workers. Therefore, the firm is no longer a price-taker, and thus has market power, at least over the labor market. Such a firm will find a wage w_M optimal, which is smaller than the equilibrium wage w^* in a perfectly competitive labor market. Firms set their wage optimal when their marginal cost of labor equals their marginal revenue product of labor. Similar to the monopoly case, the marginal cost of labor is higher than the labor supply—easier said, the marginal cost curve is steeper than the labor supply curve. Therefore, an introduction of a minimum wage can stimulate employment under certain circumstances, namely when the following equation holds true: $w_M < w_{min} \leq w^*$

This is because marginal costs decrease, even if average costs rise (Robinson, 1933). Nevertheless, a minimum wage that is set too high clearly predicts the same outcome in the monopsonist model as the neoclassical does. Furthermore, Stigler notes that the application of the monopsony model to labor markets is not "relevant" (Stigler, 1946, p.360). One reason is that low-wage industries are competitive (Stigler, 1946). Additionally, a firm's profit stays unchanged in the monopsony model—compared to the standard neoclassical model (Neumark & Wascher, 2008

Bhaskar and To (1999) try to simulate the effects of a minimum wage in a monopsonistic competition model. Contrary to the monopsony model, the situation of monopsonistic competition has a large number of employers (firms), and they can freely enter or exit the market. These employers all compete with each other for workers. Bhaskar and To (1999) use horizontal differentiation to allow workers to have different preferences on non-wage characteristics to then apply the spatial model of Salop (1979), which originally stems from industrial economics, and models the location, the number of firms, and the prices in equilibrium. If labor markets can be described as monopsonistic competitive, a minimum wage leads to a rise in employment in individual firms. However, some firms will exit due to the negative effect on their profits because of the wage-setting externality; thus, no clear effect on aggregate industry employment can be determined in the long-run, as the number of firms that exit stays ambiguous. Bhaskar and To (1999) argue a highly distorted labor market might increase the economy wide employment.

Another well-known theory in labor markets is the so-called efficiency wage theory, first developed by Shapiro and Stiglitz (1984). They argue that it can be optimal for firms to pay a higher wage (efficiency wage) than the competitive market wage to ensure that workers make an effort and are productive. This model is constructed on the basic principal-agent problem, which means that firms cannot control whether workers work efficiently (Shapiro & Stiglitz, 1984). Rebitzer and Taylor (1995) build on that model and showed that, under certain assumptions, an introduction of a minimum wage can increase short-term employment in the context of an efficiency wage model. An increase or an introduction of a minimum wage, which is higher than w^*, makes a job loss harder. Therefore, the productivity of the workers increases, and in the context of an efficiency model, less resources for production oversight are necessary. Consequently, firms can hire additional workers instead of using their resources to monitor their existing employees. In the long-term, they show that employment can increase, fall, or stay unchanged as a consequence of the firm's long-term zero economic profit condition. This is due to the decrease in firms' profits in their theoretical model. In addition, they argue, that due to the envelope theorem, a minimum wage might even be pareto-improving (Rebitzer & Taylor, 1995). In general, firms' profits do not change due to the minimum wage in efficiency wage models (Neumark & Wascher, 2008). However, in models where firms do not maximize their profits, it is even possible to experience an—ceteris paribus—increase in profitability as a consequence of the minimum wage. This can be explained with the cost saving efforts that companies are forced to pursue because of the higher labor costs and the incentive to operate more efficiently; thus, there may be a situation where an enterprise's cost savings exceed its higher labor costs (Neumark & Wascher, 2008).

To sum up the theoretical part of this thesis, the effect of minimum wages highly depends on the underlying market structure and the specific assumptions made. However, this means that there is no consensus about a generic effect of minimum wages among economists, and therefore, this "issue is best approached empirically through the careful study of the specifics of particular minimum wage laws and the operation of particular labor markets" (Rebitzer & Taylor, 1995, p. 254).

4. Empirical findings so far: Literature overview

In this section, a short description about empirical studies of the effects of a minimum wage will be given—with a special focus on, but not limited to, the German minimum wage.

4.1. Minimum Wage studies: International

Surprisingly, not only are the theoretical aspects and the possible impacts of a statutory minimum wage highly ambiguous and not clearly determined, but the empirical research also rarely agrees on a common conclusion. Nonetheless, until the work of Card and Krueger (1994) and the rising New Minimum Wage Research, economists mainly supported the concept of minimum wage causing a disemployment effect. This is especially due to the review of the existing research so far by Brown et al. (1982), where they study the literature concerning a minimum wage in the US. Brown et al. (1982) find disemployment effects, though they emphasized the rather small consequence, mainly for teenagers or the youth. Additionally, they identified an elasticity of teenage employment with respect to the minimum wage of -0.1 to -0.3; thus, it can be concluded that a 10% increase in the minimum wage leads to a reduction in total teenage employment by 1-3% (Brown et al., 1982).

However, since the work of Card and Krueger (1994); Card and Krueger (1995); Card and Krueger (2000), some economists now challenge the traditional neoclassic understanding of minimum wages and labor markets. Card & Krueger, 1994 analyze the effect of the increase of New Jersey's minimum wage in 1992 from $4.25 to $5.05. For that purpose, they survey 410 fast-food restaurants in New Jersey and the neighboring state of Pennsylvania before and after this increase. They were the first to apply the method of a difference-in-difference estimation that uses a regional variation in the affectedness to the study of minimum wage effects (Caliendo et al., 2019). To illustrate, they compare the difference in employment between New Jersey and Pennsylvania before and after the exogeneous rise in New Jerseys binding minimum wage. The result was revolutionary. They not only found no significant disemployment effects for New Jersey's fast-food restaurants relative to their neighboring state, but they also found slightly positive employment effects. As compared to restaurants in Pennsylvania, employment in New Jersey rose by 13% (Card & Krueger, 1994; Card & Krueger, 1995; Schmitt, 2013). Neumark and Wascher (2000) reply to Card and Krueger (1994) evaluation of New Jersey's higher minimum wage by using payroll data. They find significant negative employment effects and conclude by emphasizing the consistence of their results with the general labor market theories that predict a decrease in employment—especially for workers at the end of the wage distribution (Neumark & Wascher, 2000).

In contrast to Card (1992), Card and Krueger (1994), Card and Krueger (1995) and to Neumark and Wascher (2000), Michl (2000) argues that both can be right due to rescheduling. That's because Card and Krueger (1994) define employment as the total number of workers, an increasing value, whereas Neumark and Wascher (2000) analyze payroll data and define employment as the total payroll hours, a decreasing value. According to the rescheduling model of Michl (2000), a decrease in weekly hours is consistent with a small, though not significant, rise in total workers. Summing up, workers are better off after the minimum wage since the increase in wages exceedes the decline in working hours (Michl, 2000). Other recent studies stress the importance of a proper design of the control group, and thus, many analyses lead to different and often contradictorily results due to differences in the applied method. Namely, the disemployment effects might be a consequence of an omitted variable bias, which means that some studies fail to control for effects which influence the underlying dependent variable (Dube, Lester, & Reich, 2010). When controlling for spatial heterogeneity in employment growth, Dube et al. (2010) cannot find any employment effects as a consequence of the minimum wage. Allegretto, Dube, and Reich (2011) support that finding by controlling for long-term growth differences among states and heterogenous economic shades. Their study emphasizes the non-existence of negative employment effects; instead, they explain that earlier studies with negative results use biased and non-robust estimators (Allegretto et al., 2011).

Even though there are numerous studies focusing on the employment effects of minimum wages, there is a lack of research that deals with other possible adjustment channels. Firms' profits are one such channel. Draca et al. (2011) analyze the effect on a firm's profitability after the introduction of a nationwide minimum wage in the United Kingdom (UK) in 1999. To perform these studies, the authors look at two different datasets. On the one hand, they analyze the home care sector, where they expect a rather significant effect. On the other hand, the authors look at accounting data from a subsample of all firms that are registered in the UK. They then compare firms' profit margins—both highly affected as well as non-affected—before and after the introduction of the minimum wage. In the home care sector, firms' profit margins, defined as the ratio of profit to revenue, decreased by 23%. Whereas in the sector wide data, the average profit margin decreased in the range of 7.8% to 10.7%. However, they were not able to find evidence for a higher probability of market exit or a higher productivity due to the minimum wage (Draca et al., 2011).

In addition, study by Harasztosi and Lindner (2019) analyzes the increase in Hungaria's minimum wage in 2001—focusing on several possible adjustment channels such as prices and firms profitabilities. They use a difference-in-difference approach to compare both a firm's behavior towards highly affected establishments as well as the behavior of their less-affected counterparts. In line with several other studies, their analysis could only identify a small negative effect on employment; however, they also saw a large wage increase of approximately 50%[1]. Most interestingly, Harasztosi and

[1] Only workers who did not lose their jobs had on average a wage increase

Lindner (2019) concluded that nearly 80% of employee wage increases is paid by the consumers through higher prices. The remaining 20% pay the firm's owners through lower profits[2] due to higher labor costs. Consequently, the increase in the Hungarian minimum wage has a stronger effect on industries that cannot easily adjust their prices as a response to higher costs. To be more precise, the profit decline of 0.7% in a firm's sales in 2000, in the short-term, is statistically significant at the 1% level. Regardless, the profit decline of 0.7% only relates to firms highly affected by the minimum wage increase. The long-term effect was actually much weaker. Harasztosi and Linder conclude their research by noting that the minimum wage increase in Hungary is paid by consumers, and thus their study mainly excludes the adjustment channel through lower firm profits. By combining their key results, such as no strong disemployment effects, higher prices, and no stark decline in firm's profitability, they raise the question of whether a minimum wage can therefore redistribute income from consumers (who now pay higher prices) to low-wage employees.

Mayneris et al. (2018) studied the large increase to minimum wages in China in 2004—especially with regards to firms' adjustments behavior. For this purpose, Mayneris et al. (2018) use balance sheet data from the National Bureau of Statistics as well as the China Labor Net dataset for information dealing with the level of various minimum wages. Mayneris et al. (2018) then compare the results of both exposed and non-exposed firms before and after the minimum wage reform. A firm is considered exposed if the average wage is below the local minimum wage. Their results are in line with former studies in many regards, but their findings also present key contradictions. At first, they identify a significant wage increase in exposed firms, but there is no effect on employment. These results are in line with several other papers (e.g. Harasztosi & Lindner, 2019, Draca et al., 2011). In contrast to that, Mayneris et al. (2018) do not only identify no change in firms' profits, but they also detect a significant increase in firms' productivity. Unlike Draca et al. (2011), Mayneris et al. (2018) research finds a greater probability for market exit in highly affected firms. Thus, Mayneris et al. (2018) argue that firms adjust for the higher labor costs with higher productivity, therefore, the level of employment and the firm's profitability does not change. This higher productivity is mostly explained by better inventory management and an increasing capital-labor ratio (Mayneris et al., 2018). The results might be driven by the specific characteristics of China, given that it is not a fully developed country and the large improvement in productivity might be especially relevant for similar-developing economies (Mayneris et al., 2018). Consequently, these findings need to be interpreted very carefully, as their argumentation channel will probably not hold for every industrialized country.

of 50%

[2]Here profits are defined as the following accounting number: Earnings before Iterests and Taxes (EBIT)

4.2. Minimum Wage studies: Germany

Bossler and Gerner (2016) were the first to analyze the effect of the German nationwide minimum wage. They apply a Difference-in-Difference approach on the firm level. Namely, they look at highly affected firms (the treatment group) and compare the results with less-affected establishments (the control group). Their paper finds a decrease in employment of 1.9% in affected firms and implies a small negative elasticity with respect to wages.

Garloff (2016) uses regional differences of the effect (the bite) of a minimum wage to analyze employment. In his study, he detects a significant negative effect on marginal employment ("mini jobs"). Nonetheless, Garloff (2016) identifies a significant positive effect on employment for socially insured jobs. Therefore, employment structure changes, which is in line with Vom Berge and Weber (2017), who also find a decrease in the number of mini jobs. To illustrate, between 150,000 and 200,000 mini jobs were lost due to the minimum wage (Schmitz, 2017). Therefore, claim to identify a restructuring process on the labor market from marginal employment to jobs with social insurance. Though, many studies find evidence for a decline of mini jobs or a rise in employment (e.g. Garloff, 2016, Schmitz, 2017, Bruckmeier & Becker, 2018, Vom Berge & Weber, 2017, Holtemöller & Pohle, 2017), not all academics find causal evidence that this change was induced by the minimum wage. Holtemöller and Pohle (2017) do not support—according to the results of their analysis—the argumentation of a minimum wage induced changed in the labor market.

Some analyses find that the German minimum wage led to a decrease in (contractual) working hours and an increase in low-wage workers' hourly wages (Caliendo et al., 2017, Caliendo, Fedorets, & Schröder, 2018, Bonin et al., 2018, Bossler & Gerner, 2016). Nevertheless, Caliendo et al. (2017), Caliendo et al., 2018) could not identify any significant effect on low-wage workers' monthly salaries. Another recent paper uses differences in the regional bite of the minimum wage and then applies a Difference-in-Difference approach. It finds that an increase in the regional bite by 1 percentage point leads to a 0.5% higher growth in hourly wages at the lower end of the wage distribution (Ahlfeldt, Roth, & Seidel, 2018). However, most studies only identify modest employment effects and find nearly no negative effects. Others emphasize firms' strategy to decrease hiring instead of directly cutting jobs in the short-run. Therefore, the studies mostly associate the negative employment with a lower growth in employment (Bossler & Gerner, 2016, Bossler et al., 2018).

Counter intuitively, Bruckmeier and Becker (2018) argue that there is no minimum wage induced change of the probability to find a job for the unemployed. Before the introduction of the minimum wage, many opponents argued that a wage floor would disadvantage the unemployed, as their qualifications do not match the relatively high minimum wage of € 8.50. According to another paper, there might even be a potential increase in the reservation wages of unemployed persons (Fedorets & Filatov, 2018).

Many studies fail to identify significant negative employment effects. However, as firms' labor costs increase, companies will adjust their behavior. A possible adjustment channel is to increase prices; Link (2019) shows that affected firms in Germany increase their prices more frequently compared to their less-affected counterparts. However, this result is not entirely limited to low-wage industries. Interestingly, firm adjustment through higher prices questions the description of the German labor market as a monopsony (Link, 2019). Bossler et al. (2018) use data from the Institute for Employment research (henceforth: IAB) to analyze the effects of the introduced German minimum wage on the firm level to identify certain adjustment channels of German firms. They use data from 2011 to 2016 to look at possible effects on productivity or profitability. In their study, productivity is measured with revenue and the numbers of employees; easier said revenue per worker is looked at. However, Bossler et al. (2018) cannot find a significant difference in productivity between highly affected and less-affected firms. Nevertheless, they show that more exposed firms to the minimum wage have a ca. 2% higher probability to make accounting losses than their non-affected counterparts. Additionally, they identify a significant, though a rather weak, effect of the minimum wage on a firm's profitability due to the higher labor costs. Nonetheless, Bossler et al. (2018) were not able to find clear evidence for differences in firm closures.

5. Data description

In the underlying thesis, two different datasets will be used. The first dataset is the Special Statistical Publication Number 6 (henceforth: SSP) of the German Central Bank (Statistische Sonderveröffentlichung 6, Deutsche Bundesbank). It contains ratios of financial statements of German enterprises. This study is used to derive the profit margins of its reflected sectors at the aggregated level. The profit margin here is defined as the ratio of Pre-tax profit (Earnings before Taxes; EBT) to total revenue. In 2016, the SSP contained data of 116,000 balance sheets. However, the dataset itself does not contain all 116,000 financial reports to avoid an influence on the data due to a sample effect. Therefore, only 83,000 balance sheets are used to analyze firms' financial statements. The data provided by the German Central Bank clearly faces some pitfalls that should be considered—especially when drawing conclusions from the results. First, it contains financial accounting statements of many large corporations, but Small and Medium Enterprises (SME) are underrepresented. For example, firms with an overall revenue higher than € 50 million make 86% of the dataset compared to 64% of the statistical population according to the German business register. This could present a problem, as small and medium sized firms are typically more affected by a nationwide minimum wage compared to large, multinational corporations. Second, no good comparison of West and East Germany[3] is possible due to a lack of specific results for the East, as the dataset inadequate regional industry records to get representative results. Finally, relying on accounting data is always risky, as some results may possibly reflect a change in a company's accounting policy or might be the result of certain tax improving actions. To account for that, pre-tax profits (EBT) will be used in this thesis (Deutsche Bundesbank, 2018).

Nevertheless, the German Central Bank's SSP reveals some benefits as well. Namely, the SSP follows the WZ industry classification (2008) of the Federal Statistics Agency (FSA) (Destatis, 2008). Additionally, it provides relative ratios with a high degree of details regarding sub-sector classifications. The use of ratios instead of absolute values will give more representative results, as ratios are not affected by macroeconomic factors such as inflation. Furthermore, considering only an absolute increase in profits reveals no information concerning the company's profitability. Therefore, the use of a profitability ratio may probably show more realistic results. The second dataset is the Structure of Earnings Survey SES (Verdienststrukturerhebung VSE) of Germany's Federal Statistics Agency from 2014. This statistic contains survey data about individual earnings. It takes place every 4 years, is compulsory, and contains data from 60,000 firms and 1,000,000 employees in 2014. In addition, the SES follows the WZ industry classification of 2008 as well (Destatis, 2019). This thesis uses calculated bites of the German minimum wage in the different industries. These bites were calculated using the Structure of Earnings Survey dataset.

6. Summary statistics

This section gives a short overview over the empirical statistics of the SSP dataset which was introduced in section 5. Figure 1 shows the development of firms' profit margins[4] over four years prior to and two years following the introduction of Germany's minimum wage. The graph illustrates the average profit margins, aggregated on the industry level. By looking at 2015, the main year of interest, a clear decline in profit margins compared to the year 2014 can be seen. This is the strongest decline for the time period of 2010 to 2017. Nevertheless, there has been a decline from 2012 to 2013, where no minimum wage was introduced. Additionally, the level of profitability in 2015 is still at a higher level, approximately 5.0%, than in the years 2010 to 2013. Furthermore, profit margins increase for the post-reform years 2016 and 2017. Figure 2 gives a deeper insight into the differences of exposed and non-exposed industries' profit margins. This graph uses the binary definition of the bite, which means that an industry is considered exposed if its bite exceeds the average share of eligible workers (approximately 10.9%). The

[3] Note that the terms West and East Germany refer to the former national territory of the Federal Republic of Germany (West) and the German Democratic Republic (East) until 1990.

[4] Profit margin as Earnings before Tax to total Revenue ratio (in percentages)

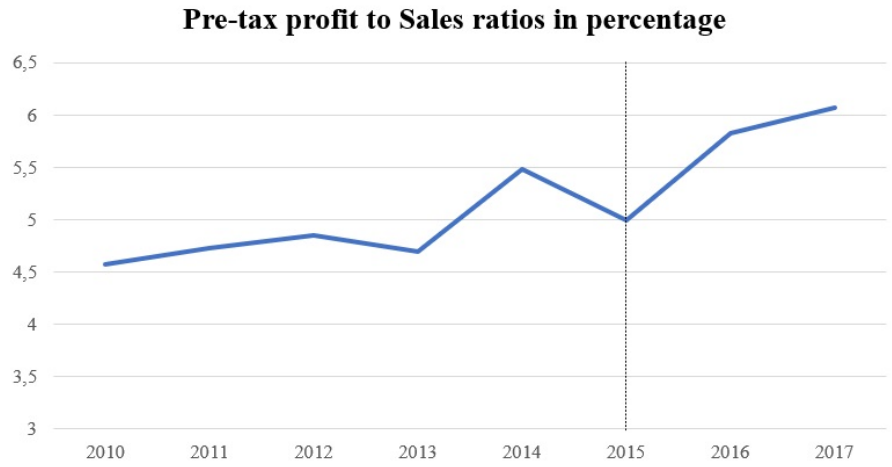

Figure 1: Industry's profit margin development

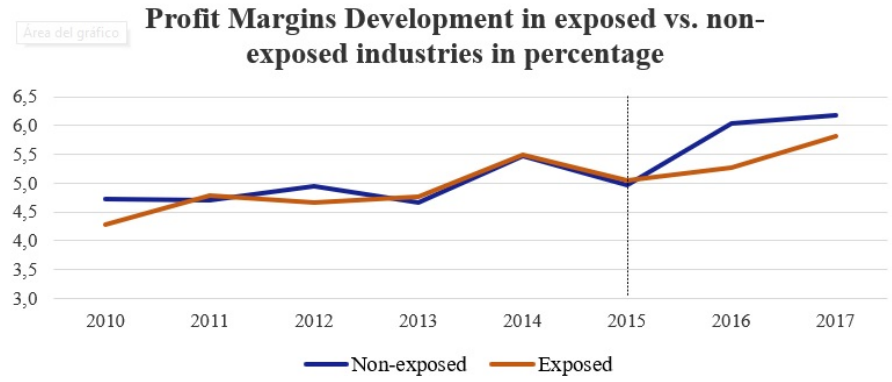

Figure 2: Exposed vs. non exposed industries profit margin development

orange line represents the profit margins of firms in exposed industries, and the blue line provides information regarding the non-exposed industries. Similar to Figure 1, there is a clear decline in profitability for both groups in 2015. However, the expectation that firms in exposed industries face a stronger decline is not met. Indeed, the level of exposed and non-exposed profitability is nearly the same for 2015. Only the further development for the years 2016 and 2017 shows a smaller increase in profitability in exposed firms compared to those which are not affected by the labor market reform of 2015. For the years 2013 and 2014, both groups were on a common trend as their profit margins nearly equal each other, though there are small differences from 2010 to 2012. Furthermore, Figure 2 illustrates that since the minimum wage reform, both groups have developed with a greater dispersion than before.

7. Empirical Strategy

7.1. General Strategy: The Difference-in-Difference approach

Due to the difficulty in exploring the effect on firms' pre-tax profit to revenue margins that can be causally interpreted as a result of the minimum wage, this analysis applies a quasi-experiment approach. The Difference-in-Difference (DiD) approach compares firms profits in highly affected industries with their less-affected counterparts before and after the introduction of the German nationwide minimum wage. Thus, this analysis relies on defining a treatment group, that includes industries which are highly exposed to a minimum wage, and a control group, that includes industries which are not at all or only slightly affected by this specific policy reform (Draca et al., 2011). Following Caliendo et al. (2019), this study relies on the assumption that a higher affectedness to the minimum wage implies a higher effect on the wages and, therefore, the variable of interest in this paper—the profitability.

The SES dataset defines the treatment and control groups, which allows for the calculation of the share of workers who earned less than the introduced wage floor of € 8.50 on an industry level. This share of eligible workers for the minimum wage in a specific industry is used for the "bite measure" and can be seen as the level of affectedness an industry faced.

The analysis uses two different definitions of the bite. The

first definition considers the bite as a continuous variable following recent studies (see e.g. Draca et al., 2011, Harasztosi & Lindner, 2019, Link, 2019, Fedorets & Filatov, 2018). Therefore, the continuous bite measure is very straight forward and only reflected by the share of eligible workers for the minimum wage in industry i. The second definition follows the traditional DiD approach and uses a binary bite measure. To obtain a binary variable of the exposure of an industry, this thesis follows previous studies such as Schmitz (2017) or Caliendo et al. (2017) to calculate the average share of workers eligible for the minimum wage over all industries that are available in the 2014 SES survey. Industries with a treatment intensity that equals or exceeds the average bite are considered as "exposed" to the minimum wage and are part of the treatment group; industries with a bite below the average treatment intensity form the control group and are considered "not exposed". Instead of using regional differences in the bite like Schmitz (2017), this analysis uses industry differences in the treatment intensity as an exogeneous variation. The DiD approach is applied by using specifications of the equation in (1) and (2) which follows the previous studies of Bossler et al. (2018).

$$Y_{it} = \beta_1 \times FA_i + \beta_2 \times Dummy_t^{2015} + \delta(FA_i \times Dummy_t^{2015}) + \theta_i + \gamma_t + \varepsilon_{it} \tag{1}$$

$$Y_{it} = \beta_1 \times Exp_i + \beta_2 \times Dummy_t^{2015} + \delta(Exp_i \times Dummy_t^{2015}) + \theta_i + \gamma_t + \varepsilon_{it} \tag{2}$$

Equation (1) measures the effect on the outcome variable Y_{it} with a continuous bite, the fraction affected variable (FA_i). In equation (1), the calculated share of workers earning less than the minimum wage is used as treatment intensity. Contrarily, the regression in equation (2) is based on the binary definition of the treatment and control group, meaning Exp_i, standing for exposed, is a binary variable that equals 1 if the treatment intensity in industry i exceeds the average treatment intensity and is 0 otherwise. In the analysis of this paper, the outcome variable Y_{it} refers to the EBT to Revenue ratio. However, the interpretations of the coefficients do not change in (1) and (2). $Dummy_t^{2015}$ is a dummy variable which is 1 for every time period after 2015, whereas 2015 is included. The use of FA_i or Exp_i as explanatory variable controls for differences among industries that already existed before the introduction of the nationwide wage floor. Additionally, including the dummy to reflect the fact that if data is pre- or post-reform measures industry-independent time effects. Besides, a significant negative coefficient of the dummy would mean that regardless of the industry, profit margins decreased for years after the policy reform. To estimate the causal effect, the coefficient δ of the interaction term between the treatment intensity and the time dummy is of main interest in the DiD analysis. This coefficient shows how the dependent variable Y_{it}, here the profit margin, developed differently over the time of the underlying panel dataset in highly affected (in terms of the continuous bite definition) or exposed (in terms of the binary bite definition) industries, compared to their less affected or non-exposed counterparts. Thus, this difference is causally interpreted as a response to the introduction of the minimum wage (Bossler et al., 2018, Stock & Watson, 2015).

Unfortunately, due to the aggregation of the data used in this thesis, controlling for individual firm-specific characteristics or other individual effects is hardly possible. To account for this fact, this paper uses the fixed effects model (FE) as a common model in panel data analysis. Furthermore, it uses a random model (RE) as well as a time fixed effects (TFE) model. This is done for two main reasons: first, using a FE and TFE model specification partly accounts for the fact that no other control variables are included. Second, it allows for the identification of differences in the result depending on which model specification is used. Thus, if the results are similar, it is more likely that they do not depend on the specific model used but, instead, are rather robust.

The FE model accounts for a common problem in regression analysis: the omitted variable bias (OVB) problem that is caused when a variable in the error term is correlated with an explanatory variable and explains the dependent variable. To account for this problem, control variables are normally included. The FE model in this underlying panel data regression model, however, allows for correlation between unobserved characteristics about the industries that do not change over time therefore, they are "fixed". To specify, θ_i in the above stated equations measures the industry specific effects which do not vary over time. The TFE model is similar to the FE model, whereas it controls for unobserved heterogeneity that changes over time, but it does not vary across industries. The above stated equations represent a fixed effects model with time fixed effects as well; however, this thesis will present the results for various specifications of these equations, such as only a FE model, a random effects (RE) model that does neither include θ_i nor γ_t, as well as the FE and RE model with time fixed effects (Stock & Watson, 2015).

7.2. Assumptions

As in every economic model, applying the Difference-in-Difference approach underlies some key assumptions. Following Schmitz (2017) and Bossler et al. (2018), there are three main assumptions that must apply to be able to interpret the results as causal effects: Common Trend Assumption, Stable Unit Treatment Value Assumption, and Definition of Treatment and Control Groups.

a) Common Trend Assumption (CTA) The CTA means, that in an absence of a certain policy reform, both groups would have developed similarly. Therefore, if a general nationwide German minimum wage had not been introduced in 2015, the pre-tax profit to revenue ratio would have been on a parallel trend across

highly affected and less-affected industries (Schmitz, 2017). Thus, an identified difference can be causally interpreted as a result of the policy reform—the minimum wage—that was introduced. Due to the fact that the DiD approach is a quasi-experiment, this assumption can unfortunately not be directly tested. As the minimum wage was introduced, it is not possible to determine what would have happened without this specific labor market reform. However, one might look at pre-minimum wage data to determine how profit margins developed in the treatment and the control group (Schmitz, 2017). Additionally, the CTA is often tested by applying placebo regressions. This study follows previous research in the minimum wage field that apply a DiD approach (e.g. Mayneris et al., 2018, Harasztosi & Lindner, 2019, Draca et al., 2011, Garloff, 2016) and conducts placebo regressions in section 9 to reduce the possibility of a violation of the Common Trend Assumption.

b) Stable Unit Treatment Value Assumption (SUTVA) The SUTVA generally means that there are no interdependencies between the treatment and the control group. In other words, the minimum wage only affects the treatment group. Furthermore, the assumption for the use of a continuous bite measure is slightly different as it requires industries with a smaller bite to be proportionally less affected (Schmitz, 2017). This assumption is not as trivial as it seems and can easily be violated in the medium to the long-term, namely through spillover effects that cause interdependencies between the treatment and the control group (Bossler et al., 2018, Bossler & Gerner, 2016). Assuming affected and non-affected industries are not generally related, a policy reform might as well affect the control group. Assuming firms with a very high treatment intensity (bite measure) increase their prices[5] to account for higher labor costs and the end market is competitive, this price increase also affects firms that are part of the control group. Due to the price increase of their competitors, non-affected firms are likely to sell more of their products if consumers are able to substitute the products of an exposed firm with similar goods of a non-exposed firm. Through spillover effects, this specific non-exposed firm now meets a higher demand than in the absence of the minimum wage; thus, there might be a situation where firms in the control group are still affected by the minimum wage. This example might be generally possible, but it is unlikely to happen in the model specification of this paper due to the fact that the analyzed data is highly aggregated and on the industry level. Substituting the same product with that of a firm in another industry is not realistic. Another example for a positive spillover effect that follows Bossler et al. (2018) would be the possibility of an effect on the control group if treated firms react on the minimum wage with a lower output and job cuts.

   Nevertheless, the SUTV assumption is unlikely to be violated in the study of this thesis due to two main reasons. First, these spillover effects need time and do not play a remarkable role in the short-term analysis of this thesis (Schmitz, 2017). Second, previous research about the German minimum wage did not find wage spillovers, which at least excludes the probability of spillovers through wages (Caliendo et al., 2017, Link, 2019).

c) Definition of the treatment and the control group This assumption requires a proper definition of the treatment and the control groups to avoid an estimation bias in the variable of interest. That is specifically relevant as the coefficient of interest in this study—DiD—is the interaction term of the treatment intensity and the time dummy. An incorrect estimation of the treatment intensity would lead to a bias in the coefficient of the interaction term, which is of our main interest in the Difference-in-Difference approach (Bossler et al., 2018).

Such a misleading definition of the two groups can be caused by an anticipating behavior of firms (Bossler et al., 2018). This might be the case if firms increase their wages before the 1 January 2015, as firms know that they have to pay higher wages to their employees who currently earn less than € 8.50. However, this can cause a problem if these firms are treated as control firms only because they are paying wages equivalent or exceeding the introduced wage floor. Treating them as a control group can lead to a wrong definition of the treatment and the control groups as they would not have been part of the control group without their anticipating behavior. This means that firms with the characteristics of low wage firms will be considered as not affected only because they anticipated their high degree of affectedness. To account for that phenomena, Bossler et al. (2018) identify firms with an anticipating behavior and exclude them from their analysis (Bossler et al., 2018). Unfortunately, this is rarely possible in the underlying study. Since data is only available on the industry level and not on the level of individual establishment, this paper does not account for anticipating effects.

Additionally, using a binary bite measure may result in a wrong definition of the control and treatment group. Namely, an exposed industry will include firms that are not affected by the minimum wage as well as some affected firms are part of non-exposed industries and thus are in the control group (Mayneris et al., 2018). To account for that fact, the estimations in this paper present the results for the same regressions as in (1), which only differ in the definition of the bite measure (2).

[5] See for example Harasztosi and Lindner (2019) who find a significant increase in prices for consumers in their analysis of the Hungarian labor market reform. Link (2019) showed that in the German case, more affected firms are more likely to increase their prices. Thus, the above stated assumption is likely to be met.

8. Regression Results and Interpretation

8.1. Results

This section presents the results for the different specifications of equation (1) and (2) of section 7. For both definitions of the treatment intensity, the results of the four different models FE, RE, FE with time fixed effects, and RE with time fixed effects are presented in Tables 1 and 2.

Looking at the results in the continuous model in Table 1, it shows that the bite measure has a negative sign for both RE model specifications. This was expected, as it shows that a higher treatment intensity has a negative effect on the industry's profit margin. However, this negative effect is not statistically significant at any common significance level. Surprisingly, the estimation of the main interest in this study, the DiD coefficient, identifies two interesting facts. On the one hand, this coefficient has a positive sign, which implies that highly affected industries profit margins increased after the minimum wage introduction. This is barely in line with the former study of Bossler et al. (2018), which finds a significant decline in firms' profits due to the German minimum wage. On the other hand, only the FE with TFE specification gives a significant effect of the interaction term's coefficient. Despite this, Table 1 shows the significant level is only at 10%. As the results for the interaction term are either not significant or only at the 10% level, drawing final conclusions from these results might be too shortsighted. Furthermore, all coefficients in the continuous model are of similar size, and thus, the results do not highly depend on the model specification.

In addition to the results of Table 1, looking at Table 2 gives a similar tendency. Similar to the continuous model, the treatment intensity's coefficient goes along with a negative sign. Furthermore, the time dummy for 2015 is for the FE and RE model negative and is in line with the results from the continuous model. Nevertheless, none of the two previously discussed estimates identifies a statistically significant effect on industries profit margins. The DiD coefficient neither reveals a significant decrease of profit margins in any of the four binary model specifications nor is it of a negative sign. Thus, the general results from the binary model are in line with the results in Table 1. However, it is remarkable that every estimation coefficient and standard error in the binary model is smaller than in the continuous model.

To sum up the results of the Continuous and the Binary model, either no strong effect or no effect on firms' profit margins, as a response to the minimum wage, can be identified. This result is robust over all model specification between these two models.

Additionally, the appendix includes further specifications of equations (1) and (2), namely the same analysis is performed for a log level model and a growth rate model. This is done to account for a possible dependence of the final results on the specific model used in the analysis. In line with the results of Tables 1 and 2, the log level model and the growth rate model, fail to identify a significant decrease in firms profit margin as response to the analyzed policy reform.[6]

8.2. Potential threads and limitations

As emphasized in section 8.1, a conclusion claiming that the German minimum wage had no effects on firms generally, and no effect on firms profits specifically, might be highly misleading. At first, the general effect on firms due to the German minimum wage was not analyzed in this study as its focus was on firms' profit margins. Additionally, this paper does only not identify any significant effects due to multiple possibilities such as through the limitation of the data used due to its aggregation and the firms it includes. However, this should not be seen as a synonym for a nonexistence of any effect.

To not identify any significant effect, whether increase or decrease, might be a result of the data used for the analysis. As discussed in section 5, the German Central Bank's SSP dataset is very limited. A main concern is the aggregation of the data, as the SSP data set gives only the results on the industry level; thus, a firm level analysis that takes the industries into account is not possible. Another limitation stems from the firms included in the SSP dataset, which are mostly large companies than Small and Medium Enterprises. However, especially small and medium enterprises are higher affected by the labor market reform in 2015 than large caps. To specify, an analysis dealing with the interaction of firms pricing, profitability, and productivity could reveal more realistic and robust results. Mayneris et al. (2018) previously applied such an analysis to Chinese firms and explained the nonexistence of a significant decrease in profitability with an increase in productivity. Nevertheless, a significant increase in productivity, which can explain the results for the profit margins, is rather unlikely for the German case. Compared to China, the German labor market is fully developed, and additional productivity gains are rather hard to obtain due to the high level of the status quo level. Additionally, former researchers that dealt with the minimum wage reform in the UK (Draca et al., 2011) identified a significant decrease in profitability. Intuitively, the UK's economy seems to be of a higher similarity to the German economy than China's.

Furthermore, the results in 8.1 do not provide information about firms' profits, but it does give information about firms' profit margins defined as the EBT to revenue ratio. Therefore, a decrease in a firm's pre-tax earnings does not necessarily mean a decreasing EBT to revenue ratio. In the German case, Bruttel (2019) found a significant decrease in firm's profits; however, they defined profit as an absolute number of the difference between revenue and the main costs and do not consider profitability. Nevertheless, a decrease in

[6] Note that the same two definitions of the treatment intensity apply to the log level model and the growth level model. Therefore, in total 16 (4 binary log level model, 4 continuous log level model, 4 binary growth level model, 4 continuous growth level model) regressions are performed and presented in the xappendix. The above stated results do not change among different models or different model specifications.

Table 1: Profit Margin – Continuous Model

Standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.010$

	(1) FE	(2) RE	(3) FE with TFE	(4) RE with TFE
Bite	0	-5.745	0	-5.638
	(.)	(5.777)	(.)	(4.317)
Dummy 2015	-0.369	-0.331	0.117	0.220
	(0.278)	(0.288)	(0.434)	(0.499)
DiD	3.025	2.941	3.368*	3.191
	(1.921)	(1.991)	(1.934)	(2.221)
Observations	434	434	434	434

Table 2: Profit Margin – Binary Model

Standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.010$

	(1) FE	(2) RE	(3) FE with TFE	(4) RE with TFE
Bite	0	-0.886	0	-0.847
	(.)	(1.394)	(.)	(1.073)
Dummy 2015	-0.249	-0.204	0.247	0.362
	(0.241)	(0.253)	(0.415)	(0.479)
DiD	0.607	0.567	0.646	0.565
	(0.444)	(0.464)	(0.445)	(0.513)
Observations	434	434	434	434

absolute profits does not necessarily imply a decreasing profitability.

Generally spoken, firms can adjust their higher labor costs which are associated with the minimum wage through many different adjustment channels. Namely, they can reduce the total hours worked to keep their total labor costs on a similar level. Additionally, firms can cut or reduce certain non-wage benefits, or they invest less in the training of their employees because these trainings are associated with additional costs. Furthermore, one of the most common responses might be the increase in prices for their products and services supplied. Therefore, consumers would primarily pay the introduction of a minimum wage (Hirsch et al., 2015).[7] In previously conducted research regarding the German labor market reform, Bruttel (2019) identified significant price increases in highly affected industries. Though, they cannot show a significant change in labor productivity, other studies (e.g. Bossler & Boszeit 2017, Pusch & Rehm, 2017) find an increase in job satisfaction which could be an indicator for the efficiency wage model. As discussed in section 3, a positive effect on firms' profits can exist in the context of the efficiency wage model.

All these other possible adjustment channels, combined with the laid-out drawbacks of the dataset that was used, might be a potential factor for the obtained results in section 8.1 of this thesis.

8.3. Placebo regressions

Since the common trend assumption (CTA) is one of the key assumptions to interpreting results of the Difference-in-Difference analysis as causal, this section presents the results of the performed placebo regressions. As already discussed in section 7, the CTA cannot be directly tested; however, placebo regressions test if prior to the minimum wage introduction, a significant 'placebo' effect of the variable of interest took place. Such a significant placebo effect leads to two conclusions: a parallel trend assumption cannot be verified and is unlikely, and the estimated results for the analyzed policy reform cannot be interpreted as causal effect in response to the policy change (Schmitz, 2017). In this study, placebo regressions for the continuous model and the normal model, both with its four different specifications, are performed. In addition, the appendix includes placebo regressions for the four model specifications of both the log level model as well as the growth rate model. Summing up the overall results, the analyses fail to identify significant placebo effects for all specifications in the log level model, the growth rate model, and the 'normal' continuous model. Contradictorily, the two fixed effects specification in the 'normal' binary model reveal

[7] See Harasztosi and Lindner (2019) who conclude that mainly consumers pay for the minimum wage reform in Hungary, instead of firm owner through lower profits. See section 4 for details.

a placebo effect at the 10% level. These results do not entirely support the applicability of the CTA in this context. Thus, the findings shown in section 8 must be interpreted carefully, as the placebo regressions do not allow to fully rely on the CTA. Nonetheless, the graphs shown in section 6 give a slightly different conclusion. The graphs show that since 2010 profitability in exposed and non-exposed industries has not always been on a common trend; however, this was clearly the case for the two years prior the implementation of the minimum wage. Additionally, the control and the treatment group have developed only slightly different for the years 2010-2012. Thus, it would be interesting to apply an adjusted trend assumption to the standard regressions from equation (1) and (2), as previously done in the context of minimum wage research namely by Bruckmeier and Becker (2018) or Bossler et al. (2018), to evaluate if the results would change since the graphical analysis and the placebo regressions over all models do not provide a clear result.

9. Discussion and conclusion

Nearly four million workers have been eligible for the new German minimum wage of € 8.50 per hour. Due to the high ambiguity of the theoretical effects of minimum wages on economic aspects—such as employment, poverty, welfare, firm profits, or consumer's prices—this study addressed firm's profitabilities on the industry level as one major possible adjustment channel of firms' behavior, which is of high relevance for a better understanding of the German minimum wage.

Surprisingly, this study did not identify a significant decline in firms' profit margins in highly affected industries as a response to the minimum wage. Therefore, the results in this thesis are nearly in line with previous international literature on profits (Harasztosi & Lindner, 2019), but still in contrast to Bruttel (2019) review of the effects of the German minimum wage, as he finds a clear decrease in firms' profits. A missing effect in firms' profits would be in line with the theoretical monopsony model from section 3; however, the price increases in Germany (Link, 2019) contradict the applicability of the monopsony model in the context of the German minimum wage. This shows the difficulty in applying a suitable theoretical model and emphasizes the importance of empirical research in the field of minimum wage reform. The results in this thesis are robust over a variation of different model definitions and model specifications. The performed robustness checks reveal two specifications for a significant placebo effect at the 10% level. Combining these results and the graphs shown in section 6, neither a clear verification of the CTA can be made, nor an obvious violation can be detected.

Unfortunately, this thesis faced some limitations according the availability of the data used to clearly apply a Difference-in-Difference approach for the German minimum wage. Therefore, further research can give more enhanced results in the following way: first, new data points such as for the years after 2017 may allow for a more robust and reliable analysis, as currently only the 2 years following the introduction of the minimum wage (2016 and 2017) are included, whereas 5 years of pre-reform data is available. Second, a better understanding of a German firm's response regarding to their profitability can be provided by a less aggregated data set that includes data on the individual firm level, and additionally provides information for results for each region and industry. Furthermore, a smaller degree of aggregation makes it easier to include suitable control variables into the regression, which may change the results. Many previous papers focus on specific adjustment channels, such as prices, employment, or profits; however, due to the high diversity in the results of these papers, a study such as Mayneris et al. (2018) that focuses on the interdependencies of firms' different opportunities to adjust their behavior, such as through prices, profits, and the productivity could give a deeper understanding of how all the different factors are influenced by the German minimum wage. Thus, such a study can also function as a reliable source for policy makers. Additionally, in the near future, an evaluation of whether increases to the German minimum wage (e.g. in 2020 to € 9.34) led to a significant change in firms' profit margins can increase the understanding of firms' adjustments. One reason might be, that the first introduction of an hourly wage floor of € 8.50 in 2015 could be primarily passed through consumers, but at a given—yet unspecified—point, firms and shareholders are paying for further minimum wage increases with lower profits, as no more price increases are tolerated by consumers.

Thus, further research will allow for an interpretation of the missing effects on firms' profit margins in this thesis as it could answer whether there was no effect because the hourly wage floor was not high enough or whether insufficient data led to the underlying results. Indeed, only a joint analysis can reveal the whole story, which means that a conclusion stating the implementation of a minimum wage has no effect on firms' profitabilities, based on these analyses, could be too short-sighted.

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