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The Effect Of The German Minimum Wage on Immigrants

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Abstract

This paper investigates the effect of the German minimum wage on immigrants. The effect of the minimum wage on employment has been discussed in papers (articles by Caliendo et al. (2018) & Bruttel, Baumann, and Dütsch (2018)), however, the focus was on workers in Germany in general. The aim of this paper is discuss the effect of the minimum wage on employment and working choice of immigrant workers. Thus, the research question is *How did the introduction of the minimum wage in Germany affect immigrant workers in the short run?* Data from the German Socio-Economic Panel is analysed using a Difference-in-Difference framework, relying on the variation between states in how strongly the minimum wage affected the workers (measured by the proportion of workers earning lower than the minimum wage in the year before its introduction). Based on that, the conclusion is that the minimum wage did not reduce immigrant employment but increased unemployment, and it lead them to reduce their working hours. Immigrants were also found to not migrate from states where the minimum wage impacted the most to the states where it impacted the most.

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Introduction

There has been a long debate about the effect of introducing a minimum wage on employment in a country or region. One of the more recent examples of such a debate took place in Germany about five years ago, when the Social Democratic Party was able to push through its agenda by introducing a minimum wage (Wagstyl 2014). The minimum wage was supported by the argument of improving social justice and the well-being of low-wage workers - particularly in the lagging East Germany- while opponents emphasised the risks regarding job losses that can be generated from higher labour costs. Naturally, as soon as the minimum wage was in effect, research was done on the possible effects on employment, specifically by Caliendo et al. (2018) and Bruttel, Baumann, and Dütsch (2018).

A subsample that was not an area of focus in previous research were immigrant workers. Immigrant workers generally have different characteristics compared to the average workers. Specifically in Germany (Geis, Uebelmesser, and Werding 2011), immigrants tend to do worse than native workers, especially if they are not high-skilled migrants. Moreover, immigrants tend to have different responses to the welfare systems, as when Borjas (1999) finds that immigrants tend to cluster in locations that provide more welfare benefits. This motivates looking into whether there was indeed a differing effect of the minimum wage on immigrants in Germany or not, especially with the presence of a large influx of immigrants in the past few years. Hence, the research question is:

How did the introduction of the minimum wage in Germany affect immigrant workers in the short run?

The research question will be addressed by looking at two aspects that the minimum wage may have impacted, namely Employment and Working Choice. The minimum wage can reduce or increase employment, depending on the competitiveness of the market. Moreover, the minimum wage is an exogenous increase in wage from the perspective of the immigrant worker, thus it can be used to investigate how immigrants react to positive wage shocks in terms of labour supply, income effects and substitution effects. Before the above-mentioned two aspects are analysed, migration flow within Germany of immigrants will be investigated to ensure the robustness of the method being used

and the actual effect that is being captured by the methodology applied in this paper. Currently, this has not been investigated yet, with the main literature focusing on the effects of the minimum wage on workers in Germany in general. Hence, this paper would add to the work of Caliendo et al. (2018) and Bruttel, Baumann, and Dütsch (2018) by focusing on immigrants specifically, who as mentioned above tend to be different from the native worker. Additionally, both papers had differing findings, with Caliendo et al. (2018) finding that the minimum wage reduced employment, and Bruttel, Baumann, and Dütsch (2018) finding that it does not affect it. Furthermore, it would be helpful for policymakers to be aware if the minimum wage causes additional issues for immigrants finding jobs, to adjust the integration policies accordingly. Specifically, if the minimum wage creates more unemployment for immigrants, it might be in the interest of the German authorities to intensify the integration and assimilation programmes with the large inflow of immigrants into the country.

In the paper, I use individual-level data from the German Socio-Economic Panel (SOEP) to run a difference-in-difference analysis, relying on the cross-state variation in the intensity of the effect of the minimum wage (Card 1992 and Stewart 2002). I find that the minimum wage did not reduce employment for immigrants but increased their unemployment rate. Additionally, the minimum wage reduced the immigrant's supply of working hours, showing that the income effect is stronger than the substitution effect. The paper is structured as follows, the next section provides a theoretical foundation for the analysis conducted in the paper. It is followed by a discussion of the data and methodology implemented in the paper. The Migration Flow of immigrants is then analysed in the following section. Afterwards, there will be two sections each discussing part of the analysis: Employment Analysis and Working Choice Analysis. Within each section, the results are presented and then interpreted in terms of the theory presented in the Theoretical Framework section. Finally, a conclusion is presented based on the findings presented in each analysis section.

Theoretical Framework

Employment

The minimum wage effect on employment depends on the competitive structure of the labour market. Boeri and Van Ours (2013) discuss two theoretical models, which represent the two extreme situations in terms of competitiveness: the (perfectly) competitive model and the monopsonistic model. Under the competitive model, the firms (labour demand) and workers (labour supply) cannot influence the wage, meaning that they are wage takers. This means that the market outcome is at the equilibrium wage, where labour demand equates labour supply as illustrated by point A in Figure 1. At this level, there is no unemployment, workers with reservation wages (i.e. the lowest wage for a worker to decide to work and participate in the labour market) below or equal to the equilibrium wage are employed, and those with reservation wages above the equilibrium wage choose not to participate in the labour market. The introduction of a minimum wage in this scenario causes a decrease in the no. of workers demanded (now at point B) and an increase in the workers' participation in the labour market (now at point C). The equilibrium is not an efficient outcome as it involves a rise in unemployment (U), decrease in employment (from A to B) and a welfare loss. Hence, the more competitive labour markets are, the less desirable minimum wages are from the perspective of economic efficiency.

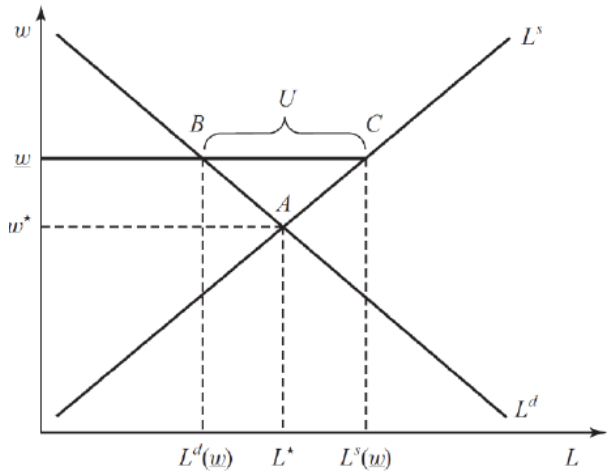

Figure 1: Perfectly-Competitive Market with and without Minimum Wage.
Adapted from: Boeri and Van Ours 2013.

A different scenario is present when firms have market power over workers. In

the presence of one firm in the labour market (i.e. a monopsony, one consumer in the market), the firm hires workers below the competitive level, as shown by point C in Figure 2. With the introduction of the minimum wage, the firm has to increase wages for all workers, since all workers in the market are employed at the firm. To do so and not suffer losses, the firm increases employment to match the marginal costs with the marginal value of workers, leading to an improvement in market efficiency. This takes place until the competitive level of employment (point A), at which the minimum wage has improved market efficiency to the highest possible level. Beyond the competitive wage, a minimum wage will increase unemployment in a similar fashion to the competitive market described above. Based on that, it might desirable from the perspective of efficiency to set a minimum wage, if firms have monopsony power over the workers they employ.

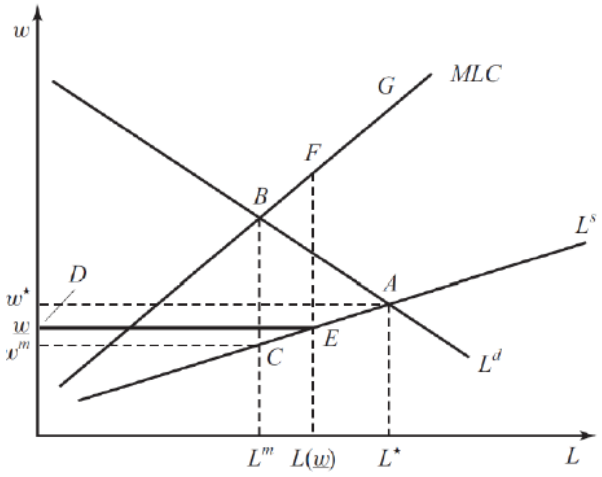

Figure 2: Monosponistic Market with and without Minimum Wage
Adapted from: Boeri and Van Ours 2013.

There is a plethora of articles discussing the effect of a minimum wage in various settings. Giuliano (2013) found that a teenage minimum wage in the US had positive effects in markets where the wage floor was "moderately binding". Her findings were in line with the monopsonistic market model shown in Figure 2, where firms in that case increased employment from point C to at most point A. While the average effect on employment was insignificant, the effect was significant and on average positive for teenagers and negative for adults. This provides further motivation that the effect on the average worker may be different when looking at different groups- in this case immigrant workers. Furthermore, Machin, Manning, and Rahman (2003) found that in sectors in the

UK where the minimum wage affected the most workers, there was a reduction in working hours. This is in line with the competitive model, which predicts that the introduction of a minimum wage will lead to a reduction in employment. However, it is worth noting that an investigation into the UK national minimum wage by Stewart (2002) across the entire country found no significant differences in employment growth between areas with a high proportion of low-wage workers (and hence strongly affected by the minimum wage) and areas with a low proportion of low-wage workers. The implication of the method applied is that areas with a low amount of low-earners were used as an approximation for a control group for the minimum wage analysis, which is the method applied in this paper and discussed in the Methodology section. To sum up, These findings all show that there is no generalised effect of the minimum wage on employment, and that each case needs to be analysed separately.

The German minimum wage was also investigated. Caliendo et al. (2018) and Bruttel, Baumann, and Dütsch (2018) found conflicting results with the former finding negative employment effects and the latter finding no significant negative employment effects. Hence, both findings could not resolve the question of what is the average level of competitiveness in the German labour market. As the SOEP sample used for the analysis in this paper does not include data on Full-Time Equivalent or any other employment measure, the data on working hours is used. Since, full-time workers generally have limited control over their working hours compared to their employers, the working hours for full-time employees are used as a proxy for employment, along with investigating the effect on foreigner unemployment rates. Part-time workers on the other hand, could choose to work less or more depending on their incentives (see following subsection), thus they would give an inaccurate representation of the effect on employment. Based on that the following hypotheses are formed:

Hypothesis 1a: The minimum wage reduced the working hours of full-time immigrant workers.

Hypothesis 1b: The minimum wage increased the state unemployment rates of foreigners.

If firms do not have market power over immigrant workers, one would expect that the hypotheses will not be rejected and there would be a significant decrease in working hours and a significant increase in unemployment rates. Nevertheless, if firms have monopson-

istic power over immigrants, the effect of the minimum wage would either be insignificant or negative on unemployment rates and positive on working hours for full-time employees. This would lead to a rejection of both hypotheses and an indication that the immigrant labour market is more in line with the monopsonistic model with a significant degree of firm market power.

Working Choice

It is also interesting to investigate the effect of the minimum wage on immigrants, as it is an exogenous wage increase that allows for investigating the other side of the market, namely the wage elasticity of labour supply. When faced with an increased wage, workers face two conflicting incentives regarding their supply of labour. The substitution effect pushes the workers to increase their labour supply, as the opportunity cost of not working (spending leisure time) is higher due to the wage being higher. On the other hand, the income effect pushes the workers to decrease their labour supply, as they can afford to spend more time on leisure activities. The income effect relies greatly on leisure being a normal good, meaning that its consumption increases with an increase in income. If a wage rise increases (decreases) working hours, then it is indicative of a stronger substitution (income) effect.

Camerer et al. (1997) and Farber (2005) investigated the elasticity of New York city cab drivers. Camerer et al. found that cab drivers have negative wage elasticities of supply (i.e. working hours declined with wages) and stop working as soon as they reach an income target. This is line with a stronger income effect (relative to the substitution effect), as working hours were reduced, if they attained more hourly income, thereby reaching their income target quicker. On the other hand, Farber found that there are no negative elasticities and attributes the behaviour described by Camerer et al. to the cumulative hours worked rather than the income accumulated. This means that workers focus more on how many hours they spent rather than the income level.

In the case of German immigrants it is very possible that there are different incentives that drive income and substitution effects. Borjas and Hilton (1996) found that immigrants in the US tended to rely more on welfare compared to native households, and they also tended to remain more on it on average. Therefore, the substitution effect might be weaker for immigrants in Germany, as the opportunity cost of working is reduced by

the presence of welfare programmes that provide a safety net in terms of disposable income. On the other hand, if these programmes are not present and immigrants are poor, the substitution effect might be stronger, as immigrants would want to capitalise on the gain in income they get from the minimum wage. For this part of the analysis, the focus is on part-time workers, as they can choose to increase or decrease their working hours more flexibly compared to full-time workers. Based on that the following hypothesis is formulated:

Hypothesis 2: The minimum wage led to an increase in the working hours of part-time immigrant employees

An increase in the working hours would imply a stronger substitution effect for immigrant workers, and the hypothesis would not be rejected. However, a decrease in the working hours would show a stronger income effect for immigrant workers, and the hypothesis would be rejected in that case.

Data

The data sample offered by SOEP contains information on demographic characteristics, immigrant background, employment and wage. The sample is cut to include individuals that have complete data. The minimum wage applies to the vast majority of workers in Germany, however, the exceptions (mainly self-employed workers in the sample) were omitted from the analysis as well (Komission 2016). Moreover, some individuals reported hourly wages that were below the minimum wage after its introduction. As this might be either misreported information or those workers are employed in the informal market, those individuals are removed from the sample both before and after the minimum wage was introduced. After these changes, the sample contains 23,308 observations spanning over the time-period 2010-2016, and it is comprised of 7,163 observations for Native Germans, 3,936 observations for Second Generation Immigrants and 12,209 observations for First Generation Immigrants (both naturalised Germans and foreigners). The individuals do not necessarily have data for each year in the time-period, but this is not an issue as the analysis is a difference-in-difference at the state level. The sample includes the monthly wage data for each observation as well as the agreed upon and actual weekly working hours per week. The hourly wage is calculated by dividing the

monthly wage by four and then by the agreed upon (contractual) working hours, while the actual weekly working hours are used as the dependent variable in the analysis (see Methodology section).

Table 1 shows the average wage and working by subsample. Firstly, it appears that on average Natives tend to earn the most and work the longest, followed by First Generation Immigrants and then Second Generation Immigrants. For all these groups the hourly wage rose after the introduction of the minimum wage, with the highest effect being on the immigrants compared to the natives. Furthermore, the working hours declined only for the First Generation Immigrants unlike both the Natives and Second Generation Immigrants. Secondly, the Full-time workers seem to have a small decline in their average working hours, while they face a rise in their wages after the minimum wage. This hints towards a possible small negative employment effect. On the other hand, the Part-time workers had a rise in their working hours and wages, hinting towards the substitution effect being stronger than the income effect as discussed earlier. Lastly, while there seem to be differences between workers residing in West Germany compared to those in East Germany (namely higher wages and lower working hours), the effect of the minimum wage seems to be (strong) only on the average wage. These changes illustrate that there could be differing results and effects for various subgroups, which is a motivation for running the analysis for several subsamples as discussed in the next section.

Table 1: Descriptive Statistics showing the mean wage and mean working hours.

	Pre-Minimum Wage		Post-Minimum Wage	
Subsample	**Wage**	**Working Hours**	**Wage**	**Working Hours**
Natives	21.89	38.9	22.72	39.1
1st Generation	18.89	38.3	20.47	38.1
2nd Generation	16.84	37.8	18.49	38.5
Full-Time	19.79	43.0	20.85	42.8
Part-Time	15.78	24.61	17.84	25.46
West Germany	18.89	38.0	20.31	38.4
East Germany	17.29	40.2	18.40	40.2

Wage is measured in euros, and Working Hours is measured in hours. All subsamples are comprised of immigrants except for the Natives subsample. Monthly wage is self-reported by the SOEP interview respondent, divided by 4 to
get the weekly wage, and then divided by the contractual working hours to get the hourly wage in euros.

The data on foreigner unemployment rates is collected from the Bureau of Labour Statistics in Germany (*Bundesagentur für Arbeit*). The unemployment rates are measured for those who do not hold the German nationality, which means that it does not capture second generation immigrants nor naturalised first generation immigrants. However, it does give an indication about the employment outcomes for immigrants overall. Moreover, data on the size of the labour force is collected. The no. of employed workers is measured based on the no. of workers paying social insurance, which is a requirement for those employed in the German labour market. Moreover, the no. of unemployed individuals is added to that to calculate the total no. of workers per state for each year. The data is classified by whether workers hold a German nationality or a Foreign one. Based on these values, the proportion of immigrants in the no. of employed workers, unemployed workers, and total labour force is calculated by dividing the no. of immigrants with the total amount of (employed and unemployed separately or both) workers. This will be used later to assess the movement across states due to the introduction of the minimum wage (see Methodology Section).

Methodology

The implementation of the minimum wage on the federal level in Germany with very few exceptions presents a difficulty in terms of the identification strategy of this research. Card (1992) suggested using regional variation in how the minimum wage affects employment to estimate the effect. Moreover, this methodology was also implemented by Caliendo et al. (2018), where the *Fraction* (the proportion of workers earning below the minimum wage before its introduction) is used as an instrument to estimate the effect of the change in wage on the change in employment. In the sample used in this paper, the Fraction does not have a strong first effect on wage, which makes it a poor instrument. Alternatively, a difference-in-difference framework is used (Stewart 2002), where the states with a high Fraction are placed in the *high impact* (Treatment) group, while those with a low Fraction are placed in the *low impact* group and are used as an approximation for a control group. The states are split up according to the median of Fraction on the individual level, with Hessen having a Fraction equal to the median. With the elimination of the observations from Hessen, this allows for a treatment and control group of comparable sizes. The split of the states between both groups is shown in Table 2.

Table 2: Split of states into High Impact (Treatment) group and Low Impact (Control) group based on Fraction.

Treatment Group	**Control Group**
Nordrhein Westfahen (0.082)	Schleswig-Holstein (0.036)
Niedersachsen (0.092)	Bremen (0.040)
Berlin (0.095)	Hamburg (0.044)
Rheinland-Pfalz (0.101)	Baden-Württemberg (0.059)
Saarland (0.103)	Bayern (0.067)
Mecklenburg-Vorpommern (0.167)	
Thüringen (0.174)	
Sachsen (0.185)	
Brandenburg (0.189)	
Sachsen-Anhalt (0.333)	

Fraction is the no. of workers earning below the minimum wage one year before it was introduced (2014) divided by the total no. of workers in this state in the sample. The median of Fraction is approximately 0.068 and corresponds to the Fraction value of Hessen, thus Hessen is not included in either of the groups. Each state's Fraction value is included between parentheses.

With the control and treatment group defined a difference-in-difference specification can be defined. The specification will include individual fixed effects (α_i), state fixed effects, year fixed effects, along with the proportion of immigrants in the labour force as a control. The specification is as following:

$$Hours_{ijt} = \alpha_i + \rho State_j + \gamma Year_t + \beta MinimumWage_{jt} + \delta Proportion_{jt} + \varepsilon \qquad (1)$$

Where Hours is the working hours of individual i in state j in year t (2010 - 2016). Thus, β is the parameter of interest, as it is the coefficient of Minimum Wage, the treatment indicator (which is equal to 1 for the high-fraction group and the year 2015 or 2016). This will also be used to investigate the effect on annual unemployment rates of immigrants at the state level, which is imported from the German Bureau of Labour Statistics' database. That means that instead of Hours, the dependent variable will be Unemployment Rate for state j in year t.

Any Difference-in-Difference framework relies on the parallel trends assumption. The assumption implies that without the treatment, both the treatment and control

groups would evolve in the same way. In context of this research, the working hours (unemployment rates) would change in the same way for individuals (states) in both groups. The parallel trends assumption will be tested using the lead of the treatment variable, which is made feasible by the use of more than two years in the sample. The specification is as following:

$$Hours_{ijt} = \alpha_i + \rho State_j + \gamma Year_t + \beta MinimumWage_{jt} + \lambda MinimumWage_{j(t+1)} + \varepsilon \quad (2)$$

The coefficient of the lead of the Minimum Wage (i.e. λ in 2) has to be insignificant to prove that there are indeed parallel trends.

Another assumption that the Difference-in-Difference framework relies on is that individuals cannot switch between treatment and control groups. To check that, the following specification is constructed:

$$Proportion_{jt} = \alpha_j + \rho State_j + \gamma Year_t + \beta MinimumWage_{jt} + \varepsilon \quad (3)$$

This model is applied to three different specifications, where Proportion is the proportion of immigrants in the labour force, population of employed workers and population of unemployed workers in state j and year t. β is again the parameter of interest. If it is significant, then it will indicate that states in the treatment group had a significant change in the proportion of immigrants compared to those in the control group. Assuming that those immigrants would migrate to other German states, this means that a large portion immigrants did move between both groups, leading to a bias in the estimated effect in model 1. However, individuals did not move states in the SOEP sample, as SOEP collects data by sending surveys to certain households. Nevertheless, if immigrants migrated in large numbers to certain states, the effect of the minimum wage could be due to a labour supply shock that is not caused by workers deciding to participate in the labour market (as seen in the Theoretical Framework section). Hence, while the bias is not in terms of the coefficient being inaccurate (i.e. internal validity), it is in terms of the actual mechanism taking place (i.e. external validity).

The methodology in models 1 and 2 will be used to test both hypotheses. The only difference is the sample chosen (full time workers for hypothesis 1a and part time for hypothesis 2). Moreover, for each hypothesis the effects will be investigated first for the general sample of immigrants, and then for subsamples to compare Natives with Immigrants, Immigrants born in Germany with those born outside, Men and Women,

and those with different education levels. As the sample is not large, some subsamples (namely in the country of birth comparison) are not analysed, but they are included in the appendices. Before that, the migration flows of immigrants are investigated to make sure that the captured effects in these models is not due to migration, but rather due to the actual effect of the minimum wage described in the Theoretical Framework section.

Migration Flow Analysis

Results

The Difference-in-Difference specification in model 3 is run for the proportion of immigrants in the labour force, and the results are presented in Table 3. The minimum wage seems to have reduced the proportion of immigrants by approximately by 0.22%-points in the labour force, 0.12%-points for employed workers, and 0.89% for unemployed individuals. The effects for the labour force and employed workers are insignificant, while the effect for unemployed individuals is significant at the 10% level. However, the coefficient of the lead for the unemployed individuals analysis is significant, implying that the parallel trends assumption is violated. The parallel trends assumption holds for the analyses of the Labour Force and Employed Workers.

Table 3: Difference-in-Difference Analysis with the proportion of immigrants in three different populations as the outcome variable

	Labour Force		**Employed Workers**		**Unemployed Individuals**	
	(1)	(2)	(1)	(2)	(1)	(2)
Minimum Wage	-0.0022	-0.0016	-0.0012	-0.0014	-0.0089*	-0.0054
	(0.00171)	(0.00277)	(0.00209)	(0.00316)	(0.00482)	(0.00569)
Lead		-0.0011		0.0004		-0.0056**
		(0.00156)		(0.00204)		(0.00233)
Constant	0.0404***	0.0410***	0.0315***	0.0324***	0.0980***	0.0986***
	(0.00161)	(0.00150)	(0.00223)	(0.00205)	(0.00306)	(0.00273)
Observations	105	90	105	90	105	90

The outcome variable *Proportion* is the no. of immigrants in a population divided by the total no. of workers in that population. The three different populations used are the total labour force, employed workers and unemployed individuals. The data is collected from the German Bureau of Labour Statistics. Robust standard errors in parentheses.*** p<0.01, ** p<0.05,* p<0.1.

Discussion

The results in the previous subsection show that there were no strong migration flows until 2016. It seems that the proportion of immigrants in the states in the treatment group decreased but not significantly for the total labour force and population of employed workers, which means that individuals did not switch treatment and control group, assuming they would migrate within Germany only. This implies that the captured effect in the next sections is mainly due to the minimum wage (as described in the Theoretical Framework) rather than a labour supply shock due to immigrants' migration flow.

The results for the unemployed individual analysis imply different results. The decrease in the proportion of immigrants shows migration to the states in the control group, which tend to be richer on average. However, due to the parallel trends assumption not holding and the effect being only significant at the 10% level, the effect does not qualify for interpreting a massive migration flow of unemployed immigrants to richer states. Nevertheless, with the presence of a possible flow, it is safer to include the

proportion of immigrants in the labour force as a control in the Difference-in-Difference analyses for Employment and Working Choice.

Employment Analysis

Results

The Difference-in-Difference specification in models one and two is run for full-time employees and the results are presented in Table 4. The minimum wage effect on working hours is insignificant and is approximately equal to zero. The constant shows the average working hours before the treatment for workers in Schleswig-Holstein in 2010, and as it is irrelevant it will not be interpreted. Likewise, Proportion is a control variable and thus is not interpreted. Additionally, the lead coefficient of the minimum wage is insignificant, meaning that the parallel trends hold and the coefficient is not capturing any variation that is not due to the minimum wage introduction itself. This is further supplemented by Figure A in Appendix A.

Table 4: Difference-in-Difference Results for the Effect on Working Hours of Full-Time Workers

	Diff-in-Diff	**Parallel Trends**
Variables	(1)	(2)
Minimum Wage	0.0067	-0.3000
	(0.237)	(0.333)
Proportion	-11.52	-19.44
	(21.82)	(27.58)
Lead		0.0296
		(0.283)
Constant	42.90***	43.70***
	(0.987)	(1.188)
Observations	11,051	

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

To supplement the results for the full-time employed sample, the same framework is applied to the state unemployment rates instead of working hours. The results are in Table 5. When using Labour Force Proportion, the minimum wage increased unemployment of foreigners by 1.24%-points, but the effect is insignificant. Moreover, the lead coefficient is significant at the 10% level, indicating that the estimated effect might be biased and could have captured variation in unemployment rates that is not due to the minimum wage. Based on that, the proportion of foreigners in unemployed individuals population is used instead of the proportion in the labour force. The coefficient is now significant, showing that the minimum wage increased unemployment of foreigners by 1.70%-points. The lead coefficient in this case is insignificant, showing that parallel trends assumption holds.

Table 5: Difference-in-Difference Results for the Effect on State Unemployment Rates

	Labour Force Proportion		**Unemployed Proportion**	
Variables	(1)	(2)	(1)	(2)
Minimum Wage	0.0124	0.0061	0.0170**	0.0084
	(0.00759)	(0.00651)	(0.00742)	(0.00657)
LF Proportion	-1.447*	-0.247		
	(0.753)	(0.467)		
U Proportion			0.161	0.358
			(0.255)	(0.247)
Lead		-0.00715*		-0.00487
		(0.00398)		(0.00402)
Constant	0.252***	0.202***	0.178***	0.156***
	(0.0307)	(0.0192)	(0.0254)	(0.0246)
Observations	105		105	

The outcome variable is the state unemployment rate of foreigners, which is used as a proxy for Employment. LF Proportion is the proportion of foreigners in the labour force, while U Proportion is the proportion of foreigners in all unemployed individuals. Robust standard errors in parentheses. ***p <0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minmium wage on unemployment rates. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. State and Year Fixed effects are used.

The results described above apply to the general sample of immigrants, however, it is also interesting to compare those results between different subsamples. Table 6 shows the differences in the minimum wage effect on employment for the different genders. For men, the minimum wage increased working hours by approximately nine minutes, but the effect is insignificant. On the other hand, the minimum wage reduced the working hours for women by approximately 27 minutes, but the effect is also insignificant. The Lead coefficient for men is insignificant, while for women it is significant. This indicates that the parallel trends assumption holds for the sample of male immigrants but not for women.

Table 6: Difference-in-Difference Results for the Effect on Working Hours of Full-Time Workers by Gender

	Men		Women	
Variables	(1)	(2)	(1)	(2)
Minimum Wage	0.156	-0.269	-0.451	-0.420
	(0.293)	(0.402)	(0.378)	(0.591)
Proportion	-3.476	-10.86	-51.39	-68.70
	(27.27)	(33.86)	(31.96)	(42.11)
Lead		0.349		-1.054**
		(0.340)		(0.492)
Constant	44.20***	44.54***	40.87***	42.40***
	(1.188)	(1.454)	(1.617)	(1.893)
Observations	7,723		3,328	

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

It is also interesting to compare the effects of the minimum wage on Natives with the effects on First Generation Immigrants and Second Generation Immigrants. In a similar fashion to the Gender comparison, the results are presented in Table 7. The Natives and First Generation immigrants had a reduction in their working hours of approximately 26 minutes and 41 minutes respectively due to the minimum wage. On the other hand, the minimum wage increased the working hours of Second Generation immigrants by approximately seven minutes. The lead coefficient for all subsamples is insignificant, showing that the parallel trends assumption holds.

Table 7: Difference-in-Difference Results for the Effect on Working Hours of Full-Time Workers by Immigrant Type

	Natives		**1st Generation**		**2nd Generation**	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Minimum Wage	-0.433	-0.683	-0.244	-0.448	0.696	0.116
	(0.327)	(0.419)	(0.281)	(0.406)	(0.437)	(0.564)
Proportion	-22.46	-4.672	-23.37	-22.79	12.94	2.580
	(26.56)	(34.19)	(23.84)	(29.56)	(47.61)	(61.71)
Lead		0.466		-0.0689		0.328
		(0.431)		(0.325)		(0.574)
Constant	45.79***	45.08***	42.44***	42.76***	44.63***	46.16***
	(1.372)	(1.757)	(1.123)	(1.313)	(1.944)	(2.485)
Observations	4,830		8,364		2,687	

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The 1st generation and 2nd generation subsample describe the effects for immigrants, while the Natives one pertains to Native Germans. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

This comparison can also be extended by comparing the minimum wage effect on state unemployment rates for Germans with the effect on Foreigners. As in Table 5 using labour force proportion did not lead to parallel trends, hence, unemployment proportion was used. However, the German unemployment rates had a significant lead coefficient in Table C in Appendix C, thus the difference between Foreign and German state unemployment rates is analysed. On average before the minimum wage was introduced the Foreigners had a higher unemployment rate by approximately 9.79%-points compared to German nationals. Table 8 shows the effect of the minimum wage on that disparity. The minimum wage increased the gap by approximately 2.27%-points, which is a significant effect at the 1% level. Moreover, the parallel trends assumption holds as Lead coefficient was insignificant.

Table 8: Difference-in-Difference Results for the Minimum Wage Effect on the Difference in State Unemployment Rate between Foreigners and Germans

	Diff-in-Diff	**Parallel Trends**
Variables	(1)	(2)
Minimum Wage	0.0227***	0.00978
	(0.00799)	(0.00606)
Proportion	-0.0671	0.127
	(0.267)	(0.222)
Lead		-0.00116
		(0.00276)
Constant	0.127***	0.106***
	(0.0268)	(0.0224)
Observations	105	

The outcome variable is the difference in state unemployment rates between the state unemployment rate of Foreigners and the state unemployment rate of Germans, where the state unemployment rate is used as a proxy for Employment. Proportion is is the proportion of foreigners in all unemployed individuals. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on unemployment rates. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. State and Year Fixed effects are used.

Different cultural backgrounds can sometimes lead to heterogeneity in the effects in the labour market. Therefore, an analysis was done on subsamples based on the country of birth of immigrants. As there are few observations per country, the countries were clustered into regions (the specific classification can be found in Appendix B). The results of the analysis done based on the immigrant's country of birth are in Table 9. Immigrants born in Germany (2nd Generation Immigrants) have an insignificant positive increase of approximately 42 minutes due to the introduction of the minimum wage. Similarly, Middle-Eastern immigrants have an insignificant positive effect on their working hours of approximately half an hour. The minimum wage reduced the working hours of Eastern Europeans (approx. 42 minutes), Southern Europeans (approx. eight minutes), Western Europeans (approx. 38 minutes). However, only Eastern Europeans have a significant

effect on their working hours, but it was only at the 10% level. The minimum wage increased the working hours of Central Asians by approximately by 56 minutes, but the effect is insignificant. Besides the Central Asian immigrant subsample, all subsamples have parallel trends as shown in Table D in Appendix D. This is based on the insignificant lead coefficients for all of these subsamples. Lastly, as other subsamples had very few observations, the results of those subsamples were not interpreted as part of the main analysis. The results are nonetheless included in Appendix E, along with the test for parallel trends using the lead of Minimum Wage.

Table 9: Difference-in-Difference Results for the Effect on Working Hours of Full-Time Workers by Country of Birth

	Germany	**Middle East**	**Eastern Europe**	**Southern Europe**	**Western Europe**	**Central Asia**
Variables	(1)	(1)	(1)	(1)	(1)	(1)
Minimum Wage	0.696	0.499	-0.697*	-0.130	-0.625	0.926
	(0.437)	(0.855)	(0.404)	(0.857)	(1.431)	(0.617)
Proportion	12.94	-25.11	-38.74	-93.77	-44.84	104.9**
	(47.61)	(73.75)	(34.98)	(99.85)	(68.17)	(45.90)
Constant	44.63***	41.03***	43.00***	46.98***	44.29***	35.00***
	(1.944)	(3.031)	(1.530)	(4.052)	(3.754)	(3.191)
Observations	2,687	1,048	4,049	870	484	1,419

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

The last subsamples to be tested are the ones by Education level. People with different education levels might be subject to different levels of monopsonistic powers depending on the their jobs and the level of their earnings. The results for the Education subsamples are presented in Table 10. Immigrants with Primary, Secondary and Post-Secondary have a reduction in their working hours due to the minimum wage of ap-

proximately twenty minutes, six minutes and eleven minutes respectively. On the other hand, the minimum wage increased the working hours of immigrants with Bachelor and Postgraduate education by approximately fourteen minutes and eleven minutes respectively. However, all the effects are insignificant. It is worth noting that the subsamples for both Primary education and Postgraduate education were small, hence, the results from those two subsamples might not be reliable. The difference-in-difference results including the Lead of Minimum Wage to test for parallel trends are included in Table F in Appendix F. All the coefficients for the Lead are insignificant, showing that parallel trends are present for all the Education subsamples.

Table 10: Difference-in-Difference Results for the Effect on Working Hours of Full-Time Workers by Education Level

	Primary	**Secondary**	**Post-Secondary**	**Bachelor**	**Postgraduate**
Variables	(1)	(1)	(1)	(1)	(1)
Minimum Wage	-0.333	-0.104	-0.188	0.240	0.182
	(1.796)	(0.322)	(0.567)	(0.548)	(1.071)
Proportion	10.09	-21.70	-66.15	40.40	-56.88
	(203.1)	(31.42)	(55.45)	(42.49)	(72.06)
Constant	45.37***	42.63***	44.57***	41.32***	50.17***
	(9.389)	(1.363)	(2.479)	(1.971)	(3.385)
Observations	270	6,015	1,795	2,055	782

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Discussion

The results in the previous subsection have several inferences. First of all, the minimum wage has not significantly changed the working hours of the general sample

of full-time immigrant workers, with the average effect being approximately equal to zero. This was in contrast with the analysis using Foreigner state unemployment rates, where there was a significant rise in the unemployment rate of approximately 1.7%-points. However, the unemployment rate only measures the unemployment of immigrants who do not hold a German nationality, meaning that naturalised first generation immigrants and second generation immigration immigrants are not included (unlike the SOEP sample with working hours). Furthermore, while Natives and First Generation immigrants had negative effects on their working hours, Second Generation had positive effects. This might justify the presence of a significant negative unemployment rate for foreigners, as the effect is not diluted by Second Generation immigrants unlike with the working hours using the SOEP sample. The difference between Native and Immigrants is not very strong in the SOEP sample analysis, but it is clear with significant rise in the gap of state unemployment rates between Foreigners and Germans. Overall, the SOEP samples had insignificant effects and seem to be more in line with what Bruttel, Baumann, and Dütsch (2018) found, while the unemployment rate rise for foreigners seems to be in line with what Caliendo et al. (2018) found. Based on that, Hypothesis 1a is rejected and Hypothesis 1b is accepted. The scenario that seems to consolidate the seemingly contradicting findings would be that the market does have a monopsonistic structure (hence the insignificant change in working hours), but the minimum wage is set too high that unemployment rises with its introduction. Lastly, it seems that immigrants face a more competitive labour market than Natives as evident by the insignificant effect on working hours of Natives and rising gap in unemployment rates.

There is some heterogeneity in the effect of the minimum wage on working hours, when looking at the differing signs and magnitudes of the coefficients of each subsample. For the Gender comparison, Men faced a more monopsonistic market, as they had a positive coefficient for the effect on their working hours. On the other hand Women face a more competitive market, as they faced a negative coefficient for their effect on working hours. Furthermore, immigrants born in Germany, the Middle East and Central Asia (and the Caucus) faced a more monopsonistic model with a positive effect on their working hours, while immigrants born in Eastern, Western and Southern Europe faced a more competitive market with a negative effect on their working hours. The degree of competition in the labour market is especially stronger for Eastern Europeans, as they

had a negative coefficient that was significant at the 10% level. Lastly, immigrants with Primary and Secondary and Post-Secondary Education were found to be in more competitive markets compared to those with Bachelor and Postgraduate Education, whom seem to face a more monopsonistic market. Overall, the general tendency towards insignificant coefficients, points towards the direction of an imperfect market with firms having some monopsonistic power, leading to the working hours (and hence employment) to not decrease after the introduction of the minimum wage.

Working Choice Analysis

Results

The Difference-in-Difference specification is run for part-time employees to test Hypothesis 2, and the results are presented in Table 11. The minimum wage reduced the working hours by approximately 53 minutes, and the effect is significant at the 10% level. The Lead coefficient was insignificant, meaning that the parallel trends assumption holds, which is shown by Figure G in Appendix G.

Table 11: Difference-in-Difference Results for the Effect on Working Hours of Part-Time Workers

	Diff-in-Diff	**Parallel Trends**
Variables	(1)	(2)
Minimum Wage	-0.879*	-0.401
	(0.462)	(0.684)
Proportion	-77.23*	-67.64
	(43.23)	(65.40)
Lead		-0.370
		(0.663)
Constant	26.39***	23.84***
	(1.944)	(2.827)
Observations	3,556	

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Similar to the Employment results, the results in Table 11 applies to the general sample of immigrants (this time part-time workers however), but it is also interesting to investigate how the different subsamples were affected by the minimum wage. Table 12 shows the results for the different Gender subsamples. The minimum wage decreased the working hours for men by approximately an hour, but the effect is insignificant. This is most likely due to the low no. of observations, leading to imprecise results and a very high standard error (as well as a high coefficient for Proportion). Similarly, the minimum wage reduced the working hours for females by approximately one hour, and the effect is significant at the 5% level. For both subsamples, the Lead coefficient is insignificant, showing that the parallel trend assumption holds.

Table 12: Difference-in-Difference Results for the Effect on Working Hours of Part-Time Workers by Gender

	Men		**Women**	
Variables	(1)	(2)	(1)	(2)
Minimum Wage	-1.175	-0.911	-0.989**	-0.495
	(2.150)	(3.313)	(0.479)	(0.698)
Proportion	-233.8	-192.8	-69.06	-57.56
	(171.6)	(267.6)	(44.97)	(67.25)
Lead		-0.965		-0.318
		(2.519)		(0.680)
Constant	37.18***	23.45***	25.23***	23.27***
	(6.693)	(3.179)	(1.973)	(2.885)
Observations	349		3,207	

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

The comparison between Natives and Immigrants also applies to the Working Choice analysis. The results of that comparison is presented in Table 13. The minimum wage increased the working hours of Natives by approximately two minutes, while it reduced them for First Generation immigrants by approximately one hour and 38 minutes for Second Generation immigrants. Only the effect on First Generation immigrants is significant, and it is significant at the 10% level. The Lead coefficients for Natives and First Generation immigrants are insignificant, showing parallel trends for those results. However, it is significant at the 10% level for the Second Generation immigrants subsample. Nevertheless, the P-value was 0.098, which is barely below the significance level of 10%.

Table 13: Difference-in-Difference Results for the Effect on Working Hours of Part-Time Workers by Immigrant Type

	Natives		**1st Generation**		**2nd Generation**	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Minimum Wage	0.0398	-0.314	-1.047*	-1.080	-0.626	1.006
	(0.630)	(0.681)	(0.535)	(0.790)	(0.938)	(1.277)
Proportion	1.539	8.760	-73.04	-46.46	-84.79	-123.5
	(47.38)	(56.66)	(51.54)	(76.90)	(82.35)	(124.7)
Lead		-0.0862		0.389		-2.306*
		(0.775)		(0.723)		(1.395)
Constant	23.29***	25.81***	26.71***	23.14***	24.91***	25.40***
	(2.393)	(2.554)	(2.334)	(3.339)	(3.432)	(5.266)
Observations	1,811		2,669		887	

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The 1st Generation and 2nd Generation subsamples describe the effects for immigrants, while the Natives one pertains to Native Germans. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

As mentioned in the employment analysis, cultural backgrounds can affect workers choices. Immigrants born in different countries might be exposed to different norms regarding their work choice that may affect their response to an increase in wage. Therefore, the analysis for subsamples of Country of Birth is presented in Table 14, where only the subsamples with sufficient no. of observations are included, with the rest being included in appendix H. Table 14 shows that immigrants born in Germany were not affected significantly by the minimum wage with a reduction in their working hours of approximately 17 minutes. Similarly, the minimum wage insignificantly reduced the working hours for immigrants born in Central Asia and the Caucus, however, the coefficient is higher in magnitude, implying a decrease of more than an hour and a half due to the minimum wage. On the other hand, immigrants born in Eastern Europe have a significant (at the 5% level) decrease in their working hours worth an hour and 38 minutes approximately. Subsamples of immigrants born in Eastern Europe and Central Asia had insignificant

Lead coefficients, showing that they meet the parallel trends assumption. However, the subsample of immigrants born in Germany had a significant Lead coefficient, but similar to the Second Generation immigrant subsample the p-value was 0.098, barely below the 10% level.

Table 14: Difference-in-Difference Results for the Effect on Working Hours of Part-Time Workers by Country of Birth

	Germany		**Eastern Europe**		**Central Asia**	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Minimum Wage	-0.626	1.006	-1.633**	-1.698	-1.520	-1.468
	(0.938)	(1.277)	(0.785)	(1.072)	(1.465)	(2.158)
Proportion	-84.79	-123.5	-110.3	-35.17	160.2	-31.11
	(82.35)	(124.7)	(78.46)	(123.3)	(147.9)	(217.3)
Lead		-2.306*		0.715		-2.130
		(1.395)		(0.941)		(2.343)
Constant	24.91***	25.40***	30.42***	27.42***	17.19***	16.57*
	(3.432)	(5.266)	(3.684)	(4.934)	(5.326)	(9.010)
Observations	887	437	1,293	562	473	222

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

The last subsamples to be tested are the Education subsamples. People with different education levels might make different choices after having their wages increased, especially if they have low education and cannot make fully-informed decisions. That being said, the results are presented in Table 15. The minimum wage has not affected the working hours for any of the Education subsamples significantly except for those with Secondary education. The minimum wage increased the working hours for immigrant part-time workers with Postgraduate education by more than two hours. On the other hand, those with Secondary and Post-Secondary education had their working hours re-

duced due to the minimum wage by more than an hour, with the effect being significant at the 10% level for those with Secondary education. Immigrants with Primary education did not seem to change their working hours by much, with an insignificant reduction of approximately eight minutes. However, it is worth noting that the low no. of observations in the Primary and Post-graduate education subsample could be affecting the precision of the coefficients. The parallel trends assumption seems to hold, as the Lead coefficients in Table I in Appendix I are insignificant except for the Primary education subsample, which had the coefficient omitted due to collinearity. Collinearity in this case probably is due to the low no. of observations.

Table 15: Difference-in-Difference Results for the Effect on Working Hours of Part-Time Workers by Education Level

	Primary	**Secondary**	**Post-Secondary**	**Bachelor**	**Postgraduate**
Variables	(1)	(1)	(1)	(1)	(1)
Minimum Wage	-0.0128	-1.220*	-1.264	-1.020	2.226
	(3.476)	(0.680)	(0.934)	(0.996)	(1.796)
Proportion	-654.1	-89.55	-110.8	-47.71	-162.6
	(633.2)	(67.29)	(78.50)	(91.32)	(158.5)
Constant	37.05*	26.93***	27.00***	23.95***	34.98***
	(21.50)	(3.001)	(3.452)	(4.265)	(6.503)
Observations	80	1,858	748	632	193

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Discussion

The results in the Working Choice analysis have several implications in terms of the effect of the minimum wage on the immigrant's choice of working hours. The analysis

showed that the general sample of immigrants reduced their working hours significantly (at the 10% level) in response to the minimum wage. Based on that, Hypothesis 2 stating that the minimum wage reduced the working hours for part-time immigrant workers is accepted. Additionally, while Natives seemed to not alter their working hours, First Generation immigrants and Second Generation immigrants reduced it greatly, with the former having a significant effect (at the 10% level). This points to the direction of stronger income effects for immigrants relative to the Natives. The disparity in significance and magnitude of the effect between First Generation and Second Generation immigrants probably has to do with the fact that the latter are more integrated into the labour market than the former. It is also possible that cultural norms and behaviours dictate the immigrants' choices, leading to a disparity between immigrants and natives, as well as a smaller effect for the Second Generation immigrants who would be influenced by the German culture as well. Overall, the results implies the presence of a negative wage elasticity of labour supply for immigrants, as Camerer et al. (1997) found for New York cab drivers. Natives on the other hand, seem to follow the pattern found by Farber (2005) for the New York cab drivers.

There were also other heterogeneous effects among the subsamples. Women (negative coefficient signifcant at 10% level) seemed to have stronger income effects compared to Men (insignificant negative coefficient). This might be due to some mothers being encouraged by the wage increase to spend more time with their children (especially for newborn children). However, the lack of observations for Men could have led to the coefficient being imprecise. Additionally, while immigrants born in Germany and Central Asia and the Caucus region had similar results (insignificant reduction in working hours due to minimum wage), but immigrants born in Eastern Europe had a significant (at the 5% level) reduction of their working hours with a magnitude of more than an hour and a half. This could point towards the direction of a difference in cultural norms regarding work choice, as it seems that the income effect was more pronounced for immigrants from Eastern Europe compared to those born in Germany and Central Asia. Lastly, it seems that immigrants with differing education levels did not have differences in terms of the effect of the minimum wage. While only immigrants with Postgraduate education had positive effects, this subsample had a very low no. of observations to be able to draw on any reliable inferences from the results. Similarly, the Primary education subsample had

a very weak negative effect that was unreliable due to the no. of observations. Among the other education levels, the reduction of working hours was significant for those with Secondary education, while the magnitudes were not very different from the insignificant effects on immigrants with Post-Secondary and Bachelor education. However, the reduced magnitude of the effect on immigrants with Bachelor education does point to the possibility of a decrease in the income effect with the presence of tertiary education.

Conclusion

This research paper was aimed at answering the following research question: *How did the introduction of the minimum wage in Germany affect immigrant workers on the short run?* To answer the question, both sides of the labour market for immigrant workers were investigated. The Migration Flow Analysis was conducted before that to test if immigrants switched states from the treatment to the control group. That would have biased the results captured by the Difference-in-Difference models, as their would have been an extra labour supply shock to the labour market. Nevertheless, the results showed that the proportion of immigrants in the labour force did not change significantly for the states in the treatment group compared to those in the control group. The Employment analysis looked at the effect of the minimum wage on employment through analysing the effect on the working hours of full-time immigrant workers and foreigner unemployment rates. The results showed an insignificant effect on the working hours and a rise in unemployment, leading to a rejection of the hypothesis stating that working hours would decrease due to the minimum wage (1a) and accepting the hypothesis stating that the unemployment rates would increase due to the minimum wage (1b). Moreover, the Working Choice analysis looked at the effect of the minimum wage through analysing the effect of the minimum wage on the working hours of part-time immigrant workers. The results showed a significant decrease in the working hours, leading to accepting the hypothesis stating that the working hours would decrease due to the minimum wage (2). Based on these findings, an answer to the research question can be formulated. The minimum wage seems to have decreased efficiency in the German labour market for immigrants, as the minimum wage increased the unemployment rate without increasing employment, measured using the working hours. This fits with the minimum wage being

set too high in a monopsonistic labour market. Furthermore, there was a significant decrease in labour supply, which combined with the lower labour demand could lead to a decrease in employment overall. This increases the welfare loss, as employment falls even more. Potentially, immigrants who are unemployed due to the minimum wage could make up for the decrease in labour supply by part-time immigrant workers in the long run. This would theoretically reduce the welfare loss caused by the minimum wage. Moreover, the results show that for both sides of the market, immigrant workers had very different effects compared to native workers. Furthermore, the minimum wage seems to have generally heterogeneous effects on workers depending on their gender, country of birth and which generation of immigrants they belong to. Lastly, the analyses results do not show any clear heterogeneity in the effects of the minimum wage on employment or working choice depending on the workers' level of education. The findings in this paper are more in line with what Giuliano (2013) and Bruttel, Baumann, and Dütsch (2018) found for teenage workers in the US and workers in Germany, where they found no negative employment effects. However, the rise in unemployment rate is more in line with what Caliendo et al. (2018) found. There needs to be further research with an even larger sample to confirm for sure what was the general employment effect of the minimum wage on workers in Germany. Furthermore, the findings are in line with what Camerer et al. (1997) found for New York city cab drivers, where he found negative wage elasticity of supply (i.e. a reduction in working hours with wage increase).

While most of the results found are supported by the parallel trends assumption, there are still several limitations to be addressed. First of all, the sample used may have not been representative of the entire immigrant population in Germany. Some sub-samples where over-represented in parts of the analysis (e.g. Females in the Working Choice Analysis), which greatly limits the external validity of the research. Moreover, the difference-in-difference method used is not the most ideal application of the regional variation. Unfortunately due to the weak first-stage effect of the *Fraction* variable (proportion of immigrant workers earning below the minimum wage in 2014 in each state), the instrumental variable method suggested by Card (1992) could not be implemented. Instead, the method based on Card's research and used by Stewart (2002) was implemented. While both the treatment group and control groups were exposed to the treatment, the treatment group had a higher fraction of workers earning below the minimum wage before

it was introduced. This means that the results above are more of an approximation of the actual effect, and again this limitation greatly reduced the external validity and applicability of the findings of this paper. In addition, the use of working hours for full-time workers as a proxy for employment is not ideal. While indeed full-time workers tend to have less autonomy over their choice of working hours, this has been changing over the last few years with firms introducing more flexible working hour schemes. Nevertheless, with the lack of a measure for employment (namely the absence of Full-Time Equivalent from the SOEP sample), this provided a good approximation for employment. Lastly, the sample size was extremely low, limiting the ability to conduct the analysis for all subsamples (especially in the Country of Birth subsamples). It also reduced the reliability of the results presented in the paper.

The findings in this paper raise several questions that should be addressed in future research. Firstly, it is not very clear what are the underlying mechanisms behind the minimum wage effect. While the labour market theories do provide some guidance in that area, it is interesting to investigate why immigrants would be exposed to monopsonistic power from firms, or why they would have different income and substitution effects from natives. Furthermore, with larger sample size that represent the immigrant population in Germany, there could be different findings that would more accurately depict how the minimum wage affected immigrants in Germany. Lastly, the relationship between how integrated immigrants are and how they were affected by the minimum wage is a very interesting topic that would provide vital policy implications, as long as good measures and proxies for immigration are found.

While the findings in this paper have a few limitations that cast doubt on their validity, they also have some important implications. Theoretically, the paper shows that native workers are different from immigrant workers in terms of how they react to labour market policies. Additionally, the paper contributed to the long debate of whether the labour market is competitive or monopsonistic, by showing that the labour market does have imperfections that can make a minimum wage desirable from an efficiency point of view. In that respect, it is important to investigate the necessary level to introduce the minimum wage, to avoid welfare losses that may arise (as with the rise of foreigner state unemployment rate). Similarly, the paper shows that it is not always the case that substitution effects offset income effects, and that in some cases they can cancel

each other out or the income effect can be stronger (as was the case in this paper). Furthermore, there are also several policy implications that the paper provides. Given that Germany is currently addressing the large influx of immigrants into the country, the German government should take into account the heterogeneity of the minimum wage effects on employment and working choice. For example, immigrant integration policies should be altered accordingly, if First Generation Immigrants do decrease their working hours in response to the minimum wage. As working is a necessary part of immigrant assimilation, the German government could turn to more Active Labour Market policies to address the lower labour supply and push immigrant workers to work more. Overall, it seems that there might be a tendency that minimum wages might affect immigrants differently than native workers, hence, governments should take into account how this can affect immigrant assimilation as well as well-being before introducing a minimum wage. Lastly, the government should take into account possible influxes of immigrants within the country, as this may put pressure on some state/regional labour markets, while causing shortages in others. This can be especially detrimental, if workers migrate from Eastern Germany, which is known to have a lower living standard, causing a shortage in labour and potentially a slowdown in the economic development of that region.

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Appendices

Appendix A

This appendix shows the parallel trends figure for the Employment part of the analysis.

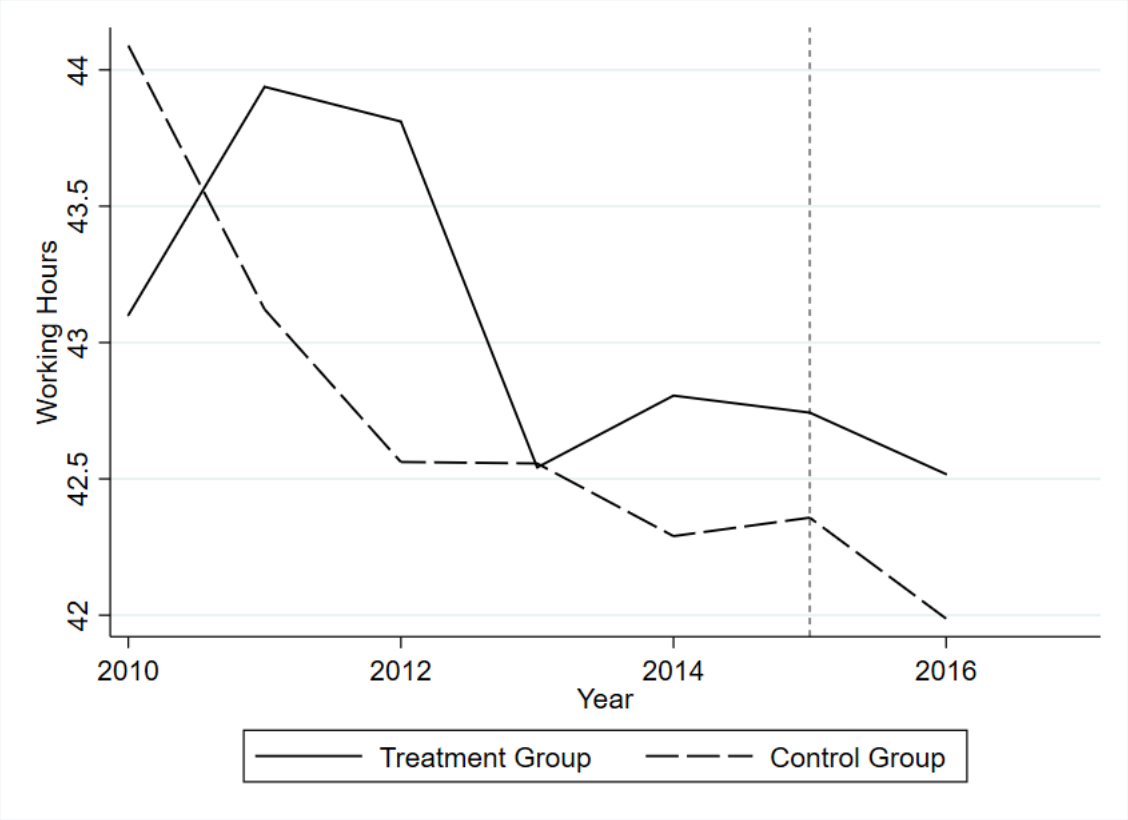

Figure A: Evolution of Working Hours for Full-time Employees showing parallel trends.

Appendix B

This appendix includes the classification of countries into regions for the subsamples of country of birth in both the Employment and the Working Choice analyses. The name of the countries is based on the labelling in the SOEP data, where some individuals were given regions instead of specific countries.

- **Middle East and North Africa**: Turkey, Iran, Syria, Tunisia, Iraq, Morocco, Lebanon, Algeria, Egypt, United Arab Emirates, Jordan, Libya, Kuwait and Palestine.
- **Eastern Europe**: Ex-Yugoslavia, Romania, Poland, Hungary, Bulgaria, Czech Republic, Russia, Moldova, Albania, Ukraine, Estonia, Latvia, Croatia, Bosnia-Herzegovina, Macedonia, Slovenia, Slovakia, Belarus, Kosovo-Albania, Lithuania, Serbia and Unclassified Eastern Europeans.
- **Southern Europe**: Greece, Italy, Spain and Portugal.
- **Western Europe and Scandinavia**: Austria, France, Denmark, Great Britain, Sweden, Norway, Finland, Switzerland, Ireland, Luxembourg, Belgium and Netherlands.
- **Latin and Caribbean**: Chile, Bolivia, Mexico, Argentina, Jamaica, Colombia, Venezuela, Cuba, Brazil, Peru, Ecuador, Dominican Republic, Nicaragua, Paraguay, Honduras, Suriname.
- **Central Asia and Caucus Region**: Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Azerbaijan, Georgia, Turkmenistan and Afghanistan.
- **South and East Asia**: Indonesia, Philippines, Japan, India, Thailand, Bangladesh, Hong Kong, Sri Lanka, Nepal, China, Vietnam, Pakistan, Singapore, Laos, Malaysia and Taiwan.
- **Oceania**: Australia and New Zealand.
- **Sub-Saharan Africa**: Ethiopia, Ghana, Nigeria, South Africa, Angola, Namibia, Kenya, Botswana, Guinea, Cameroon, Congo, Togo, Chad, Lesotho, Rwanda, Other African.

Appendix C

This appendix includes the comparison of the minimum wage effect on state unemployment rates between Foreigner unemployment rates and German unemployment rates. The results are presented in table C.

Table C: Difference-in-Difference Results for the Minimum Wage Effect on State Unemployment Rates for Germans and Foreigners

	Foreigners		**Germans**	
Variables	(1)	(2)	(1)	(2)
Minimum Wage	0.0170**	0.00843	-0.00572***	-0.00136
	(0.00742)	(0.00657)	(0.00199)	(0.00275)
Proportion	0.161	0.358	0.228***	0.231**
	(0.255)	(0.247)	(0.0686)	(0.104)
Lead		-0.00487		-0.00371**
		(0.00402)		(0.00177)
Constant	0.178***	0.156***	0.0507***	0.0497***
	(0.0254)	(0.0246)	(0.00709)	(0.0104)
Observations	105		105	

The outcome variable is the state unemployment rate, which is used as a proxy for Employment. Proportion is is the proportion of foreigners in all unemployed individuals. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minmium wage on unemployment rates. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. State and Year Fixed effects are used.

Appendix D

This appendix includes the results of testing the parallel trends using the leads of the minimum wage indicator. The results are presented in Table D

Table D: Difference-in-Difference Parallel Trends Results for the Effect on Working Hours of Full-Time Workers by Country of Birth

	Germany	**Middle East**	**Eastern Europe**	**Southern Europe**	**Western Europe**	**Central Asia**
Variables	(1)	(1)	(1)	(1)	(1)	(1)
Minimum Wage	0.116	-0.0518	-0.721	-0.340	-3.602*	1.631**
	(0.564)	(1.126)	(0.585)	(1.222)	(1.903)	(0.794)
Lead	0.328	0.480	0.356	0.896	0.271	-1.388**
	(0.574)	(1.031)	(0.493)	(1.038)	(1.178)	(0.663)
Proportion	2.580	-25.15	13.63	-69.01	26.46	-21.69
	(61.71)	(99.00)	(43.76)	(90.23)	(92.89)	(67.94)
Constant	46.16***	41.18***	41.01***	45.55***	38.67***	44.75***
	(2.485)	(4.026)	(1.804)	(3.740)	(4.037)	(4.662)
Observations	1,636	595	2,258	483	289	837

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Appendix E

This appendix includes both the results of the difference-in-difference analysis (Table E.1) and the parallel trends test using Lead (Table E.2 for the subsamples of Country of Birth with few observations. As seen from the tables, all effects are insignificant and follow parallel trends.

Table E.1: Difference-in-Difference Results for the Effect on Working Hours of Full-Time Workers by Country of Birth Subsamples

Variables	**US & Canada**	**Latin & Caribbean**	**South & East Asia**	**Oceania**	**Africa**
	(1)	(1)	(1)	(1)	(1)
Minimum Wage	1.796	-0.425	-0.0417	-1.265	-6.146
	(1.383)	(2.202)	(1.669)	(11.29)	(4.508)
Proportion	110.3	-36.65	91.39	1,361	-636.4*
	(107.9)	(255.3)	(125.0)	(1,426)	(344.0)
Constant	39.90***	52.94***	38.36***	-102.8	102.3***
	(4.664)	(7.578)	(7.580)	(140.0)	(28.25)
Observations	78	121	164	21	104

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Table E.2: Difference-in-Difference Parallel Trends Results for the Effect on Working Hours of Full-Time Workers by Country of Birth

Variables	(2) US & Canada	(2) Latin & Caribbean	(2) South & East Asia	(2) Oceania	(2) Africa
Minimum Wage	-0.588	-0.124	-0.291		-9.939
	(3.999)	(3.371)	(2.947)		(12.79)
Lead	-1.507	-3.746	-1.712		-1.291
	(2.165)	(2.655)	(1.635)		(4.662)
Proportion	167.3	-187.3	14.66	2,523*	-1,274
	(261.5)	(311.0)	(82.04)	(1,476)	(850.3)
Constant	35.72***	59.43*	51.83***	-215.0	98.48**
	(11.46)	(33.30)	(4.238)	(152.9)	(43.55)

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Appendix F

This appendix includes the results of testing the parallel trends using the leads of minimum wage. The results are presented in Table F.

Table F: Difference-in-Difference Parallel Trends Results for the Effect on Working Hours of Full-Time Workers by Education level

	Primary	**Secondary**	**Post-Secondary**	**Bachelor**	**Postgraduate**
Variables	(2)	(2)	(2)	(2)	(2)
Minimum Wage	-0.362	-0.713	0.810	0.0960	-1.067
	(1.970)	(0.452)	(0.787)	(0.731)	(1.605)
Lead	0.965	-0.170	0.472	0.204	-0.556
	(2.353)	(0.375)	(0.653)	(0.596)	(1.417)
Proportion	233.9	-45.46	-8.321	59.63	-193.8**
	(284.2)	(38.13)	(70.05)	(60.20)	(81.76)
Constant	31.33**	43.81***	43.12***	41.57***	55.91***
	(12.59)	(1.571)	(3.091)	(2.697)	(4.121)

The outcome variable is the weekly working hours for full-time workers, which is used as a proxy for Employment. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Appendix G

This appendix shows the parallel trends figure for the Working Choice part of the analysis.

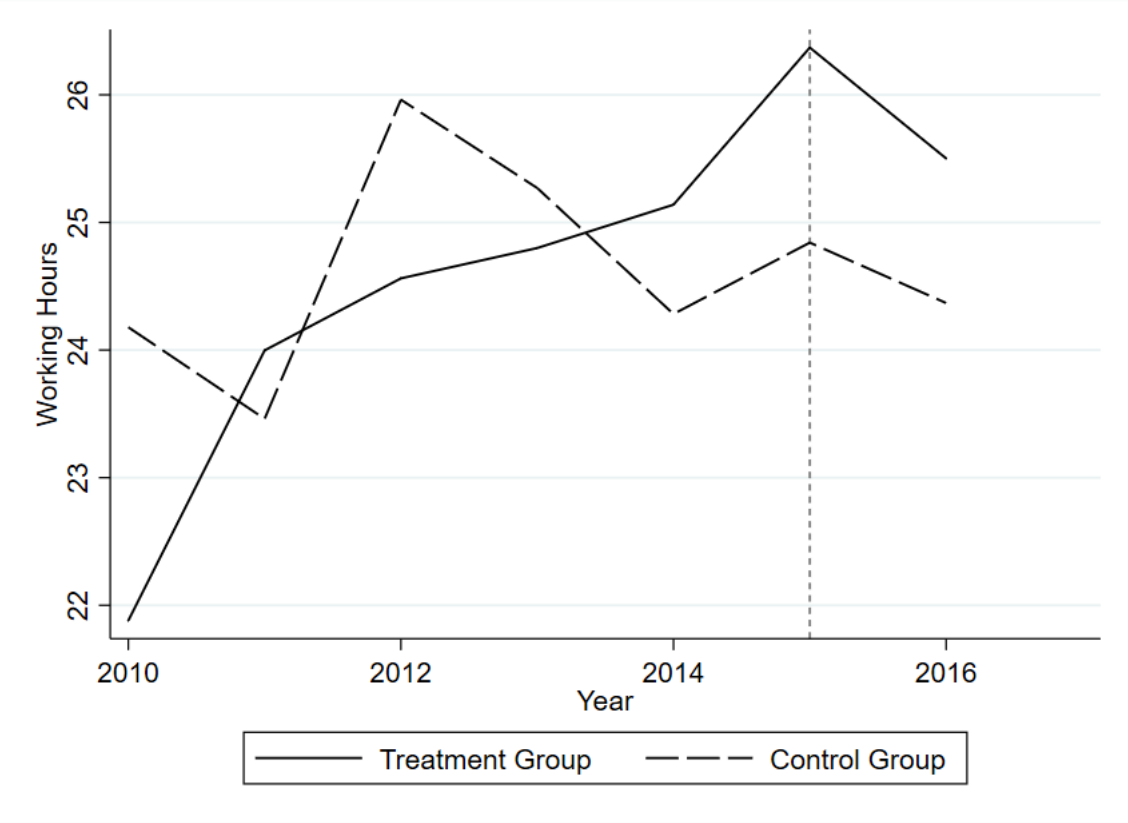

Figure G: Evolution of Working Hours for Part-time Employees showing parallel trends.

Appendix H

This appendix includes both the results of the difference-in-difference analysis (Table H.1) and the parallel trends test using Lead (Table H.2) for the subsamples of Country of Birth with too few observations. Oceania's results could not be calculated due to the presence of only two immigrants working part-time born in Oceania. Most subsamples have parallel trends, while only immigrants from the US and Canada have a Lead coefficient significant at the 1% level. All effects are insignificant.

Table H.1: Difference-in-Difference Results for the Effect on Working Hours of Part-Time Workers by Country of Birth

	Middle East	**Southern Europe**	**Western Europe**	**US & Canada**	**Latin & Caribbean**	**South & East Asia**	**Africa**
Variables	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Minimum Wage	0.175	0.637	-2.496	3.289	6.451	1.425	2.213
	(2.076)	(1.195)	(1.797)	(3.784)	(4.941)	(3.692)	(6.509)
Proportion	-103.5	-363.8*	6.915	154.8	137.2	-206.5	-55.29
	(140.8)	(189.0)	(152.3)	(351.6)	(625.6)	(226.5)	(780.9)
Constant	19.40***	40.96***	24.68***	31.84**	8.428	29.88***	22.64
	(6.474)	(6.613)	(7.304)	(14.19)	(42.54)	(8.292)	(34.81)
Observations	242	261	150	33	61	100	51

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Table H.2: Difference-in-Difference Parallel Trends Results for the Effect on Working Hours of Part-Time Workers by Country of Birth

	Middle East	**Southern Europe**	**Western Europe**	**US & Canada**	**Latin & Caribbean**	**South & East Asia**	**Africa**
Variables	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Minimum Wage	-1.014	-0.811	1.322	0.481	-3.516	6.637	-6.813
	(2.401)	(1.142)	(2.630)	(4.925)	(14.95)	(4.886)	(7.744)
Lead	1.013	1.189	-0.810	4.384***	0.0688	2.971	-1.158
	(1.456)	(1.049)	(2.411)	(1.386)	(6.094)	(5.356)	(5.905)
Proportion	-349.2	-176.4	-149.1	242.1	242.9	380.1	-848.8
	(248.8)	(176.3)	(142.0)	(205.3)	(670.4)	(436.0)	(1,231)
Constant	22.61**	36.68***	29.10***	0.602	-11.15	10.08	96.38
	(10.29)	(6.063)	(5.911)	(17.89)	(78.51)	(15.58)	(112.4)

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.

Appendix I

This appendix includes the results of testing the parallel trends using the leads of minimum wage for the Education subsamples in the Working Choice analysis. The results are presented in Table I.

Table I: Difference-in-Difference Parallel Trends Results for the Effect on Working Hours of Part-Time Workers by Education Level

	Primary	**Secondary**	**Post-Secondary**	**Bachelor**	**Postgraduate**
Variables	(2)	(2)	(2)	(2)	(2)
Minimum Wage	-7.619	-1.023	0.0329	-0.596	1.498
	(14.40)	(1.117)	(1.124)	(1.210)	(2.164)
Proportion	972.8	-156.8	-44.97	-35.04	-67.80
	(904.7)	(112.8)	(85.53)	(151.4)	(252.8)
Lead	-	-0.678	-0.451	0.0974	0.412
		(1.063)	(0.962)	(1.657)	(2.299)
Constant	-71.80	27.44***	20.60***	25.03***	31.81***
	(75.99)	(4.749)	(3.810)	(4.651)	(10.93)

The outcome variable is the weekly working hours for part-time workers, which is used as a proxy for the worker's labour supply. The sample includes immigrants only. Proportion is the proportion of immigrants in the labour force. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Minimum Wage is the treatment variable, and its coefficient in model 1 is the effect of the minimum wage on working hours. The Lead coefficient is interpreted in terms of significance and is used to test the parallel trends assumption. Individual, State and Year Fixed Effects are used.