

ΟΙΚΟΝΟΜΙΚΟ  
ΠΑΝΕΠΙΣΤΗΜΙΟ  
ΑΘΗΝΩΝ



ATHENS UNIVERSITY  
OF ECONOMICS  
AND BUSINESS

Department of International & European Economic Studies

M.Sc. International Economics & Finance

M.Sc. Thesis

*“The Employment Effects of Minimum Wages during the Great  
Recession and the Subsequent Recovery: evidence from 17 EU  
Member States”*

**Nikolaos Filippopoulos**

Supervisor: Yiannis Biliass

2018





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## ABSTRACT

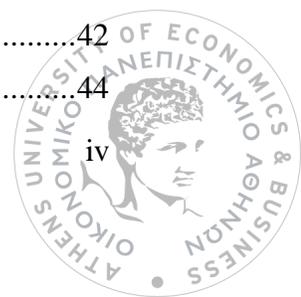
Using data for 17 EU member-states, we examine the employment effects of minimum wages during 2007-2015. The sample period allows us to investigate the employment patterns that are related to minimum wage developments during a period of weak aggregate conditions. Nevertheless, before proceeding to our own estimates, we review the relevant theoretical and empirical literature. As regards our findings, we do not find any adverse employment effects. However, we do not rest on the nonnegative impact of the minimum wage, but instead argue that its effect is not a predetermined outcome. Hence, we also take into count the interaction between the minimum wage and GDP growth, in order to estimate the minimum wage effect during different aggregate conditions. Finally, we also attempt to investigate which minimum wage system is more effective. According to our sample, our estimates indicate that as far as bargaining involves all relevant economic agents, the minimum wage will most likely not lead to disemployment effects.

**Keywords:** Minimum wage, Employment, GDP growth, Recession, Labor market



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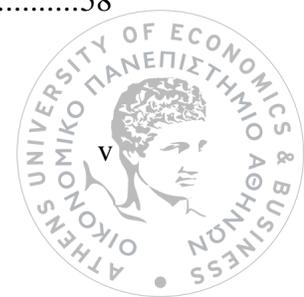
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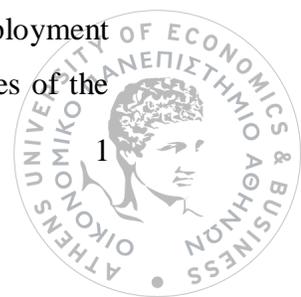
## INTRODUCTION

The minimum wage has always been a core debate among economists, policy makers and technocrats. The debate mostly concerns the minimum wage effects on employment and the potential labor market distortion that it might create. As any debate, the minimum wage debate has its proponents and opponents. The proponents of the minimum wage argue that minimum wage increases promote economic well-being, and prevent demand and consumption from falling. Moreover, they advocate that once the minimum wage is able to provide adequate disposable income to its earners, government spending need not be that intense. In addition, they support that an adequate minimum wage reduces labor turnover and increases labor productivity. As far as the welfare implications of the minimum wage are concerned, its advocates support that it is capable of reducing poverty and inequality among low-skilled and disadvantaged workers.

On the other hand, the opponents of the minimum wage maintain that high minimum wage rates create major distortions in the labor market. In fact, some of its opponents are against the minimum wage legislation in first place. The disputants of the minimum wage argue that it increases labor costs substantially, making it difficult to maintain demand for labor at high levels. Furthermore, the adversaries warn that minimum wage increases induce employers to substitute labor for machinery, which creates a further downward pressure on employment. Finally, another argument is that minimum wage increases will lead to an increase in the price level.

It is obvious that one can find many more arguments for or against minimum wage increases. Notice though that in most of these arguments, the advocates of the minimum wage tend to obtain a more left-wing ideology, while its opponents have a more right-wing perspective on economic policy. By the same token, we feel that the fact that some economists or policy makers have built on the minimum wage debate, while being heavily affected by their ideology, is what offers diversity in the debate. Therefore, we suggest that ideology should not precede empirical evidence.

Moreover, it is provoking that in most cases opponents and proponents of the minimum wage subversively interpret the results of empirical evidence in order to reject or overwhelm a specific study. In the framework of this thesis, we strongly suggest that minimum wage increases or decreases should be based on recent and adequate evidence as well as on aggregate political and economic conditions. In addition, we argue that the effect of the minimum wage on employment is not predetermined. That is to say that the listing of the advantages and disadvantages of the



minimum wage should be made wisely. For example, when arguing that minimum wage increases will boost demand, essentially one implies that the economy is facing a falling demand. If this is not the case however, why should we rest on this potential advantage of the minimum wage? On the other hand, if policy makers have found ways to counterbalance the labor costs created by the minimum wage increases, why should we rest on the “labor cost” argument of the minimum wage? In essence, we argue that the minimum wage is a policy tool that under the right handling it can provide tailor-made outcomes for each business cycle.

The present thesis is divided in three chapters. In Chapter 1, we present the core theoretical considerations of the minimum wage. In Chapter 2, we display relevant empirical studies, with the most notables being the ones by Neumark & Wascher (2004) and Dolton & Bondibene (2012). Finally, in Chapter 3, we proceed to our specifications where we estimate the employment effects of minimum wages during 2007-2015.



*CHAPTER 1*  
*THEORETICAL CONSIDERATIONS*

1.1. INTRODUCTION

The first part of the present master's thesis comprises leading theoretical models that assess the relationship between employment and minimum wages. In what follows, we present:

- The competitive model
- Monopsony
- The efficiency wage theory
- The search and matching theory
- The institutional theory

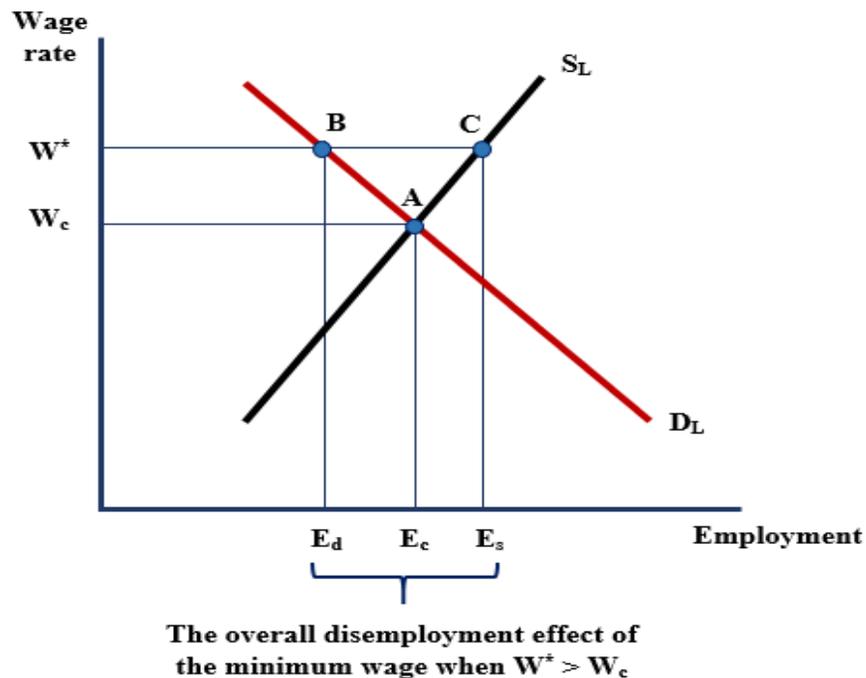
However, before reviewing these theories it is necessary to make some important notes. The first is related to the role of business cycles in the labor market. As you may have already noticed, the aim of this thesis is not only to examine the employment effects of minimum wages, but also their potential effects during times of recession and growth. Hence, it is highly recommended to the reader to evaluate both the theories and the thesis itself, while having in mind the idiosyncratic characteristics of each economy and business cycle.

Secondly, theories like the search and matching one, examine in detail the behavior and willingness of workers to search for a vacancy, regarding the information available to them, as well as their preferences (that is, in terms of reservation wages). Information and preferences therefore, imply bargaining. Many theories have raised arguments on the role of labor unions in bargaining, regarding both their effectiveness in ameliorating working conditions and wages and their overall involvement in the determination of aggregate economic performance. Generally, during booms, employers find it harder to obtain labor, and therefore unionized as well as non-unionized workers, find it easier to demand higher wages. The opposite is true during a recession. Hence, we also suggest that the reader accounts for the parameter of bargaining power.

Both suggestions aim to ameliorate our understanding of the theories that follow, since they make a range of assumptions that are simplistic and in some cases unrealistic. However, regardless of the level of validity of the assumptions, these theories provide substantial incentives to evaluate empirically the employment effects of minimum wages.



## 1.2. THE COMPETITIVE MODEL

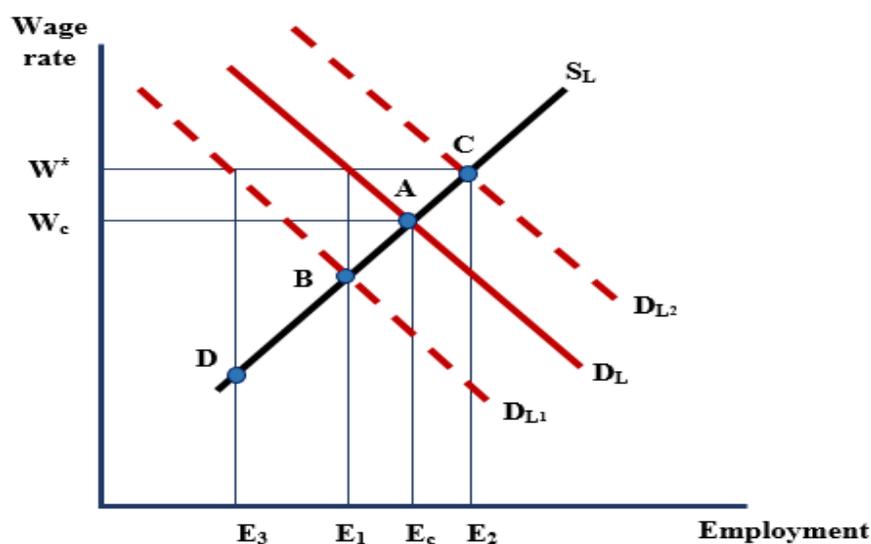


**Figure 1.** The competitive model, where  $W_c$  the competitive wage and  $W^*$  the minimum wage

In Figure 1, the analysis starts at point A, where the competitive labor market is at equilibrium;  $E_c$  is the equilibrium employment rate and  $W_c$  is the equilibrium wage rate. Suppose that the government decides to impose a minimum wage that covers all workers in the labor market and that employers are willing to comply with the minimum wage legislation. Regarding the effect of the imposed minimum wage on employment, there are some interesting points to consider. Firstly, after the imposition of the minimum wage,  $W^*$ , which is higher than the competitive wage,  $W_c$ , employment falls from  $E_c$  to  $E_d$  (point B). On the other hand, existing workers find the minimum wage  $W^*$  attractive enough to continue supplying their labor, while new workers, those who were unwilling to work at the competitive wage,  $W_c$ , try to enter the market. Thus, labor supply increases from  $E_c$  to  $E_s$ , at point C, which however will not be absorbed by the labor market. Therefore, according to the standard competitive model, the imposition of the minimum wage,  $W^*$ , will lead to an amount of  $E_s - E_d$  unemployed workers.

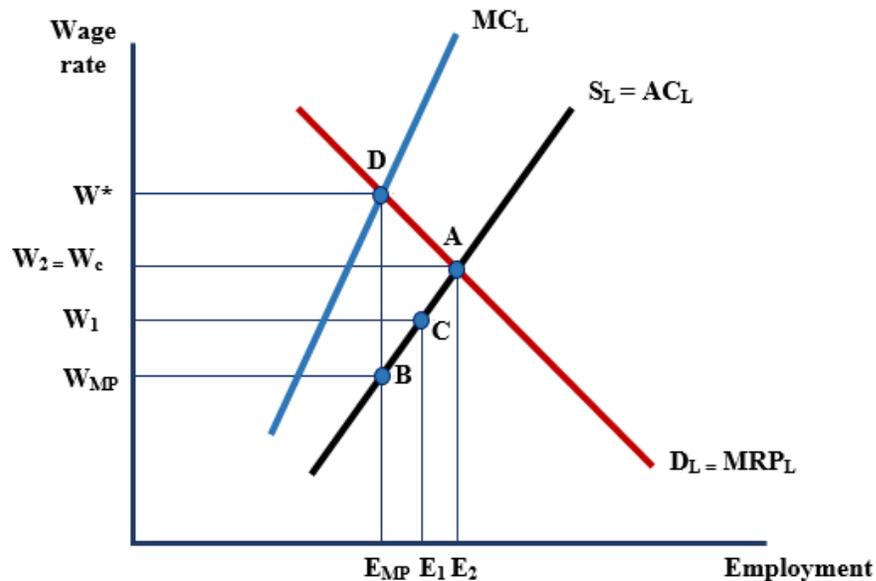
The competitive model is the starting point when trying to examine the employment effects of the minimum wage. However, it must always be examined with caution since it employs a

number of over-simplistic assumptions (e.g., employers will comply with the law; employers will not try to offset increased labor costs through legal or illegal means etc.). However, as Dolton and Bondibene (2012) explain, the fact that we ignore aggregate economic conditions, that is, times of recession or growth will make us draw false conclusions, seeing that aggregate shocks can affect the determination of the minimum wage rate. To illustrate this viewpoint, the authors provide an intuitive figure (Figure 2). In the case where the imposition of the minimum wage,  $W^*$ , coincides with a recession, as captured by the fall in the demand for labor (from  $D_L$  to  $D_{L1}$ ), it is not clear whether the rise of the minimum wage rate or the recession caused the fall in employment from  $E_c$  to  $E_1$  (point B). In addition, they argue that in the case where there is a simultaneous interaction between the minimum wage and the recession, employment could decrease even more, to  $E_3$  (point D). On the contrary, in times of economic growth, demand for labor will increase from  $D_L$  to  $D_{L2}$ . Within the framework of the standard competitive model however, we cannot assume that the increase in the minimum wage rate is responsible for the increase in employment (from  $E_c$  to  $E_2$ , point C). Therefore, it is obvious that we also need to control for factors like an economic downturn, which is also true for the rest of the models presented below.



**Figure 2.** *Movements of the aggregate labor demand within the analysis of the competitive model. Source: Dolton & Bondibene (2012, p. 102)*

### 1.3. MONOPSONY



**Figure 3.** Monopsony, where  $W_1$ ,  $W_2$ ,  $W^*$  minimum wage increases,  $W_c$  the competitive wage and  $W_{MP}$  the wage set by the monopsonist

The term monopsony refers to the situation where a firm is not a wage taker, while at the same time, enjoys market power in employing workers. Figure 3 depicts the case of a (nondiscriminating)<sup>1</sup> monopsonist who chooses to employ  $E_{MP}$  amount of labor at a wage rate of  $W_{MP}$ , where the marginal cost of labor<sup>2</sup> equals the marginal revenue product of labor ( $MC_L = MRP_L$ ) (point B). Workers now receive a wage lower than the competitive one, whilst the employment rate is also lower (point A shows the competitive case). Moreover, notice that at point B, the wage is less than the workers' MRP, which indicates clear labor exploitation.

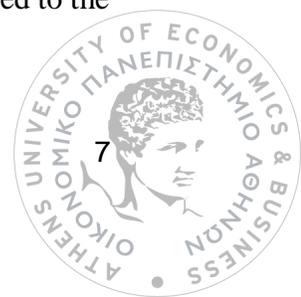
<sup>1</sup> The setting and interpretation of Figure 3 does not hold in the case where wage discrimination exists, either with respect to each worker's efficiency and productivity or with respect to his/her individual bargaining power. In such cases and under certain conditions, the imposition of a minimum wage will at best, leave the employment rate unaffected, while the most probable outcome will be an increase in unemployment. For a more in-depth analysis, see Robinson (1933/1969, pp. 299-304) or McConnell, Brue & Macpherson (2016, pp. 401-402) for a more compact one.

<sup>2</sup> Within our analysis, the cost of labor is the wage the monopsonist has to pay.

However, if the government decides to intervene in the labor market by imposing a minimum wage at  $W_1$ , which is higher than the wage rate set by the monopsonist ( $W_{MP}$ ), the firm can now hire  $E_1$  workers (point C). In effect, the government can set the minimum wage even higher, at  $W_2$  where it equals  $W_c$ , the competitive wage (point A). In addition, at the minimum wage  $W_2 = W_c$ , the marginal cost of labor equals the average cost of labor ( $MC_L = AC_L$ ). Employment increases to  $E_2$ , which is sufficiently higher than the  $E_{MP}$ , while there is no more labor exploitation. However, Robinson (1933/1969, p. 295) argues that the imposition of a minimum wage will fully eliminate labor exploitation, if and only if “*the demand curve for labor represents the value of the marginal physical product of labor*”. In any case, she suggests that at reasonable levels, the minimum wage will increase employment and reduce labor exploitation.

It is highly recommended however, to pay attention to the fact that the government cannot continually increase the minimum wage floor. For example, the minimum wage rate  $W^*$ , does not create any positive employment effects (point D). At  $W^*$ , the monopsonist will hire again  $E_{MP}$  amount of workers. Moreover, it is easily understood that any minimum wage rate above  $W^*$  would create strong disemployment effects. Therefore, the minimum wage rate should be set somewhere between  $W_{MP}$  and  $W^*$ . In other words,  $W_{MP} < \text{Minimum Wage} < W^*$ .

Nevertheless, numerous studies and theorists argue that the employment effects of minimum wages under monopsony is not a clear-cut as Figure 3 implies. For instance, Boal & Ransom (1997) suggest that even under negligible labor exploitation (i.e. wages are high enough and close to  $MRP_L$ ), the imposition of a minimum wage might raise overall wages without causing disemployment effects. They also suggest though, that under wage dispersion caused by the heterogeneity in marginal products and not by the rate of labor exploitation, minimum wages will be ineffective. Finally, another important consideration is that of Bhaskar & To (1999) and Bhaskar, Manning & To (2002) who argue that monopsony is an unrealistic labor market situation, and that we should consider the case of monopsonistic competition instead. According to Bhaskar & To (1999), under the framework of a large number of firms, job heterogeneity and individual market power, the key fact is that firms have the option to enter or exit the market. As the authors specify, the imposition of a minimum wage will make some firms exit the market (due to the increase in labor costs), which will increase employment in the remaining firms (also in Bhaskar, Manning & To, 2002). However, they argue that the aggregate employment effect is related to the



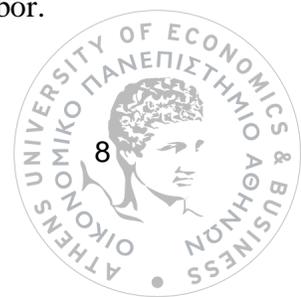
level of distortion in the labor market. In essence, the more distorted the labor market is, the more probable the positive employment effect of the minimum wage is.

#### 1.4. EFFICIENCY WAGES

The efficiency wage theory deals with the particular incentives of workers to provide their effort and the particular incentives of employers to pay a wage higher than the market-clearing one. The argument of the theory is based on labor productivity. Workers will choose to put positive effort into their jobs/tasks if and only if they have strong incentives to do so. The opponents of the efficiency wage theory argue that a wage higher than the equilibrium wage will increase unemployment and that the increase in labor productivity will not be enough to counterbalance it. Moreover, they claim that the efficiency wage theory aims to explain why in some occupations wages are higher than their equilibrium level rather than explaining why wages should be higher than their equilibrium level. In this section, we will briefly discuss the most important and influential theories of efficiency wages.

To begin with, Salop (1979) emphasizes on the firm's willingness to reduce labor turnover costs. In doing so, the firm pays higher wages in order to prevent workers from quitting. The rationale goes as follows: if a worker quits, the firm will have to hire a new one, who will have to be trained. At the same time however, it is ambiguous as to when the new worker will reach the productivity levels of the worker who recently quit the job. It is extremely apparent that the procedure just described is costly to the firm, and therefore they will choose to pay a wage higher than the market-clearing one.

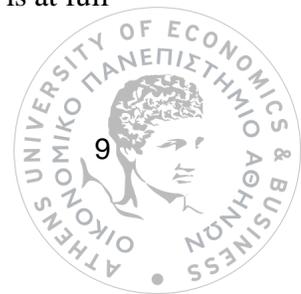
Weiss (1980), made certain key assumptions (i.e. the wage level is inconsistent with labor productivity and the acceptance wages are an increasing function of labor productivity), and showed that it is optimal for a firm to pay higher wages. The intuition behind the necessity of a higher wage is that a firm is actually looking for efficient workers. Thus, a firm that provides higher wages, attracts more and better labor. Moreover and according to the author, it is not optimal for a firm to cut wages even when it faces a fall in the demand for its output. A wage cut would induce productive workers to quit and search for alternative jobs that offer higher wages. Finally, notice that Weiss (1980) assumes that there is asymmetric information in the labor market, which explains why firms might choose to increase wages in their effort to attract productive labor.



Akerlof (1982) proposed that we should examine labor markets and labor contracts through the notion of the gift-exchange economy. In essence, the gift-giving idea emphasizes on labor productivity, which depends on norms of work effort. Thus, it is important to understand that the analysis takes into consideration the sociological aspect of labor contracts. Practically, the author argues that higher wages induce workers to increase their effort in return for the increase in their income. However, this gift-exchange condition (i.e. higher wages and better working environment for higher effort), cannot be examined through the neoclassical-competitive model where an increase in the wage above the equilibrium wage, creates negative employment effects.

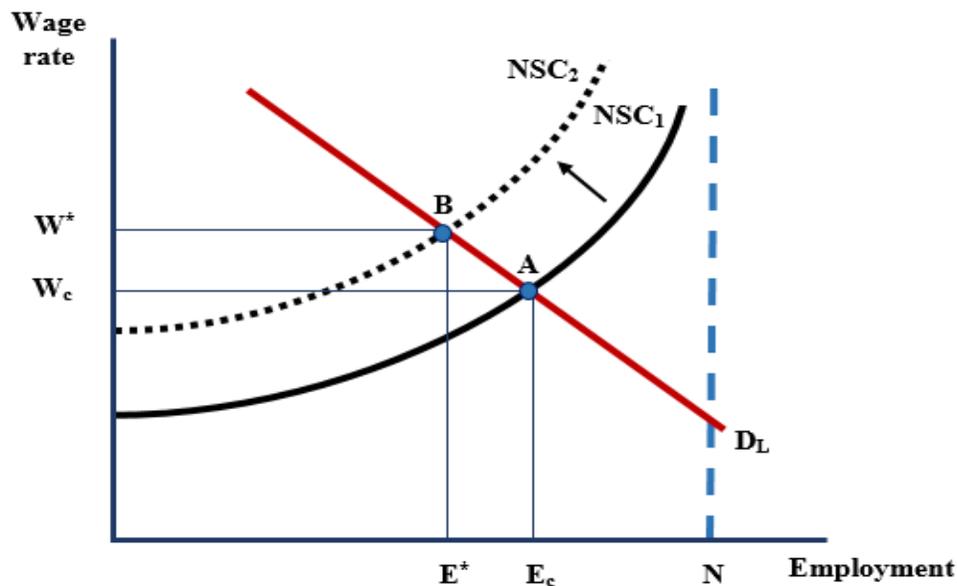
One of the most influential models among the efficiency wage literature is the Shapiro-Stiglitz model, or in other words, the shirking model (Shapiro & Stiglitz, 1984). In their paper, Shapiro & Stiglitz (1984) argue that increased incentives to shirk (due to low wages and increased chances of obtaining a job after being fired), and inadequate monitoring technology to detect a worker who is shirking, lead to higher wages. To begin with, the authors examine the case of involuntary unemployment (i.e. there are workers willing to work at lower wage rates than the existing ones, whereas there are no job vacancies). The only way firms have in order to prevent shirking, a condition that the authors call the no-shirking condition (NSC) is to pay higher wages; if this is done, the penalty of shirking increases, since workers now realize that if they get caught shirking they will get fired and stop receiving this higher wage. Note that the only income a fired worker is assumed to receive is some level of unemployment benefits, which is assumed less than wage rate. The intuition behind NSC is that, if and only if there is a penalty associated with shirking, the worker will choose not to shirk. On the contrary, NSC will never occur if the fired worker is able to obtain a new job immediately. Moreover, a firm finds it optimal to fire a shirker since a wage cut would make the worker shirk even more.

Point A, in Figure 4, illustrates the equilibrium wage and employment, given the assumptions and clarifications made so far. At that point, there is no reason to increase or decrease the wage rate. The latter will induce workers to shirk, while the former will induce employers to lower their demand for labor. Consequently, employment will decrease and employers will have more incentives to reduce wages since with high unemployment, workers will not have strong incentives to shirk. The equilibrium wage and employment then occurs when the labor demand curve  $D_L$  intersects  $NSC_1$  (Point A). Furthermore, notice that NSC cannot occur when the economy is at full



employment ( $N$ ) since workers have incentives to shirk, due to the absence of penalties associated with shirking (no unemployment).

The authors then, alter three key assumption. They assume that there is either an increase in unemployment benefits, an increase in the quit rate<sup>3</sup>, or even a decrease in the firms' monitor intensity. All three of them will induce workers to shirk and, consequently, firms will have to increase wages. In such a case, the  $NSC_1$  curve slides all the way up the labor demand curve,  $D_L$ , which remains unchanged. Now the new NSC curve is the  $NSC_2$ , while the wage rate rises to  $W^*$  and employment falls from  $E_c$  to  $E^*$  (point B). The interpretation of Figure 4 is straightforward; an increase in wages will reduce shirking incentives but will decrease employment as well.

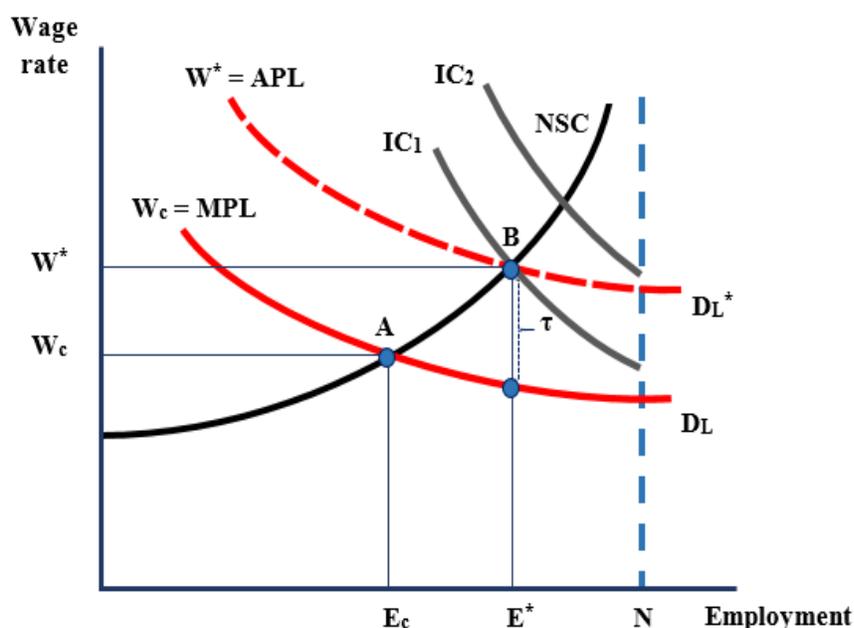


**Figure 4.** The No-Shirking Condition (NSC) and the equilibrium employment. Source: Shapiro & Stiglitz (1984, p. 439)

However, the authors present means where an increase in the wage rate could also increase employment (Figure 5). Provided that the demand for labor,  $D_L$ , is greater than the required effort a worker must put in his job, the indifference curves  $IC_1$  and  $IC_2$  are steeper than the average product of labor (APL). The social optimum then occurs at point B where the NSC intersects  $D_L^*$  (where wages equal APL). The market equilibrium occurs at point A, where the NSC intersects

<sup>3</sup> The probability per unit of time that a worker will be separated from his job (due to relocation etc.).

$D_L$  [where wages equal the marginal product of labor (MPL)]. In effect, the authors suggest that, it is possible to achieve the social optimum depicted in point B, by taxing away all profits and imposing a wage subsidy ( $\tau$ ). Notice though that such an option does not lead to Pareto optimality. That is, since profits fall, one of the two parts (employers) is indeed getting worse. Nevertheless, the authors conclude that if there is proper government intervention, which aims to put into force well designed unemployment benefits or taxes and subsidies on monitoring, Pareto improvements can possibly occur.



**Figure 5.** *NSC, equilibrium employment and social optimum.* Source: Shapiro & Stiglitz (1984, p. 440)

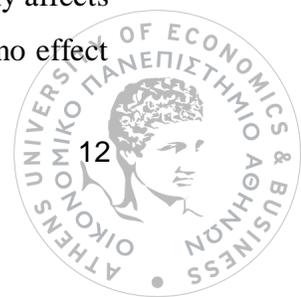
Consistent with Shapiro & Stiglitz (1984) appear to be Rebitzer & Taylor (1995), who support that, unless the minimum wage is set high enough, its imposition might lead to positive employment effects. Essentially, they argue that an increase in the wage rate will also increase the cost of job loss, and therefore, workers will choose not to shirk. As regards employers, they will now be able to save resources, due to the decrease in monitoring expenses, which will allow them to hire additional workers. Notice though that the authors also make an argument on the employment effect of the minimum wage with respect to its short and long run consequences. According to their model, the short run effect of the minimum wage would be an increase in employment. However, this positive employment effect will not persist, since firms will start

losing profits. On the other hand, the long run effect is ambiguous; it can either increase, decrease or leave employment unaffected.

## 1.5. JOB SEARCH AND MATCHING MODELS

Stigler (1962) focuses on the value of information available to economic agents (both workers and employers). As the author argues, it is extremely difficult for a worker to be aware of the wage and conditions of employment that each employer offers. Therefore, wage dispersion is a problem a worker must account for when he/she lacks of the information. In order to eliminate wage dispersion and increase his/her level of information, a worker must increase his/her search effort; if this is done, he/she will be aware of the wage rates offered by employers and will be able to reject low-paying jobs. However, searching for a job entails a certain cost, which is the cost of search. It is straightforward then that when the cost of search is large enough, workers stop searching for a job. Regarding employers, the author argues that when an employer hires new labor it is actually bearing a substantial cost, which is the cost of training and low productivity for a given period. To eliminate this cost, an employer will have to offer higher wages in order to reduce the quit rate and attract high-quality labor. This hiring cost is apparent in large firms where the detection of unproductive workers is actually difficult, and therefore a higher wage is needed to induce workers to be more productive. On the other hand, when it comes to smaller firms it is easier to monitor the productivity of each worker, and therefore, no wage increase is necessary. Finally, regarding the social implications of the importance of information in the labor market, the author argues that increased levels of information will stimulate productivity and prevent low-quality workers from finding high-quality jobs, and low-quality employers obtaining labor.

McCall's (1970) search model is also an important input to the job search theory. The author makes a clear distinction between dropouts (those who do not search for a job) and frictionally unemployed (those who wait for the right offer to accept a job opportunity). In essence, he suggests that if the cost of job searching is high, the individual will choose to stop searching for a job vacancy. On the other hand, as the cost of searching drops, the individual will start looking for a job. Consequently, he argues that in order to reduce dropouts, the right policy would be either to decrease the cost of searching, or train them in order to improve their skills and the wages related to those skills. Regarding the imposition of a minimum wage, the author argues that it only affects those who are frictionally unemployed; that is, the imposition of a minimum wage has no effect



on dropouts. However, the minimum wage will affect those who search for a job, if and only if, it is above the critical wage (or reservation wage) that induces the worker to remain unemployed (i.e. the expected return from unemployment). Thus, a job searcher will reject offers between the critical wage and the minimum wage, which would have been accepted otherwise. Finally, the author notes that information and over-optimism or over-pessimism can be important determinants of the choice between dropping out and searching for a job, as well as an important determinant of the length of frictional unemployment.

In line with Stigler (1962) and McCall (1970), Burdett & Mortensen (1998), support that information plays an important role in labor markets, and that wage dispersion is a consequence of imperfect information. In addition, the authors draw three important conclusions. Firstly, experience and tenure are important determinants of the wage level; that is, high levels of experience and tenure imply higher wages. Secondly, the higher the wage, the higher the labor force available to employers. Thirdly, low wage offers induce an increase in quit rates. Regarding the effect of the minimum wage while accounting for heterogeneous workers with respect to the opportunity cost of employment, it is considered to reduce unemployment caused by monopsony power and increase wages. Finally, regarding employer heterogeneity with respect to the level of productivity, the authors conclude that productive employers attract more labor and pay higher wages.

The search and matching theories described so far rely heavily on the role of information in the labor market. Therefore, the level of information, is considered one of the most, if not the most, important determinants of job search. However, another important determinant that affects equilibrium employment and wage is the level of bargaining power. Diamond (1982) argues that the number of workers relative to the number of vacancies is of primary importance regarding the determination of bargaining power. The intuition behind this suggestion is straightforward. When there are more workers than vacancies, employers have the bargaining power, and therefore, it is easier for them to obtain labor. However, notice that the wage that induces workers to enter the market depends also on their own bargaining power, which can set the reservation wage at either a high or a low level. Nevertheless, we should not relate the bargaining power only to the level of unemployment. For example, another determinant of the bargaining power is the level of unemployment insurance, which is a factor taken into consideration from both the efficiency wage theory (e.g. Shapiro & Stiglitz, 1984) and the search and matching theory (e.g. Diamond, 1982).

Generally, a high level of unemployment insurance is assumed to strengthen the bargaining power of workers and increase the number of rejected offers. Finally, as Rogerson, Shimer & Wright (2005) suggest, apart from the increase in the number of rejected offers (due to the increased reservation wage), a high level of unemployment insurance will also increase the duration of unemployment.

## 1.6. INSTITUTIONAL MODEL

Kaufman (2010) analyzes the effects of the minimum wage legislation, within the framework of institutional economics. The author provides four rationales in favor of minimum wage legislation. To begin with, he argues that labor markets are characterized by imperfect competition and inequality of bargaining power, especially among low-skilled and disadvantaged workers. In essence, the fact that labor markets are imperfectly competitive means that firms are not wage-takers, and that they have at least a moderate control over wages. Therefore, the introduction of a minimum wage would help reduce inequality of bargaining power and provide a more competitive outcome. According to the author, the analysis of the standard competitive model is austere since it does not account for the welfare implications of the competitive wage, which might fall behind its reasonable value; that is, the wage that economic agents perceive as fair and reasonable, given aggregate conditions.

The second rationale refers to the macroeconomic implications of the minimum wage. The minimum wage can increase income and demand, and therefore reduce unemployment, which institutionalists consider involuntary. Consequently, it can prevent both deflation and the continuous downward pressure on wages and prices (destructive competition). Finally, the minimum wage leads to an equal share of the gains from productivity growth.

Thirdly, minimum wages provide economic efficiency by reducing employment insecurity and by reassuring that wages are not excessive. In line with Akerlof (1982), the author argues that fairness in the workplace will both increase work effort and help workers commit to the firm.

The last rationale in favor of the minimum wage arises from the existence of labor market externalities and the social cost of labor. Essentially, incomplete labor contracts that include inadequate wage and nonwage benefits, increase the social labor cost. Even if this argument favors the introduction of a social wage, the author suggests that since the social wage as a concept is deplored, the second best option is the introduction of a minimum wage. Nevertheless, the author

also argues that in terms of the competitive model (Figure 1), the introduction of a minimum wage at  $W^*$ , where it covers the full social cost of labor, will increase unemployment. It should be noted however that this is not to be considered a bad outcome. The intuition is that at  $W^*$ , firms produce and employ at the efficient and truly competitive equilibrium, where workers are not underpaid. Consequently, unemployed workers can now engage in activities that are more profitable than working for a low-paying job.

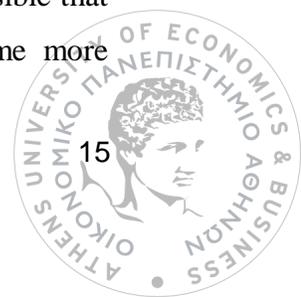
Finally yet importantly, the author suggests that the minimum wage is not the only option available, especially when its introduction comes at a great cost. For instance, an alternative policy might be a wage subsidy to employers, which could increase labor demand and employment. Hence, according to the institutional theory, the imposition of a minimum wage is one way, however not the only one, to increase employment.

## CONCLUSION

Undoubtedly, all the theories presented are important inputs to the minimum wage debate. The key factor in understanding the divergence between these theories is the assumptions they make. For instance, the standard competitive model does not allow any minimum wage increases since it considers markets as perfectly competitive. However, even if we assume that markets are indeed perfectly competitive, we cannot ignore the argument of Dolton and Bondibene (2012) who comment on the shifts of labor demand due to aggregate economic conditions. Thus, even under the austere assumptions of the competitive model, the impact of the minimum wage on employment is not as clear. Moreover, as institutionalists suggest, the equilibrium wage and employment determined by the competitive model, does not account for any welfare implications.

Nevertheless, the problem is not the individual or the subsequent assumptions of these theories, but the way they view the labor market. For example, in reality we cannot assume that labor markets are monopsonistic. A more realistic assumption would be monopsonistic competition, since a worker can obtain a job in other industries as well, especially in times of growth when the number of firms increases.

In contrast to the competitive model and monopsony, the efficiency wage theory gives prominence to incentives and norms of work effort. It is certainly true that some workers do appreciate wage increases. Moreover, and according to the institutional model, it is possible that the minimum wage will decrease employment insecurity, and make workers become more



efficient. However, work effort is also a matter of working conditions. Poor working conditions cannot counterbalance generous wages. Note that according to the efficiency wage theory, firms aim to reduce quit rates. The parameter of working conditions is also an important determinant of the quit rate. In addition, generous wages must not lead to excessive loss of profits. Employers will most likely not welcome a decrease in their profits and will try to counterbalance the loss with job destruction or reductions in nonwage benefits. Nevertheless, efficiency wages will be effective under certain circumstances, which are not difficult to meet, yet they must be met.

Job search and matching models suggest that wage dispersion exists under asymmetric information. The introduction of a minimum wage would decrease both wage dispersion and the cost of job search. Thus, a sufficient minimum wage rate is supposed to increase labor supply and competition among workers. Consequently, employers will obtain better labor as well as a decreased quit rate.

Closing this chapter, we must mention the importance of the recovery phase. Mortensen & Pissarides (1994) argue that when an economy is closer to exiting the recession, or in other words, when it recovers at an increasing rate, job destruction is less possible. A decreasing rate of job destruction is a good sign, especially when it is combined with job creation. However, job destruction and creation is a matter of aggregate performance; this means that it depends on the incentives to search for a job, invest, produce, consume etc. Thus, we must treat the recovery phase with caution. If recovery means increase in investment and consumption, a further attack in aggregate demand might delay economic growth.

## *CHAPTER 2*

### *EMPIRICAL CONSIDERATIONS*

#### 2.1. INTRODUCTION

Chapter 1 was constructed in a way where we could best understand the basic theoretical arguments on the impact of minimum wages. In this chapter though, we concentrate on empirical evidence. For a considerable period, the popular opinion was that any increase in the minimum wage would create strong disemployment effects. In 1994 though, Card & Krueger, reignited the discussion by examining the employment effects of the increase in the minimum wage on the fast-food industry in New Jersey, and compared its employment growth with that of Pennsylvania, where the minimum wage remained at the same rate.

In their survey, Card & Krueger (1994) found that the rise in the minimum wage did not cause any job losses in New Jersey; on the contrary, it actually raised employment. Essentially, the authors suggested that as regards employment, there is no evidence of adverse employment effects, which could be explained by monopsonistic and job-search models. In a later book, Card & Krueger (1995, pp.383-384), argue that the standard competitive model is not always correct. Evidence indicates that in reality, like in the New Jersey case, an increase in the minimum wage can have null, positive or negative effects, which depends on the characteristics of each case, and most importantly on whether firms are price and wage takers or not. The “wage-taker” condition is indeed a substantial consideration, since industries, like the restaurant industry, have a moderate control over wages, something incompatible with the standard competitive model (Hirsch, Kaufman & Zelenska, 2015).

Despite the fact that there are numerous studies dealing with the employment effects of minimum wages on a state level, we were able to find only a few well-established studies that comprise international data. Although the present thesis is based on the studies of Neumark & Wascher (2004) and Dolton & Bondibene (2012), we will also present other studies that have been an aid to our understanding of the labor market and the minimum wage argument.

The structure of the chapter is as follows: in Section 2.2, we discuss in detail the studies of Neumark & Wascher (2004) and Dolton & Bondibene (2012) and more briefly other studies. In Section 2.3, we focus on three other categories of studies: studies that do not examine international



data, studies that do not examine the impact of minimum wages, but rather the impact of an economic downturn and studies using data at a state level. In Section 2.4, we try to explain why the empirical literature appears to be somewhat inconclusive and finally, in the last section we provide the conclusions drawn from the empirical literature review.

## 2.2. STUDIES COMPRISING INTERNATIONAL DATA

The study of OECD (1998) is the baseline of most relevant studies. In short, the authors tried to examine the employment effects of minimum wages by using international data. As regards the specifications of the study, the author used data for nine countries and the sample period is 1975-1996. Now, the results indicate that an increase in the minimum wage will lead to negative employment effects for teenagers (15-19) and youths (20-24), which is also true for adults (25-54). However, the disemployment effect is stronger for teenagers and youths.

More recently, OECD (2015) published another employment outlook, which examines the post-crisis minimum wage effects. The study focuses on a number of meta-analyses, which suggest that, there is indeed some evidence of negative impact on youth employment. The relevant impact on adults however, is not of the same magnitude (for example, see Chletsos, 2015). However, the authors warn that in the case of large minimum wage increases, the disemployment effects will be much greater. Finally yet importantly, this study, as well as Arpaia et al. (2017), makes a clear argument on the different minimum wage systems, in terms of the decision making process of the minimum wage. Note that, this consideration is of substantial importance as far as the present thesis is concerned.

One of the most influential studies regarding the empirical minimum wage literature is the one by *Neumark and Wascher (2004)* who estimate the impact of minimum wage on employment in 17 OECD countries for the period 1975-2000. In their study the groups of interest are teenagers (15-19) and youths (15-24). The baseline model they estimate is the following:

$$E_{it} = \alpha_i + \lambda_t + \delta_i t + \beta MW_{it} + X_{it} \Gamma + u_{it} \quad (\text{eq. 2.1})$$

where,

$i = 1, \dots, I$  (country index)

$t = 1, \dots, T$  (time index),

$E_{it}$  = Employment to population ratio



$MW_{it}$  = Minimum wage to average wage ratio

$X_{it}$  = Adult unemployment rate; Relative cohort size of youths

$a_i$  = country effects

$\lambda_t$  = year effects

$\delta_i t$  = time trends

Apart from the adult unemployment rate, which has a strong negative effect on employment, the authors find that, the vast majority of minimum wage estimates indicate a negative employment effect. The authors find in almost all estimations negative minimum wage effects on teens. The authors progressively add in controls, whilst at the same time they try different combinations. The estimated elasticities when they include all three controls (Country Effects, Year Effects and Country- Specific Time Trends), are -0.24 and -0.18, for FE and GMM estimations respectively. The youth estimates yield the same interpretation as the estimates for teenagers. The disemployment effect is apparent in all six estimations. However, the youth disemployment effect is lower than the one of teenagers (-0.016 and -0.13, for FE and GMM respectively)

Regarding the institutional framework of minimum wages, the disemployment effect of the minimum wage on youth employment is smaller when its determination involves collective bargaining. In addition, the disemployment effect of the minimum wage on teen employment is also smaller when a youth subminimum wage exists. However, when it comes to subnational minimum rates, the authors note that the substantial regional or industry variation of minimum wage rates yields remarkable negative results.

When the authors estimate the employment effects of minimum wages while examining their sensitivity to other labor market policies and institutions, the results do not change much. All minimum wage coefficients are negative and statistically significant. Regarding the labor market policies employed by countries, the results for both youths and teens indicate that countries with generous unemployment insurance benefits tend to face greater disemployment effects. However, high labor standards do not affect teens as much as they affect youths. Active labor market policies and stronger employment protection have a positive impact on employment. Finally, the authors find that union density has a positive effect on teen employment, while there is no effect on youth employment.

The second reference study of the present thesis is the one by *Dolton and Bondibene (2012)*. The main difference between the study of Neumark and Wascher (2004) and the one of Dolton and Bondibene (2012) is that the latter focuses on the impact of minimum wages on employment during an economic downturn, since it accounts for the interaction between the minimum wage and the variable used as a demand side control. The authors estimate the impact of minimum wages on 33 OECD and European countries, where their sample period is 1971-2009. For their specifications, Dolton and Bondibene (2012) equip Equations 2 and 3<sup>4</sup>:

$$E_{jt} = \alpha_3 + J_j + T_t + \gamma_3 X_{jt} + \beta_3 MW_{jt} + u_{jt} \quad (\text{eq. 2.2})$$

where,

$j = 1, \dots, J$  (country index)

$t = 1, \dots, T$  (time index),

$E_{jt}$  = employment rate

$MW_{jt}$  = Minimum wage to average wage ratio / the Percentile at which the minimum wage bites the wage distribution/ Minimum wage relative to GDP per head

$X_{jt}$  = GDP growth / Dummy for economic downturn (0 =growth 1= downturn / Adult unemployment rate; Relative population size; Bargained Minimum; Youth Subminimum; ALMP (Active Labor Market Policies); EPL (Employment Protection Legislation); Unemployment Insurance Replacement rate; Union Density

$T_t$  = year effects

$J_j$  = country-fixed effects

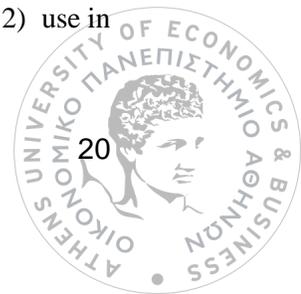
$$E_{jt} = \alpha_2 + T_t + J_j + \beta_2 MW_{jt} + \gamma_2 X_{jt} + \delta C_{jt} + \theta C_{jt} * MW_{jt} + \varepsilon_{jt} \quad (\text{eq. 2.3})$$

where,

$C_{jt}$  = Direct effect of the recession on the employment rate

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<sup>4</sup> Both Equations (2.2 & 2.3), are presented with the exact notation Dolton and Bondibene (2012) use in their study



$C_{jt} * MW_{jt}$  = Interaction effect of any recession and the minimum wage

The minimum wage estimates (Kaitz index) for both youths and adults are negative, indicating a negative employment effect. However, the estimates for adults are substantially smaller than the estimates of youths. As for the rest of the estimates:

- The **GDP growth rate** is estimated to have a **positive** effect on employment for both youths and adults.
- Relative population size is estimated to have a **negative** effect on youth employment but a **positive** one adult employment
- The dummy variable for the **bargained minimum** is estimated to have a **positive** effect on employment for both youths and adults.
- The dummy variable for the **youth subminimum** is estimated to have a **negative** effect on employment for both youths and adults (but statistically significant only for adults)
- **ALMP** (Active Labor Market Policies) is estimated to have a **negative** effect on employment for both youths and adults
- **EPL** (Employment Protection Legislation) is estimated to have a **negative** effect on employment for both youths and adults (but statistically significant only for adults)
- The **Unemployment Insurance Replacement rate** is estimated to have a **negative** effect on employment for both youths and adults
- **Union Density** is estimated to have a **positive** effect on employment for both youths and adults (but statistically significant only for youths)

Apart from the Kaitz index, the authors use alternative minimum wage measures as well as alternative demand side controls. As for the alternative demand side controls, they use **a**) the adult unemployment rate and **b**) a dummy variable (0 if periods of growth, 1 if periods of downturn). The alternative minimum wage measures are **a**) the percentile at which the minimum wage bites the wage distribution and **b**) the minimum wage relative to GDP per head. Again, the minimum wage estimates are negative no matter which demand side control the authors use. The effect of these demand side controls is negative for both adults and youths, though the estimates for the dummy are weak and not always statistically significant. The unemployment rate however, has a negative and statistically significant effect. As for the alternative minimum wage measures,

both the percentile and the minimum wage relative to GDP per head are negative and statistically significant, both for youths and adults.

Moving to Equation 3, Dolton & Bondibene (2012) add in the interaction between the minimum wage and the demand side control. Regarding GDP growth rate, the estimate for youths is negative and statistically insignificant, while for adults, it is positive and statistically insignificant. The coefficient of interaction between the minimum wage and the GDP growth is positive for both youth and adult employment (however, statistically significant only for youths). The unemployment rate has a negative and statistically significant effect on youths and adults, while its interaction with the minimum wage is negative and slightly statistically significant for youths. The opposite is true for adults. Finally, the dummy variable is, in all specifications statistically insignificant. Its direct effect is positive on youths and negative on adults. On the contrary, its interaction with the minimum wage, yields negative results for youths and positive on adults. However, apart from the statistical insignificance of the dummy, all its estimates are close to zero. According to their simulations, the authors conclude that the negative effect of the minimum wage on youths strengthens substantially in times of recession.

As for the alternative minimum wage measures, regarding youths, the interaction of both measures with the GDP growth is positive, but only slightly significant for the percentile. On the contrary, as regards adults, the interaction of both measures with the GDP growth rate is statistically insignificant (for the record, positive for the percentile and negative for the minimum wage relative to GDP per head).

Finally, the authors examine the endogeneity of the minimum wage by using the Schmidt index<sup>5</sup> as an instrument variable. They do so, because they support that the determination of the level of the minimum wage lies on the government. When left-wing parties compose the government, a higher minimum wage is expected. The Schmidt index therefore, is a good instrument for the minimum wage, since according to the authors, it is correlated with the Minimum Wage ratio, but uncorrelated with the stochastic factors that determine employment. Their results are in accordance with this conception, as they confirm that left-wing governments are associated with higher minimum wage rates. As for the results, they find that the minimum

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<sup>5</sup> Higher values of the Schmidt index (1 to 5), indicate that left-wing or socio-democratic parties dominate. Lower values of the index indicate that right-wing parties dominate



wage has a negative and statistically significant effect on youths, while for adults the effect is positive but statistically insignificant.

To summarize, Dolton and Bondibene (2012) find that there is a strong negative employment effect on youths (especially during times of recession), while on adults most of the estimates are weak, which provides little evidence of any minimum wage effects for this age group.

Regarding other noteworthy studies, Addison & Ozturk (2012) examine the impact of minimum wages on women in 16 OECD countries from 1971-2008, and find a negative relationship between the minimum wage and female employment. . On the contrary, Feldmann (2009), who examines 73 countries from 2000 to 2003, does not find evidence of any minimum wage impact, and therefore cannot confirm the negative relationship.

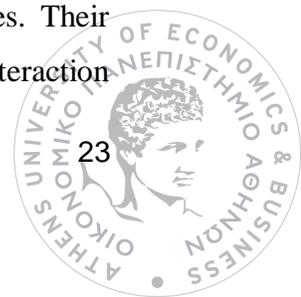
Laporšek (2013) examines 18 EU countries from 1996 to 2011 and finds a negative effect of minimum wages on teen (15-19) and young (20-24) workers. However, the effect is stronger on teens. The author's estimates are somewhat greater in magnitude than in previous related studies, and hence she attributes this outcome to the recent crisis.

Arpaia et al. (2017) examine 18 EU countries (the unrestricted sample, where all available countries and years are included), and 15 EU countries (the restricted sample, where only those countries and years for which the authors were able to find institutional variables are included). In all cases, the results indicate negative employment effects, which in a number of specifications are statistically insignificant. The only two groups that have somewhat statistically significant results are the age group 20-24 and the low-skilled workers. Nevertheless, the authors conclude that at conventional levels, minimum wages do not create strong disemployment effects and that the negative effect on low wage earners disappear over time. Finally, one important contribution of this study is the compilation of the minimum wage decision-making process across EU.

### 2.3. OTHER EMPIRICAL CONSIDERATIONS

Apart from the studies presented so far, we also need to consider some others that either do not equip international data or do not examine the impact of minimum wages, but the impact of economic downturns. Hence, this section comprises three other important categories of studies:

Addison, Blackburn, & Cotti (2013) examine the employment effects of an increase in the minimum wage in times of recession, on teenagers and restaurant-and-bar employees. Their sample includes US data for the years 2005-2010. Moreover, the authors estimate the interaction



between the minimum wage and their recession measure, which is the unemployment rate of each county. Firstly, they do not find enough evidence to support the argument of a greater minimum wage disemployment effect during the recession. Secondly, according to their findings, the disemployment effect is greater among teenagers, and smaller among restaurant-and-bar employees. However, the negative impact on teen employment is greater in states where the unemployment rate is high.

Choudhry, Marelli, & Signorelli (2012) do not examine the impact of minimum wages, but rather the impact of financial crises on youth unemployment (15-24). Their dataset comprises 75 countries for the years 1980-2005. The results are straightforward. The impact of financial crises is always positive and statistically significant, meaning that financial crises consistently raise youth unemployment. In fact, the authors find that the negative effects are greater for youths than for adults (also greater for youths in high-income countries than in low-income countries). Moreover, this negative effect is found to disappear five years after the crisis, while the second and third year is estimated to have the most adverse effects. This result makes a clear argument on the short and long -run impact of the financial crises on youth employment. Choudhry (with Bruno, Marelli & Signorelli, 2017), finds that the adverse youth employment effects are again greater than those of adults, while the impact of the financial crisis is large both in the short and long-run.

A similar study is the one of O'Higgins (2012) who comprises data from 2008Q3 to 2011Q3, in order to examine the impact of the recent recession on youth employment in EU. The author argues that the recession not only exacerbated long-term youth unemployment, but also has helped temporary employment contracts to rise, especially during the third quarter of 2011 where most of the new employment contracts in EU were temporary. In addition, the author finds that only these countries, which had stronger Employment Protection, managed to mitigate the adverse youth employment effects of the recession. Finally, the author's findings are in accordance with Choudhry, Marelli, & Signorelli (2012), in terms of confirming that adult employment is less affected during times of recession.

Another aspect of the empirical minimum wage literature is the dominance of studies that comprise time-series data. However, it seems that we could only utilize these studies in order to understand how the minimum wage, as a labor market institution, is perceived within distinct countries. We could of course draw some conclusions, such as the fact that most of the studies find a significant negative impact on youth employment, however, most of them differ in a number of

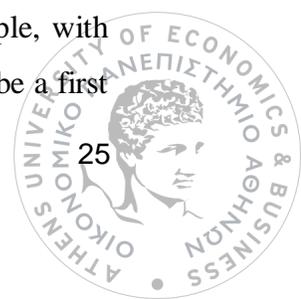
parameters. That is to say that within the same country, studies differ in the time span, groups or even industries examined. For example, Cuesta, Heras & Carcedo (2011) and Galán & Puente (2015), examine the impact of the minimum wage in Spain. Even if the time span appears to be more or less the same (2000-2008 for the former, 2004-2010 for the latter), the fact that Galán & Puente (2015) include years 2009 and 2010 is really important, since these are the first two years of the recent recession. The first difference of these studies is the definition of “youths”, or more specifically, the range of ages incorporated in the group. Cuesta, Heras & Carcedo (2011), examine the age range 16-19, and find slightly positive or null effects of the minimum wage. On the other hand, Galán & Puente (2015) examine the age range 16-24, and find negative effects of the minimum wage. Similar controversy on the impact of minimum wages is present in other studies too, such as the ones concerning Slovak Republic (e.g. Vokorokosová, 2010 and Eriksson & Pytlikova, 2004).

Nevertheless, there are countries where the majority of the studies point to the same direction, with only minor deviations. For instance, in France, Bazen & Martin (1991), Benhayoun (1994), Bazen & Skourias (1997) and Abowd et al (2000) tend to conclude that there are some negative effects on youths. Finally, although the studies comprising times-series exceed by far those comprising panel data, one will not find a wide range of them for most countries. Two extreme examples are Belgium and Luxemburg where we did not find any studies. Moreover, not all studies are recent. In Appendix A, Table A1 provides a description of selected studies that examine the employment effects of minimum wages at a country level (for countries included in the sample of the present thesis).

#### 2.4. CHANNELS OF ADJUSTMENT: AN EXPLANATION FOR THE CONTROVERSY OF THE EMPIRICAL LITERATURE

When examining the impact of the minimum wages we should also take into consideration a number of factors, such as the level and the timing of the minimum wage, as well as the alternative channels of adjustment employers might choose. These adjustment channels might involve cuts in other labor-related costs and not necessarily job destruction (OECD, 2015).

The fact that different studies draw different conclusions on the same matter raises some concerns. However, a good number of studies examine a unique or differentiated sample, with respect to either the period or the groups and variables equipped. Therefore, that might be a first



approach to the controversy of the empirical literature. A second approach however, could be the channels of adjustment available to employers. The channels of adjustment argument could help explain why empirical evidence is somewhat inconclusive and provide a better understanding of the studies that suggest that, given the period and groups examined, the impact of the minimum wage was negligible (Schmitt, 2013). In essence, as Hirsch, Kaufman & Zelenska (2015) suggest, these channels of adjustment might include, increased prices, smaller pay raises, reduction in training-related costs or improvements in the efficiency of workers. Thus, studies that do not confirm the negative impact on employment, by either estimating a positive or a small impact, might have examined a period where employers adjusted to the minimum wage increases, for example, with an increase in prices.

Another channel of adjustment might be the increase in demand. In fact, the potential positive effect of the minimum wage on demand, and consequently on employment, has been treated as a possible explanation for its positive effects. For example, Addison, Blackburn & Cotti (2009), examine the employment effects of minimum wages on employment and earnings in selected branches of the US retail-trade sector, for the period 1990–2005. The authors do not confirm the negative impact of minimum wages, while in some cases they find positive effects. Regarding, the interpretation of the results, they suggest that one possible explanation is the increase in the demand for products. However, that channel is conditional on the status of the economy (in recession or growth), and on the proportion of workers that are minimum wage earners. Then, economies in recession, where demand is falling due to the decrease in income, might find the increase in the minimum wage particularly helpful, since demand and consumption might increase again. However, that requires the share of minimum wage workers to be adequate; if not, the entire argument is irrelevant since the minimum wage will not have any discernible, let alone substantial, effects on demand.

Finally, regarding profits, Neumark & Wascher (2008, p. 243) argue that employers might adjust to a minimum wage increase, by reducing nonwage benefits (such as training), which can counterbalance the increase in labor costs. In addition to that, a common argument is that employers might accept some fall in profits, for the sake of efficiency. However, this idea seems to be falling away from the main scope of businesses; that is, to maximize profits. Hence, at least in the long-run, a more rational channel of adjustment for employers is to counterbalance the increase in the minimum wage without losing profits. Therefore, studies examining the impact on

employment based on firm level data would be wise to examine whether firms tried to adjust by cuts in employment or by cuts in nonwage benefits.

## CONCLUSION

In general, as regards the empirical literature, the group reported to be affected the most by the minimum wage is younger people. We do not use “youths” for younger people since many studies define youths differently. However, it seems that the younger the age group is, the more likely it is to be affected. In addition to that, from the studies reviewed in this thesis, it appears that the more compact and specific the group under examination is, the more reliable the results reported by these studies are.

In short, Neumark & Wascher (2004) and Dolton & Bondibene (2012) confirm the negative impact on younger workers. As regards older workers, Neumark & Wascher (2004) seem to conclude that there is also evidence of disemployment effects. The opposite is true for Dolton & Bondibene (2012). However, both studies agree on the fact that the younger the worker is, the more likely the disemployment effect.

The interaction between the minimum wage and the demand side control, as examined by Dolton & Bondibene (2012), appears to play a key role in the minimum wage argument. Thus, it will be interesting to examine whether this parameter makes any difference regarding our own results. The fact that the authors conclude that the minimum wage affected youths more during the recession is thought provoking. One explanation is that minimum wages increase labor costs, and makes employers reduce their demand for labor. However, one could expect that in times where demand is falling sharply, for example in the recent recession, an increase in income could improve aggregate conditions, such as consumption and employment. Hence, this result is subject to further investigation, as far as the present thesis is concerned.

Finally, regarding the channels of adjustment, it seems that they can explain why empirical evidence is inconclusive. Nevertheless, we must be careful when making use of this argument since each channel of adjustment is conditional on the will and power of employers, as well as on aggregate conditions.

## CHAPTER 3

### *MINIMUM WAGES, THE GREAT RECESSION AND THE SUBSEQUENT RECOVERY*

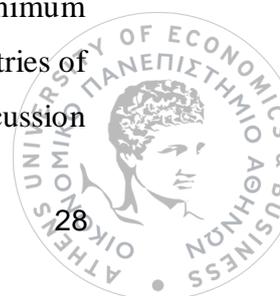
#### 3.1. INTRODUCTION

In this chapter, we will investigate the effect of the minimum wage on employment during the recent recession and the subsequent recovery. Our panel dataset comprises 17 EU member states for the period 2007-2015. We chose to examine this period in order to understand the employment patterns in a period of poor aggregate conditions in countries that are in some way related to each other. The link between these countries is their participation in the European Union. The age groups examined are Youths (15-24) and Adults (25-54).

The recent recession came to reveal the structural deficiencies of many EU member states. These deficiencies were exacerbated by the sharp fall in demand. However, the magnitude and time span of the crisis is not the same across all of the countries of our sample. Some countries were affected only slightly and for a relatively short period. Some others however, with the extreme example being Greece, were affected substantially and for a longer period. Therefore, in order to estimate and understand the employment patterns of the recent recession that are related to the minimum wage, we employed three strategies. Firstly, we made clear to ourselves that the minimum wage is not just a labor cost or a tool to boost demand. The minimum wage-employment relationship follows time-specific idiosyncratic patterns. Hence, having that in mind we were ready to analyze our results, regardless of the estimated effects. Secondly, we kept the period of our sample to the boundaries of the recent economic downturn. In doing so, we held our sample compact but at the cost of a low number of observations. Thirdly, following Dolton & Bondibene (2012), we tested whether the interaction between the minimum wage and our demand side control provides a better understanding and interpretation of the estimated effects.

In addition, we also examine which system of minimum wage setting is most likely to be more effective, in terms of a positive and significant effect on employment. Even if such an estimation relies heavily on our sample, we believe that it would be interesting to examine the effects of various minimum wage mechanisms.

In Section 3.2, we present the methodology and data used for our specifications. In Section 3.3, we provide some summary statistics on the level of employment, the minimum wage ratio and GDP growth as well as on the minimum wages systems across the countries of our sample. In Section 3.4, we proceed to the results of our specifications. In the Discussion



section, we elaborate on the estimated effect of the minimum wage, and finally, in the Conclusion section we make a last comment on our findings.

### 3.2. METHODOLOGY AND DATA

Regarding the data used in order to construct our dataset, OECD databases and publications, the ILO Minimum Wage database and ICTWSS database were the sole sources. In our analysis we also include countries that have not been widely examined in the past, due to the unavailability of data. Fortunately, recent OECD statistical inputs and publications have made countries such as Latvia or Lithuania available to investigate, even if certain data for these countries are limited, especially compared to countries such as Belgium or France. However, the choice to include only EU member states, as well as to include countries with limited data, came at the cost of “losing” a great amount of observations.

Moving to the methodology and the econometric models we estimated, following Neumark & Wascher (2004) we start from Equation 3.1:

$$E_{it} = \alpha_i + \tau_t + \omega_{it} + \beta MW_{it} + \gamma X_{it} + u_{it} \quad (\text{eq. 3.1})$$

where,

$E_{it}$  = employment to population ratio

$MW_{it}$  = minimum wage to average wage ratio

$X_{it}$  = GDP growth, Relative cohort size, Bargained minimum, Youth subminimum, Active labor market policies, Employment protection index, Trade union density, Out-of-work income

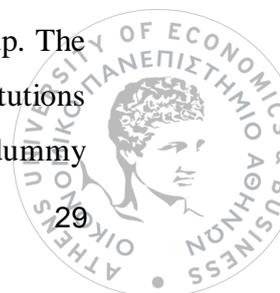
$\alpha_i$  = country effects

$\tau_t$  = year effects

$\omega_{it}$  = country specific time trends

The depended variable, employment to population ratio, refers to youths (15-24) and adults (25-54). Unlike Dolton & Bondibene (2012) we do not examine the age group of 25 to 64 since we believe that the additional 10 years (from 54 to 64) might be misleading, given that it is more probable that the minimum wage affects the age group 25-54. Moreover, extending the age groups, or even examining the total employment to population ratio (15-64) will not provide clear results.

The minimum wage measure is the Kaitz index, while our demand side control is the GDP growth rate. The supply side control is the relative cohort size of each age group. The remaining variables included are the usual measures of labor market policies and institutions employed in the standard minimum wage model. The inclusion of the institutional dummy



variables Bargained minimum (1 if the minimum wage is bargained, 0 if it is statutory) and Youth subminimum (1 if separate minimum wage rates apply to younger workers, 0 otherwise) allows us to control for differences in minimum wage systems. In addition, in order to examine which minimum wage system provides better and significant outcomes, we re-estimate Equation 3.1 by replacing Bargained minimum and using instead three categories of minimum wage systems (we explain more in subsection 3.4.4.).

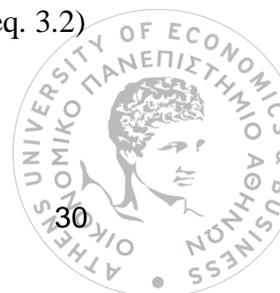
Active labor market policies measure the public spending as a percentage of GDP that aims to increase employment and job vacancies. Employment protection index measures the strictness of regulation on individual and collective dismissals and the use of temporary contracts. Trade union density is the ratio of union members divided by the total number of employees.

Moreover, notice that in contrast to the studies of Neumark & Wascher (2004) and Dolton & Bondibene (2012), we employ Out-of-work income as a control of the level of benefit generosity. Out-of-work income measures the public spending on passive labor market policies as a percentage of GDP, and includes full and partial unemployment benefits, unemployment insurance, unemployment assistance, part-time unemployment benefits, redundancy and bankruptcy compensation.

Following Neumark & Wascher (2004), apart from country effects we also choose to include year effects as well as country specific time trends. The former allows for the control of global shocks that affect the employment rate of all countries (i.e. a global financial crisis), while the latter allows for the control of factors that might influence the employment rate of countries separately, due to distinct policies or aggregate conditions. The inclusion of all these controls holds for all specifications.

Apart from Equation 3.1, we also employ the strategy of Dolton & Bondibene (2012) in order to provide a solid interpretation of the minimum wage effects during times of low or negative growth. The interaction effect between the minimum wage and the GDP growth is essential since it provides the overall employment effect of the minimum wage, given the assumption that there is an important interaction between aggregate conditions and the level of the minimum wage. Hence, in Equation 3.2 we also add the interaction ( $MW * GDP_{it}$ ) between the minimum wage and GDP growth:

$$E_{it} = \alpha_i + \tau_t + \omega_{it} + \beta MW_{it} + \gamma X_{it} + \delta GDP_{it} + \eta MW * GDP_{it} + u_{it} \quad (\text{eq. 3.2})$$



### 3.3. SUMMARY STATISTICS

Table 1 provides information on the employment to population ratios of both age groups, the minimum wage ratio and GDP growth in 2008 and 2015. In terms of the time span of the crisis, 2008 is considered to be the first year of the crisis, while 2015 is considered to be one of the recovery years for the majority of the countries in our sample. Table 2 displays the

*Table 1. Summary statistics of the employment to population ratio, the minimum wage ratio and GDP growth.*

Country	Employment to population ratio (15-24)		Employment to population ratio (25-54)		Minimum wage ratio (L.)		GDP growth (L.)	
	2008	2015	2008	2015	2008	2015	2008	2015
<b>Belgium</b>	0.27	0.23	0.80	0.79	0.51	0.49	0.78	1.43
<b>Czech Republic</b>	0.28	0.28	0.84	0.85	0.38	0.39	2.68	5.31
<b>Estonia</b>	0.37	0.37	0.84	0.83	0.38	0.41	-5.42	1.67
<b>France</b>	0.31	0.28	0.83	0.80	0.62	0.61	0.20	1.07
<b>Greece</b>	0.23	0.13	0.76	0.65	0.48	0.48	-0.34	-0.29
<b>Hungary</b>	0.20	0.26	0.75	0.81	0.46	0.53	0.86	3.37
<b>Ireland</b>	0.58	0.37	0.78	0.74	0.52	0.43	-3.94	25.56
<b>Latvia</b>	0.37	0.35	0.82	0.79	0.40	0.52	-3.55	2.97
<b>Lithuania</b>	0.26	0.28	0.81	0.82	0.42	0.50	2.63	2.03
<b>Luxemburg</b>	0.24	0.29	0.80	0.83	0.54	0.55	-1.28	2.86
<b>Netherlands</b>	0.67	0.61	0.86	0.82	0.49	0.46	1.70	2.26
<b>Poland</b>	0.27	0.26	0.77	0.79	0.43	0.51	4.25	3.84
<b>Portugal</b>	0.34	0.23	0.82	0.79	0.49	0.56	0.20	1.82
<b>Slovakia</b>	0.26	0.23	0.80	0.78	0.43	0.47	5.63	3.85
<b>Slovenia</b>	0.38	0.30	0.87	0.83	0.51	0.60	3.30	2.26
<b>Spain</b>	0.40	0.20	0.76	0.69	0.39	0.37	1.12	3.43
<b>United Kingdom</b>	0.56	0.52	0.81	0.82	0.46	0.49	-0.47	2.35

minimum wage systems, since it provides information on whether the minimum wage is bargained or statutory as well as on whether separate youth rates exist. It is obvious that one cannot draw clear conclusions on the relationship between all these different pieces of information. For example, if we assume that employment is more likely to increase when the minimum wage rate is low and bargained, we will then find ourselves in a situation where we will not be able to understand the employment patterns in countries like the Czech Republic,

*Table 2.* Minimum wage systems

**Panel A- Bargained minimum**

<b>Belgium</b>	Yes	<b>Luxemburg</b>	No
<b>Czech Republic</b>	No	<b>Netherlands</b>	No
<b>Estonia</b>	Yes	<b>Poland</b>	No (1992, 1998-2003, 2010 onwards) /Yes (1993-97, 2004-09)
<b>France</b>	No	<b>Portugal</b>	No
<b>Greece</b>	Yes (Prior to 2012) /No (from 2012 onwards)	<b>Slovakia</b>	No (1997-98, 2002-05, 2008 onwards) / Yes (1994-96, 1999-2001, 2006-07)
<b>Hungary</b>	Yes	<b>Slovenia</b>	No (2007 onwards) / Yes (2005-06)
<b>Ireland</b>	No	<b>Spain</b>	No (2011 onwards) / Yes (prior to 2011)
<b>Latvia</b>	No (2001-03, 2009 onwards) / Yes (2000, 2004-2008)	<b>United Kingdom</b>	No
<b>Lithuania</b>	No (2008-12) /Yes (2007, 2013 onwards)		

**Panel B - Youth subminimum**

<i>Yes</i>		<i>No</i>	
<b>Belgium</b>	<21	<b>Czech Republic</b>	Limited
<b>Greece</b>	<25	<b>Estonia</b>	-
<b>Ireland</b>	<18	<b>France</b>	Limited
<b>Latvia</b>	<18	<b>Hungary</b>	-
<b>Luxemburg</b>	<18	<b>Lithuania</b>	-
<b>Netherlands</b>	<22	<b>Poland</b>	-
<b>Portugal</b>	<18	<b>Slovakia</b>	-
<b>United Kingdom</b>	<21	<b>Slovenia</b>	-
		<b>Spain</b>	-

Luxemburg or Poland. This is the reason why we need to control for country and year effects as well as for country specific time trends. Generally, it is obvious that the labor market is largely affected by the crisis, something not fully reflected in Table 1. Greece, Ireland, Portugal and Spain are four countries that have been affected the most by the recession, and we assume that this has played a substantial role in forming the results of our estimations.

As regards the minimum wage ratio, it is also apparent that it varies across countries. In 2008 only Belgium, France, Ireland, Luxemburg and Slovenia had a minimum wage ratio greater or equal to 50%. On the contrary, in 2015 France, Hungary, Latvia, Lithuania, Luxemburg, Poland, Portugal and Slovenia exhibit a minimum wage ratio greater or equal to 50%, whilst some of them (e.g. Portugal, Latvia) have a greater minimum wage ratio than in 2008. Finally, in 2015 the highest minimum wage ratio is spotted in France (61%), while the lowest in Spain (37%).

GDP growth rate, our demand side control, is the variable that depicts with substantial accuracy aggregate conditions throughout the sample. The basic difference between 2008 and 2015 is that in 2008 six countries were experiencing negative GDP growth while in 2015 only one was. Nevertheless, from 2008 to 2015, there were years (e.g. 2009) where the majority of the countries were experiencing negative growth.

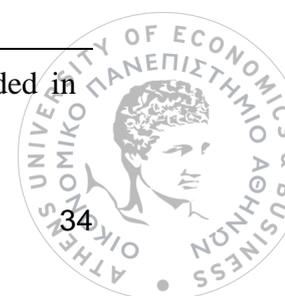
Regarding the different minimum wage systems, it is again apparent that there is a substantial variation even within the same country. The advantage of consulting ICTWSS database in order to construct the Bargained minimum variable is that we are able to identify with certain accuracy the years when the minimum wage was bargained or not. As shown in Table 2 Panel A, seven countries (Greece, Latvia, Lithuania, Poland, Slovakia, Slovenia and Spain) have had both a bargained and a statutory minimum wage throughout the sample. As for the youth subminimum, in Panel B we can see that not all countries have separate youth rates. Notice that the Czech Republic and France are considered not to have a youth subminimum since it is limited to workers with less than six months of work experience (Grimshaw, 2014). Therefore, this limitation does not constitute these two countries directly comparable to countries where age is the criterion that entitles to a specific minimum wage rate. Moreover, it is also important to mention that in some countries (e.g. the Netherlands), youth minimum wage rates vary depending on the age of the worker, while in others (e.g. Greece) there is a single rate that applies to the entire age group. Hence, one consideration is that the dummy variable for the youth subminimum might not fully provide the information needed. That is to say that there could potentially be a chance that some rates help youth employment more, which may provide essential policy guidelines.

### 3.4. RESULTS

*Table 3. Estimates of the minimum wage model*

Variable	(1)	(2)
	FE	FE
	Youths (15-24)	Adults (25-54)
Minimum wage (L.)	0.030 (0.031)	0.068*** (0.019)
GDP growth (L.)	0.180*** (0.043)	0.202*** (0.042)
Relative cohort size	-0.141* (0.767)	0.118** (0.499)
Bargained minimum	0.021* (0.010)	0.011** (0.005)
Youth subminimum	-0.024*** (0.007)	-0.046*** (0.004)
Employment protection index	0.001 (0.007)	0.017*** (0.005)
Active Labor Market Policies	0.026* (0.013)	0.007 (0.013)
Trade Union density	-0.083 (0.191)	0.053 (0.147)
Out-of-work income	-0.048*** (0.006)	-0.041*** (0.006)
Constant	0.590*** (0.189)	-0.004 (0.324)
<b>Minimum wage elasticity</b>	<b>0.047</b>	<b>0.042</b>
Country effects	Y	Y
Year effects	Y	Y
Country Specific Time Trends	Y	Y
Hausman test	0.0251	0.0041
R-squared	0.962	0.943
Observations	130	130

*Notes:* Hubert-White robust standard errors in parenthesis. All the countries included in Table 1 are also included in the analysis. \* p<0.10 \*\* p<0.05 \*\*\* p<0.01



Moving on to the most important part of the present master thesis, we will first present the estimates for Equation 3.1 for both groups and then we will present the estimates for Equation 3.2. Finally, we will re-estimate Equation 3.1 and will use three categories of minimum wage systems as an alternative to the Bargained minimum dummy variable.

#### 3.4.1. YOUTHS (15-24)

In Table 3, Column 1, we present the estimates for youths. The first striking result is the sign of the minimum wage ratio. The minimum wage ratio is estimated to have a slight positive but statistically insignificant effect on young workers. The estimated elasticity is 0.047, which clearly does not cope with the standard minimum wage literature. Nevertheless, we must interpret this result carefully. We attribute this result to the substantial fall in youth employment during the years of the recession, which was not caused by the level of the minimum wage. However, the only stable conclusion we can draw is that the minimum wage is not estimated to have a negative impact on youth employment.

GDP growth rate is estimated to have a positive and significant impact on employment, as expected. Notice though that the relevant coefficient is large and significant at all conventional levels, which indicates that GDP growth was of substantial importance as regards employment growth during the years of the crisis.

Regarding minimum wage setting, Bargained minimum is found to have a positive and significant effect on youth employment. On the other hand, Youth subminimum is estimated to have a negative and significant effect on employment. One could expect that the existence of youth subminimum rates would have a positive and significant effect on youths since it would induce employers to hire younger workers who work for lower rates. Another opinion however, could be that the youth subminimum should be indeed negative, since according to the standard competitive model the problem is the existence of a minimum wage itself; meaning that it creates unemployment regardless of its rate. Nonetheless, as regards youths, it is difficult to favor (or not) one of these opinions. As mentioned in section 3.2 (Methodology and Data), the coding strategy usually followed in order to account for separate youth rates might be misleading, because it answers whether a youth subminimum applies or not, and not whether youth subminimum rates differ substantially from the adult rates. Employment protection index is estimated to positively affect youth employment; however, the effect is only marginal and statistically insignificant. As Dolton & Bondibene (2012) suggest, employment protection is another difficult parameter to estimate due to the ambiguous net effects on employment. For example, Neumark & Wascher (2004) find a positive impact on youth and

teen employment and attribute it to the cost of dismissing workers, while Dolton & Bondibene (2012) find a negative and statistically insignificant effect on youths. On the other hand, Laporšek (2013) finds a positive and significant effect on teenagers and a negative and significant effect on young workers. In our estimation, both the negligible impact and the statistical insignificance does not allow for a conclusion other than the rejection of strong negative effects of higher employment protection.

Active labor market policies provide evidence that an increase in public spending, which aims to promote employment and start-up incentives as well as training and direct job creation, has a positive and slightly significant effect on youth employment. The relatively small effect could be attributed to the fact that the labor market is that distorted that simply raising the expenditure on active labor market policies cannot provide the desired results.

Trade union density is found to have a negative and insignificant effect on youth employment. In fact, the recent crisis was that great in magnitude that it did not allow unions to bargain wages like they used to in the past. Countries that received substantial financial support and signed a memorandum of understanding (Greece, Ireland, Portugal, Spain) left little space to trade unions to have any significant effect on wage determination and employment.

Finally yet importantly, Out-of-work income is estimated to have a negative and significant effect on youths. Thus, in line with theory we find that an increase in unemployment benefits reduce incentives to search for a job, especially when these benefits grant the same or almost the same utility from working and receiving the minimum wage. Nevertheless, the effect is not large enough, as one could expect. We attribute the relatively small effect on the fact that the decrease in employment and wages in some countries decreased consumption, which in turn led employment to decrease even more. Hence, unemployment benefits maintained some incentives to consume, which in turn mitigated but did not eliminate the negative effect of the increase in public expenditure on passive labor market policies.

#### 3.4.2. ADULTS (25-54)

In Column 2, Table 3, we present the estimates for adults. Regarding the effect of the minimum wage on adult employment, we find a positive and statistically significant effect, which is however not strong (the relevant elasticity is 0.042). The interpretation of this result should be made with extreme caution. Firstly, the fact that we do not confirm the negative effect of the minimum wage on adult employment is attributed to the same reason why we did not find a negative impact on youths. That is, the minimum wage was not responsible for the

fall in employment during the crisis. In fact, many countries tried to use the minimum wage as a tool to mitigate a further decline in consumption. Secondly, it is important to understand that during the crisis the number of prime age adults working for the minimum wage or for wages close to the minimum wage increased. Therefore, during a period of decreased demand and consumption, small or marginal increases in the minimum wage could not cause disemployment effects, let alone meaningful disemployment effects.

The GDP growth rate is again estimated to have a positive and significant effect on employment. Similarly, a bargained minimum wage is found to have a positive effect on adult employment. Regarding the existence of youth subminimum rates, we find a negative and significant effect. This time however, it is easier to interpret the result. According to our estimates, the existence of lower youth rates provide incentives to employers to substitute adult labor for youth labor.

Employment protection has a positive and significant impact on adults. For once again, we did not confirm any negative effects. Up to a certain extent, we can assume that employment protection mitigated the fall in adult employment, which could have been greater at the absence of the relevant legislation.

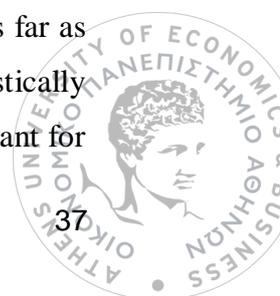
Active labor market policies are again estimated to have a small impact on employment but this time the impact is not significant. Nevertheless, we believe that the same rationale we equipped for youths apply to adults too. The level of distortion of the labor market leads to positive but negligible effects on adult employment. In addition, we believe that active labor market policies have a more understandable meaning on younger workers than on older workers. Perhaps, shortening the range of the adult age group, could provide better results.

Trade union density is again estimated to be insignificant, but this time it is positive. As stated in the case of youths, we are not shocked by the small and statistically insignificant result since the recent crisis mitigated the power of unions.

Out-of-work income has a negative and significant effect on adults as well. The effect is again relatively small but the reasoning is the same; unemployment benefits maintained some incentives to consume. Practically though, increased unemployment benefits come at the cost of higher public expenditure, and an increase in quitting or shirking incentives.

### 3.4.3. MINIMUM WAGE AND GDP GROWTH

In Table 4, we add the interaction of the minimum wage with GDP growth. As far as the minimum wage is concerned, it is still positive for both age groups, and statistically significant for adults. As regards the effect of the interaction, it is negative and significant for



adults, while for youths is positive and insignificant. Needless to say that the difference in the effect of the interaction between youths and adults indicates that each age group has its own patterns during a recession. However, the marginal positive and insignificant effect of the interaction on youths confirms that the relevant age group is considerably difficult to investigate during the recent recession, especially since the minimum wage is not predicted to explain the fall in demand for youth labor.

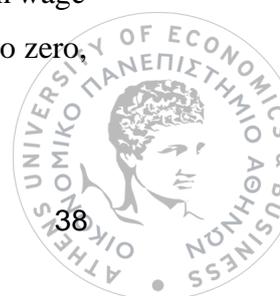
Regarding adults however, the results indicate that the interaction we added is able to provide the overall effect of the minimum wage. The negative sign of the interaction (-0.546), implies that as far as our sample is concerned, during times of negative growth small increases in the minimum wage rate are needed the most.

**Table 4.** *The Interaction between the minimum wage and GDP growth*

Variable	(1)	(2)
	FE	FE
	Youths (15-24)	Adults (25-54)
Minimum wage (L.)	0.030 (0.035)	0.075*** (0.017)
GDP growth (L.)	0.169 (0.243)	0.440*** (0.101)
MW*GDP (L.)	0.025 (0.531)	-0.546** (0.233)
Country effects	Y	Y
Year effects	Y	Y
Country Specific Time Trends	Y	Y
R-squared	0.962	0.944
Observations	130	130

**Notes:** Hubert-White robust standard errors in parenthesis. All the countries included in Table 1 are also included in the analysis. \* p<0.10 \*\* p<0.05 \*\*\* p<0.01

In Table 5, we chose four countries that were hit the most by the recent recession, in order to provide a solid understanding on the impact of the interaction on adult employment. Starting from Ireland in 2012 and Spain in 2010, the only way the impact of the minimum wage remains unaffected (that is, 0.075), is for an economy to be experiencing zero, or close to zero, GDP growth.



In the case where an economy faces negative growth, the effect of the minimum wage strengthens, probably due to its power to prevent further decreases in demand and consumption. However, this result is conditional on the magnitude of the negative growth. For example, in 2011 Greece experienced a negative growth rate of 0.091 %. Therefore, the effect of the minimum wage on employment has strengthened (from 0.075 to 0.125). On the contrary, at positive levels of growth (e.g. Spain in 2014) the effect weakens (from 0.075 to 0.067). Ireland in 2015 is the loudest example since the growth rate of 0.256% led to an overall minimum wage effect of -0.065.

Therefore, our results indicate that there are times when minimum wage increases are needed, and times when are not. Notice however that the results concern the minimum wage-employment relationship during a downturn. They do not take into account other factors that might render this analysis only basic. For example, in the case where policy makers aim to boost economy (during a recession) by increasing the minimum wage without employing policies that would increase productivity as well, our analysis turns pointless. Hence, this is only a preliminary interpretation of the estimates. Further elaboration will be made in the Discussion section.

*Table 5. Simulations of the overall minimum wage effect for adults during various GDP growth rates*

	<b>Greece</b>		<b>Ireland</b>		<b>Portugal</b>		<b>Spain</b>	
	<i>GDP growth</i>	<i>MW (L.)</i>						
<b>2008</b>	-0.003	<b>0.077</b>	-0.039	<b>0.096</b>	0.002	<b>0.074</b>	0.011	<b>0.069</b>
<b>2009</b>	-0.043	<b>0.098</b>	-0.046	<b>0.10</b>	-0.03	<b>0.091</b>	-0.036	<b>0.095</b>
<b>2010</b>	-0.055	<b>0.105</b>	0.018	<b>0.065</b>	0.019	<b>0.065</b>	0.00	<b>0.075</b>
<b>2011</b>	-0.091	<b>0.125</b>	0.03	<b>0.059</b>	-0.018	<b>0.085</b>	-0.01	<b>0.08</b>
<b>2012</b>	-0.073	<b>0.115</b>	0.00	<b>0.075</b>	-0.04	<b>0.097</b>	-0.029	<b>0.091</b>
<b>2013</b>	-0.032	<b>0.093</b>	0.016	<b>0.066</b>	-0.011	<b>0.081</b>	-0.017	<b>0.084</b>
<b>2014</b>	0.007	<b>0.071</b>	0.083	<b>0.03</b>	0.009	<b>0.07</b>	0.014	<b>0.067</b>
<b>2015</b>	-0.003	<b>0.077</b>	0.256	<b>-0.065</b>	0.018	<b>0.065</b>	0.034	<b>0.056</b>

#### 3.4.4. MINIMUM WAGE AND COLLECTIVE BARGAINING

In this section, we aim to confirm at which bargaining level we obtain a better, or a more significant outcome. The estimates in Table 3 indicate that the collective bargaining of the minimum wage rate has positive effects on employment. However, countries often have diverse minimum wage systems in terms of its determination. To test which of the minimum wage systems provides the most effective results, we examine categories 3 to 5 of ICTWSS coding strategy (variable “NMS: Minimum Wage Setting”). The full index is the following:

0 = No statutory minimum wage, no sectoral or national agreements

1 = Minimum wages are set by (sectoral) collective agreement or tripartite wage boards in (some) sectors

2 = Minimum wages are set by national (cross-sectoral or inter-occupational) agreement (“autonomous agreement”) between unions and employers

3 = National minimum wage is set by agreement (as in 1 or 2) but extended and made binding by law or Ministerial decree

4 = National minimum wage is set through tripartite negotiations

5 = National minimum wage is set by government, but after (non-binding) tripartite consultations

6 = Minimum wage set by judges or expert committee, as in award-system

7 = Minimum wage is set by government but government is bound by fixed rule (index-based minimum wage)

8 = Minimum wage is set by government, without fixed rule.

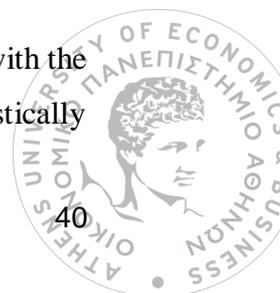
We exclude categories 0, 1 and 2 since they do not apply to any of the countries in our sample. In addition, we exclude categories 6 to 8 since bargaining does not take place. In Appendix B, Table B1, we provide information on the determination of the minimum wage for all countries. The coding we employ in order to re-estimate Equation 3.1 is:

NMS3 = 1 if the minimum wage was determined through category 3, 0 otherwise

NMS4 = 1 if the minimum wage was determined through category 4, 0 otherwise

NMS5 = 1 if the minimum wage was determined through category 5, 0 otherwise

As shown in Table 6, all three NMS dummies are positive, which is consistent with the positive effect of the bargained minimum dummy. Nevertheless, only NMS3 is statistically

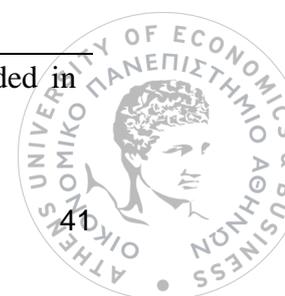


significant for both age groups. Therefore, the determination of the minimum wage through collective agreement or by tripartite wage boards, which is then extended and made binding by law or Ministerial decree, is estimated to have a positive and significant effect. Even if we recognize that this result relies heavily on our sample, we think that it is rational. We believe this to be, since the minimum wage determination through NMS3 renders it possible to rest on a minimum wage rate close or equal to the market rate -or according to institutionalists, to the reasonable rate- without distorting the labor market. Hence, our estimates indicate that at the absence of bargaining between social partners, the economy might rest on the wrong minimum wage rate. As far as bargaining involves inputs of information from all economic agents (i.e. unions, employers, government etc.), minimum wages will be set at adequate rates.

**Table 6.** Estimates of three categories (NMS3 NMS4, NMS5) of minimum wage bargaining

Variable	(1)	(2)
	FE	FE
	Youths (15-24)	Adults (25-54)
Minimum wage (L.)	0.004 (0.032)	0.053** (0.020)
GDP growth (L.)	0.159*** (0.040)	0.190*** (0.038)
NMS3	0.075*** (0.013)	0.043*** (0.010)
NMS4	0.039 (0.029)	0.015 (0.017)
NMS5	0.011 (0.023)	0.005 (0.010)
Youth subminimum	-0.023*** (0.007)	-0.045*** (0.004)
Country effects	Y	Y
Year effects	Y	Y
Country Specific Time Trends	Y	Y
R-squared	0.965	0.945
Observations	130	130

**Notes:** Hubert-White robust standard errors in parenthesis. All the countries included in Table 1 are also included in the analysis. \* p<0.10 \*\* p<0.05 \*\*\* p<0.01



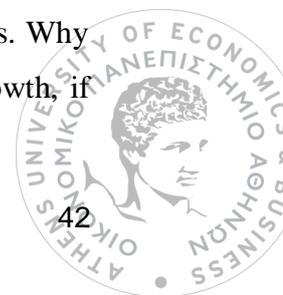
## DISCUSSION

This section is of substantial importance since we will try to explain why the minimum wage is not confirmed to have the strong disemployment effects usually predicted in empirical literature. The first obvious reason is the recent recession. Employment fell, and the minimum wage was not the reason for that fall. Recall Figure 2 in Chapter 1, where the occurrence of a recession coincides with an imposition of a minimum wage. Dolton & Bondibene (2012) argue that the decrease in labor demand could have been caused by both parameters, making it extremely difficult to understand the reason why demand fell. On the contrary, they suggest that during times of growth, we might falsely attribute the increase in labor demand to the imposition of a minimum wage. However, the countries of our sample do not follow this pattern, since all of them have had a minimum wage long before the crisis. Hence, reasonable increases in the minimum wage would not be able to create a shock in the economy similar to the one created by the financial crisis.

Secondly, the statistical insignificance of the minimum wage as regards youth employment should not be surprising. Youths is the most volatile age group as far as the minimum wage is concerned. It is extremely difficult to assume that minimum wage increases could increase substantially and significantly youth employment. However, it is also extremely difficult to assume that the minimum wage could provide strong disemployment effects during a period of decreased demand and high unemployment spells caused by aggregate conditions.

Regarding adult employment, the fact that nowadays a higher proportion of prime age adults work for low wage rates indicates that times have changed. Perhaps, a different sample size, separating low-income EU countries from high-income ones could provide different results. We believe however, that the divergence of the results will mainly concern the statistical significance and not the sign of the effect.

Finally, as seen in Table 5, GDP growth plays a key role in determining the overall effect of the minimum wage. The reason why we decided to add the interaction between the minimum wage and GDP growth was to prove that the effect of the minimum wage is not a predetermined outcome. The extreme example of Ireland in 2015, where GDP growth was at 25.6 %, indicates that the minimum wage is a policy tool that should always be in accordance with aggregate conditions. In fact, all wages should keep track of aggregate conditions. Why should Ireland irregularly increase the minimum wage in a time of radical growth, if



such an action was not needed? Would that not induce a wage push inflation? The answer is straightforward: yes, it would!

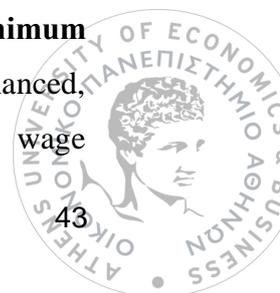
On the other hand, when do we truly need a boost in demand? Again, the answer is straightforward: When the economy is shrinking! A fall in incomes and consumption, and subsequently in employment, is not exactly the definition of a “boost in demand”. Nevertheless, we must be careful. As our estimates indicate, the minimum wage is not capable of transforming the economy alone. We should treat the minimum wage as a supplementary policy tool. An unreasonable increase in taxation or social security contributions will constitute the minimum wage ineffective, even at low rates. Thus, a reasonable minimum wage rate in conjunction with well-designed economic policies could provide the desired results.

As a matter of fact, one of the recommendations of the Council of the European Union (2016) regarding the Portuguese national reform program, was that there should be an increase in the minimum wage. The Council built upon this recommendation due to the low level of inflation and the high level of unemployment. However, it insisted that the high proportion of minimum wage earners, and its potential increase, might put upward pressure on overall wages. Therefore, the Council suggests that the increase in wages must be accompanied by improved aggregate conditions like an increase in productivity.

Additionally, another important consideration that strengthens the interpretation of our estimates is the comment of the Council of the European Union (2016) on the French case study, where in 2016 minimum wage increases were to be considered. The Council stated the following:

*“In the current context of high unemployment, there are risks that the cost of labor at the minimum wage hampers employment of low-qualified people. **While the minimum wage is high compared with the median wage, the cost of labor at the minimum wage has been reduced by social contribution exemptions.** Increases in the minimum wage induce wage increases for most categories of workers and risk creating upward wage compression. **Because of the minimum wage indexation mechanism, there are feedback loops between increases in average wages and changes in the minimum wage, which delay the necessary wage adjustment in response to a weak economic situation.**”*

The above statement is proof that there are ways to counterbalance the costs generated by the minimum wage, and as Eurofound (2017) argues, **“the problem is not the minimum wage itself”**. In this case, we have an already high minimum wage that is counterbalanced, high unemployment, weak economic conditions, and an indexation minimum wage



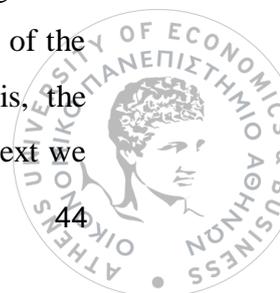
mechanism. Therefore, especially under the risk of creating further upward pressure on other wages the French case loudly indicates that minimum wage increases should not be based only on the minimum wage – employment relationship but to aggregate political, institutional and economic conditions.

Recent Eurofound reports (2017 and 2018) show that no nominal reductions in the minimum wage level were observed over the last two years. On the contrary, these reports show that many countries have undertaken major minimum wage increases. However, there is a substantial divergence between low and high-income EU countries. Low-income countries (e.g. the Czech Republic, Hungary etc.) have increased considerably the nominal minimum wage. Of course, these increases raise some concerns, since they induce employers to adjust rapidly to the new minimum wage levels. On the other hand, high-income countries had smaller minimum wage increases. The only country that had a sharp decline in wages, and has not yet proceeded to any minimum wage increase is Greece. Greece is also the country with the slowest recovery, in terms of GDP growth and high spells of unemployment. Of course, Greece is a somewhat problematic case study since its structural and political instability worsens aggregate conditions and delay its recovery. Nevertheless, we believe that the dramatic attack in demand created by the decline in the disposable income did not help Greece keep pace with the rest of the EU countries.

Therefore, the policy implications of our estimates point directly to Table 5. At high levels of growth, irregular wage increases should not be encouraged. On the contrary, at low or negative levels of growth, marginal minimum wage increases are able to provide additional help to other policies that aim to boost economy and lead to a stable increase in GDP growth. Notice that in cases where minimum wage increases are needed, we suggest that these increases should be well-designed. Remember that in times of low or negative growth, firms are also hit. Thus, sharp increases in labor costs that are not counterbalanced, would mitigate or reverse any positive minimum wage effects.

## CONCLUSION

Minimum wage legislation is still one of the most controversial economic policies. It seems though that the root of the minimum wage debate lies on the way each economist or technocrat interprets both theoretical and empirical considerations. For example, taking as an example our estimates, we feel that it would be wrong to attribute our findings to one of the theories described in Chapter 1. Even the strictest theory presented in this thesis, the competitive model, can have some applications to our findings. Given that in our context we



do not argue for or against the imposition of a minimum wage, but for its level, we can now interpret the standard competitive model somewhat differently.

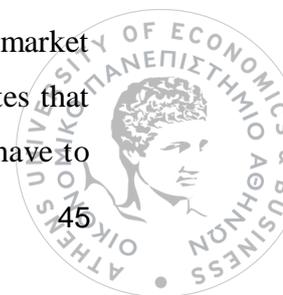
As mentioned in section 3.4.4 (Minimum wage and Collective Bargaining), if we assume that all economic agents have equal access to the bargaining process, the advantage of collective bargaining is that it renders possible that all agents agree on the true minimum wage rate or the market-clearing minimum wage. In fact, ILO (2016) in its Global Wage Report 2016/17, states that the minimum wage setting should be made under adequate statistical evidence and in consultation with social partners. If so, the minimum wage level will be set at a reasonable level and will not hamper employment significantly.

As regards monopsony, it is obvious that labor exploitation was the case during the recession, especially in countries like Greece. However, it would be misleading to assign this labor exploitation only to monopsonistic power during the recession. Firstly, if we were to consider monopsony as the reason why our estimates are positive, we would be then pointing to monopoly power as the source of labor exploitation. Secondly, even if monopsonistic competition might be a more realistic scenario, we believe that in the case of the recent crisis, the problem was much greater.

As regards the remaining theories, such as the efficiency wage theory or the institutional theory, we suggest that it is difficult to test any of their implications on the recent crisis. That is to say that during a time of negative growth and increased job insecurity, it is considerably difficult to measure the “wage that induces workers to provide more effort” or the “reasonable value of the minimum wage as it is perceived by the majority of economic agents”.

Our estimates suggest that times have changed. We believe that the relationship between the minimum wage and employment does not follow a predetermined pattern. Even if we do not confirm any negative effects of the minimum wage during the crisis, we warn that this is only a basic ascertainment. Keep in mind that the minimum wage model we employ, aims to estimate the relationship between the minimum wage and employment. The minimum wage though, is not able to save or destroy an economy by itself.

We suggest that in times of recession, increases in the minimum wage should be considered, only and only if, other policies aim to boost the economy as well. A contractionary policy with increased taxes cannot constitute minimum wage increases effective. Moreover, even if the interaction between the minimum wage and GDP growth is statistically insignificant for youths, the positive sign of the effect indicates that we should treat the youth labor market with caution. In fact, even the negative sign of the interaction effect on adults indicates that even if minimum wage increases would help adult employment, GDP growth would have to



be extremely negative in order to alter substantially the “direct” effect of the minimum wage. Nevertheless, our findings suggest that the minimum wage could act as a supplementary policy tool to prevent demand from falling. For instance, in Greece, political stability and structural reforms would eliminate the need for heavy austerity measures, which include low minimum wage rates as well.

Finally, regarding the rest of the labor market policies and institutions, we believe that given the poor aggregate conditions of the crisis, the impact of labor market policies was mitigated even in countries with well-designed and executed policies. Needless to say that, in countries where labor market policies were poorly undertaken, their effect could not be expected to be radical. A notable example is Spain in 2016, where the Council of the European Union argued that recent reforms of active labor market policies were progressing slowly and that job search assistance was still limited.

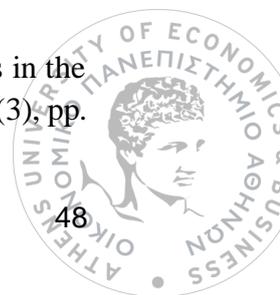
As regards trade union density, we confirm the difficulty to estimate its impact on employment. Moreover, resting on the number of trade union members in order to assume or predict its power might be also misleading. It seems that the answer lies in the level of trade union power, which may or may not be directly linked to the number of union members. A high number of union members accompanied by low levels of power confirms that in many cases quality overpowers quantity. We believe that this is the case in our sample. As for the alternative measure of benefit generosity we used (i.e. out-of-work income), it proved to be the most stable and straightforward variable to interpret. Increased spending on passive labor market policies does not ameliorate poor labor market conditions. To summarize, it is obvious that in order for the minimum wage to provide the desired results, policy makers need to coordinate all labor-related economic policies with exorbitant accuracy.

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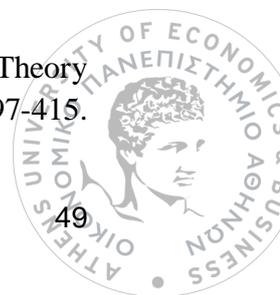
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*APPENDIX A- STUDIES COMPRISING WITHIN STATE EVIDENCE*

*Table A1. Studies comprising within state evidence of the minimum wage employment effect*

<i>Study</i>	<i>Country</i>	<i>Target Group</i>	<i>Impact on employment</i>
<b>1</b> Fialová & Mysíková (2009)	Czech Republic	Low-paid workers	Negative
<b>2</b> Pavelka, Skála & Čadil (2014)	Czech Republic	Total employment (15-64)	No impact
		Youths (15-24)	No impact
		Low-educated workers	No impact
<b>3</b> Bazen & Martin (1991)	France	Youths (15-24)	Negative but small
		Adults (>25)	No impact
<b>4</b> Benhayoun (1994)	France	Youth males (<25)	Mixed: Negative and statistically significant / Positive and statistically insignificant
		Youth females (<25)	No impact
		All youth people (<25)	Mostly negative but small, and statistically insignificant
<b>5</b> Bazen & Skourias (1997)	France	Youths	Negative
<b>6</b> Abowd et. al (2000)	France (& USA)	Youths (<31)	Negative (France)

7	<b>Koutsogeorgopoulou (1994)</b>	Greece	Adult industrial workers	Negative
8	<b>Yannelis (2014)</b>	Greece	Individuals (between 22 and 27)	Negative
9	<b>Kertesi (2003)</b>	Hungary	Low-wage workers	Negative
10	<b>O'Neill, Nolan &amp; Williams (2006)</b>	Ireland	Low-wage workers [workers below the minimum wage (prior to its introduction)]	No impact
			Low-wage workers (where employers would not have increased wages were it not for the legislation)	Negative
11	Van Soest (1994)	Netherlands	Teens	Negative
			Young adults	Negative

12	<b>Majchrowska &amp; Żolkiewski (2012)</b>	Poland	Total employment (15-64)	Mostly negative and statistically significant
			Youths (15-24)	Mostly negative and statistically significant
			Adults (25-34)	Mostly negative and statistically significant
13	<b>Majchrowska, Broniatowska &amp; Żolkiewski (2016)</b>	Poland	Youths (15-24)	Mixed: Positive but statistically insignificant (whole sample) / Negative and statistically significant in poorest regions (regional variation included)
14	<b>Baranowska-Rataj &amp; Magda (2015)</b>	Poland	Young workers (18-29)	Negative
15	<b>Pereira (2003)</b>	Portugal	Teens (18-19)	Negative
			Young Adults (20-25)	Positive
16	<b>Portugal &amp; Cardoso (2006)</b>	Portugal	Teenagers	Mixed: Negative (decrease in newly hired teens) / Job separations decreased (for teens already in employment)

17	Vokorokosová (2010)	Slovak Republic	Employment of men and women regardless age	Positive
			Total employment (15-64)	Positive
18	Cuesta, Heras & Carcedo (2011)	Spain	Youths (16-19)	Slightly positive or null
19	Galán & Puente (2015)	Spain	Youths (16-24)	Negative but smaller than the rest of age groups
			Adults (25-32)	Negative
			Adults (33-45)	Negative
			Adults (>45)	Negative
20	Machin & Manning (1994)	UK	Adults in selected industries	Positive or no impact
21	Dickens, Machin & Manning (1999)	UK	Total employment in selected industries	Positive or no impact
22	Stewart (2004)	UK	Youths (18-21)	Mixed: Mostly positive or null and statistically insignificant / Sometimes negative but mainly statistically insignificant (for women)
			Adults (22-59)	

<b>23 Dolton, Bondibene &amp; Stops (2015)</b>	UK	Total employment	No impact
	France	Total employment	Positive or no impact
<b>24 Dolado et al. (1996)</b>	Netherlands	Youths (17-22) in selected occupations	Negative but weak
	Spain	Youths (16-19)	Negative but slightly statistically significant
		Total Employment	Positive
	UK	Total Employment	Ambiguous but closer to no impact
<b>25 Machin &amp; Manning (1997)</b>	France	Total employment	Positive or no impact
	Netherlands	Youths (17-22) in selected occupations	Almost no impact
	Spain	Youths	Negative but slightly statistically significant
		Total Employment	Positive
	UK	Total employment in selected industries	Positive but slightly statistically significant

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**Eriksson &  
Pytlikova (2004)**

	Czech Republic	Total employment (firm-level data)	Mostly negative
		Low-skilled workers (firm-level data)	Mixed: in some cases positive, in some others negative
	Slovak Republic	Total employment (firm-level data)	Mixed: Negative in 1 out of the 2 periods examined / Positive but almost always statistically insignificant
		Low-skilled workers (firm-level data)	No impact

**APPENDIX B- DETAILED INFORMATION ON THE MINIMUM WAGE SYSTEMS**

*Table B1. The various minimum wage systems and the determination process of the minimum wage*

<b>Country</b>	<b>NMW is set by agreement but extended and made binding by law or Ministerial decree</b>	<b>NMW is set through tripartite negotiations</b>	<b>NMW is set by gov't, but after (non-binding) tripartite consultations</b>	<b>MW set by judges or expert committee, as in award-system</b>	<b>MW is set by gov't but gov't is bound by fixed rule (index-based minimum wage)</b>	<b>MW is set by gov't, without fixed rule</b>
<b>Belgium</b>	From 2007 onwards					
<b>Czech Republic</b>					In 2007	From 2008 onwards
<b>Estonia</b>	Through the whole sample					
<b>France</b>						Through the whole sample
<b>Greece</b>	From 2007 to 2010					From 2011 onwards
<b>Hungary</b>		From 2007 to 2010	From 2011 onwards			
<b>Ireland</b>				Through the whole sample		
<b>Latvia</b>			From 2007 to 2008			From 2009 onwards
<b>Lithuania</b>			In 2007 / From 2013 onwards			From 2008 to 2012
<b>Luxemburg</b>					In 2007 / From 2007 to 2010 / From 2012 onwards	In 2011
<b>Netherlands</b>					Through the whole sample	

<b>Country</b>	<b>NMW is set by agreement but extended and made binding by law or Ministerial decree</b>	<b>NMW is set through tripartite negotiations</b>	<b>NMW is set by gov't, but after (non-binding) tripartite consultations</b>	<b>MW set by judges or expert committee, as in award-system</b>	<b>MW is set by gov't but gov't is bound by fixed rule (index-based minimum wage)</b>	<b>MW is set by gov't, without fixed rule</b>
<b>Poland</b>			From 2007 to 2009			From 2010 onwards
<b>Portugal</b>						Through the whole sample
<b>Slovakia</b>	In 2007					From 2008 onwards
<b>Slovenia</b>					Through the whole sample	
<b>Spain</b>			From 2007 to 2010			From 2011 onwards
<b>UK</b>				Through the whole sample		