The Effect of Subminimum Wage Introduction on Employment in Greece¹

Alexandros Karakitsios²

March 2016

Abstract

In 2012, Greek government introduced a 22% cut in the minimum wage for all private sector employees and a 10 percentage points larger cut for those aged below 25 years in 2012, effectively introducing a subminimum wage for the latter. The present paper analyzes the effects of the subminimum wage introduction on employment by focusing on two specific age groups that are likely to be close substitutes in the labour market. These groups consist of individuals aged between 20–24 and 25–29. The analysis is based on quarterly longitudinal data of the Greek Labor Force Survey (LFS) for the period 2008 to 2014.

The results show that the employment rate for 20 -24 year-old employees declined less than the corresponding rate for "older" employees. This may imply a possible positive impact of the introduction of the sub-minimum wage cut on youth employment. To confirm the existence of this effect, we examine the possibility of substitution of 25-29 year-old workers with younger ones by computing employment probabilities of the two abovementioned age groups. Once controlling for other factors, the results are conflicting and dependent to the sample selection.

Keywords: minimum wages, unemployment, youth employment

JEL classification: J08, J21, J23, J38

¹ The author wishes to thank Panos Tsakloglou, Manos Matsaganis, Eirini Andriopoulou and Michalis Veliziotis for their helpful comments, suggestions and advice and the Hellenic Statistical Service (EL.STAT.) for providing access to the Greek Labour Force Survey.

² Department of International and European Economic Studies, Athens University of Economics and Business, <u>karakalex@aueb.gr</u>

1. Introduction

Minimum wage is one of the oldest and most important institutions in modern economies and especially labour markets. It sets the lower bound to the wage paid to individual workers in the formal sector of the labour market while many economists support that it also affects the informal sector. Minimum wage was established for the first time in the United States in 1938 and paid 25 cents per hour.

For several decades the minimum wage issue has caused intense debate among economists. This debate concerns primarily the effects of the minimum wage despite the fact that a number of economists dispute its usefulness. However, the vast majority of labour economists argue that minimum wage is an important labour market institution. This importance mainly lies on its impact on the main labour market outcomes, such as employment, wages or wage distribution which have been widely-discussed in the labour market literature. But also, excluding its effects on the labour market, minimum wage is considered to be a very attractive redistributive tool as it mostly affects low-paid workers and it is considered that it protects them from poverty. Furthermore, minimum wage seems to protect low-skilled workers that are more likely to be low-paid and generally are more vulnerable to labour market changes.

Consequently, it can be claimed that the minimum wage is a very important policy tool that affects not only the labour market but also social conditions like poverty or inequality. Nonetheless, most of the studies related to minimum wages are devoted to its effects on employment and wages but their results vary a lot not only as far as their magnitude but also their direction.

The present study focuses on the employment effects of the minimum wage decrease and more specifically the youth subminimum wage introduction that was decided in 2012 in the context of austerity programmes adopted by the Greek government. We mainly study the impact on employment outcomes for two different age groups those aged 20-24 and 25-29 as since 2012 minimum wage is differentiated for employees aged over 25. Firstly, we investigate the minimum wage effects on employment for the aforementioned age groups. By focusing on full-time employees in the private sector and using a difference-in-differences method, we find that employment rates for employees aged 25-29 fell more than for older employees. This finding might be an indication for a positive employment effect of the minimum wage discrimination. To verify this finding by an econometric way, we use panel data from the Greek Labour Force Survey from 2008 to 2014 and we conduct probit estimations controlling for several characteristics. We initially compute

employment probabilities for the whole labour force and then for the aforementioned specific age groups by restricting our sample.

The paper is organized as follows. In the next section, we present the theoretical predictions of the minimum wage effect on employment. In section 3, a brief literature review about minimum wage employment effects is presented. In section 4, basic labour market trends are presented in order to recognize two of the most fundamental structural problems of the Greek labour market which are female and youth unemployment. The economic background of the minimum wage in Greece is described in section 5 and some comparisons with other EU countries are also presented. The descriptive results of our analysis are shown in section 6 and in section 7 probit estimations' results are being presented. In the final section, we list our conclusions and possible further work is described.

2. Theoretical context

Theory offers unambiguous predictions about minimum wage effects only in the case of the perfectly competitive labour market. In this context, a minimum wage set above the market-clearing level will reduce employment and increase the equilibrium wage level as shown in Figure 1. The introduction of the minimum wage will cause the displacement of some workers who were previously paid at a lower rate and will increase labour market participation. These effects lead to some unemployment that did not exist before the minimum wage introduction.



Figure 1. The Minimum Wage in a Competitive Labour Market

In Figure 1, the above situation is being pictured. Before the minimum wage introduction, the market-clearing wage level is w^{*} and the labour level is L^{*} as they are determined by the intersection of the labour supply and the labour demand curve. In the case of the introduction of a minimum wage w¹, that is higher than the equilibrium wage, the labour market supply curve changes and it will be flat until point C. Under these circumstances, employers cannot hire workers at a lower wage than w1 even if their reservation wage is lower than that. The difference between L^{s1} and L^{d1} denotes the number of unemployed individuals who want to supply labour at the minimum wage. Thus, these persons are unemployed due to minimum wage introduction.

On the other hand, theoretical predictions are not clear in the case of monopsony. There, employers have monopsony power in wage setting and the employment effects by a minimum wage introduction are not easily predicted and are dependent with minimum wage level. Stigler (1946) and Lester (1947) firstly studied the employment effects of minimum wage in a monopsony and they argued that the minimum wage could increase employment under specific conditions.

In a monopsony, the marginal labour cost curve is differentiated by the labour supply curve as illustrated in Figure 2. Under that circumstances, the monopsonistic equilibrium is at point C. In comparison with the competitive equilibrium, at point A, both employment and wage levels are lower.

In the case of the introduction of a minimum wage slightly above the monopsonistic equilibrium, the marginal labour cost curve is flat up to point E and then jumps to the original labour cost curve. Thus, we obtain that if a minimum wage is introduced in a monopsonistic labour market and it is set between the monopsonistic and the competitive equilibrium wage, employment and wages will be increased. In case that the minimum wage will be set at a higher level than the competitive wage, employment will fall lower than in the competitive context.

Finally, in the case of monopsony, the relationship between minimum wages and employment is non monotonic and it is dependent on the minimum wage level. Thus, the employment effects of minimum wage cannot be obtained straightforward as in the competitive case.



Figure 2. The Minimum Wage in a Monopsonistic Labour Market

3. Literature Review

As mentioned before, there is a large body of literature in labour economics that studies minimum wage effects on employment. The results of studies in the related research are not similar and predict different effects in both qualitative and quantitative level. On the other side, theory offers unambiguous predictions about minimum wage effects only in the case of the perfectly competitive labour market. In this context, a minimum wage set above the market-clearing level will reduce employment as participation will be higher but some workers, especially the low-paid, will have to be displaced out of the labour market. In this case, minimum wage will destroy jobs and lead to higher unemployment (Stigler, 1946).

On the other hand, studying the effects of minimum wage on employment under noncompetitive conditions is a much more complicated issue. As Stigler (1946) and Lester (1947) claimed, minimum wage may have a positive impact on employment if it is set above the monopsonistic equilibrium level and also below the competitive equilibrium level. Thus, the monopsonistic labour market model predictions depend on the new minimum wage level. Therefore, regarding to the theoretical predictions of the minimum wage employment effects, we conclude that it depends on the form of the labour market and the prevailing conditions in it. This explains the very important and heated debate between Stigler (1946), Machlup (1946) and Lester (1947). Furthermore, the related empirical research about minimum wage effects is enormous. Despite the fact that it is not the present study's purposes to offer an analytical review of the related literature, we will present the main pillars of the minimum wage effects debate. During the 1960s and 1970s time-series studies found a negative impact of the minimum wage on employment. Additionally, Brown, Gilroy and Kohen (1982) suggested that there is a negative effect on teenagers' employment by the minimum wage. They also find negative –but smaller- effect for young adults and no certain effect for adults. To some extent, the results above confirmed the aforementioned standard predictions of theory.

Nonetheless a few years later, during the 1990s, important studies about minimum wage based on "natural experiments" and cross-state variations have been realized. The benchmark of these studies is that of Card and Krueger (1994) which analysed the impact of the 1992 minimum wage increase on employment in New Jersey. They collected data from 410 fast-food restaurants in New Jersey and Pennsylvania and exploited minimum wage variation between the two bordering states in order to compare the effects on employment, wages and prices. Initially, they considered New Jersey to be the treatment state and Pennsylvania as the control state and they identified a clear influence of the minimum wage increase in the wage distribution. Using a simple difference-in-differences method, they also found that there was no evidence of negative employment effects by the minimum wage increase in New Jersey. On the contrary, they found that employment slightly increased concluding that minimum wage increase led to rising prices.

In general, Card and Krueger's study fuelled a wave of empirical research about minimum wage's impact on employment ("the new minimum wage research"). This kind of research focused on the 'bite' of the minimum wage considering that minimum wage is more likely to affect more low-wage workers. Card and Krueger (1995) claimed that the main finding of this research was that a minimum wage increase can cause a neutral or positive effect on employment. Actually, their study caused a large contestation of the prevailing theoretical predictions. On the contrary, according to Neumark and Wascher (2008), studies included "in the new minimum wage research were diverse in their findings" and to some extent, this is true. Card's (1992b) findings were in line with the above statement. He argued that minimum wage would affect a larger proportion of workers in some states albeit there was no relationship between this fraction and the employment rates. He divided the U.S. states in three groups according to the share of their teenage workforce as he considered that teenagers would be affected more by the minimum wage because they are at the bottom of the earnings distribution and also a large fraction of the low-paid are teenagers. His findings confirmed that the more the low paid, the greater the

effect of the minimum wage is likely to be. In summary, Card concluded that there is no evidence of any disemployment (negative employment) effect but minimum wage increase affect positively average teenage wages.

Furthermore, regarding to "the new minimum wage research", Card & Krueger (1995) book *Myth and Measurement: The New Economics of the Minimum Wage* offered to minimum wage researchers a very detailed summary. As noted above, the general conclusion of this book was that it is unlikely to find a negative employment effect of the minimum wage.

In contrast to the statements of Card and Krueger, Neumark and Wascher conducted many panel data based studies. Their findings are in accordance with the standard theoretical predictions. More specifically, Neumark and Wascher (1992 and 1994) supported that there is a negative and significant impact of the minimum wage on employment. Also, in their more recent study about the minimum wage effects on the wage distribution (2004), they stated that minimum wage changes are more likely to affect workers in different ways according to their skill level and position in the wage distribution. As far as the wage effects of a minimum wage increase, they estimated positive and statistically significant effects. Although, they detected negative and significant employment effects for those workers paid near or at the minimum wage. Additionally, in a more recent review of the minimum wage research, Neumark and Wascher (2007) focused their critique on "the new minimum wage research" and more recently (2013) they argued that empirical analysis that used time-series, resulted in negative impact of minimum wage on employment. Dube et. al (2010) also stated that traditional national-level studies tend to find a negative relationship between minimum wage and employment. But on the other hand, they argued that case studies comparing adjoining local areas with different minimum wages find small or no disemployment effects.

Also, there are other studies related to the employment effects of the minimum wage that offer controversial conclusions. Firstly, Dolado et. al (1996) studied the impact of minimum wage on employment in four European countries, France, Netherlands, United Kingdom and Spain. They found mixed results as the impact of the minimum wages increase is negative in France but on the contrary it is positive in employment in the United Kingdom. Regarding to Spain, they found different impacts for young workers. They argued that there was negative relationship between the employment of young workers and the Kaitz index (the minimum to average wage ratio) but this relationship is positive for all workers. At the same time, their results from Netherlands were not statistically significant albeit there is some evidence of positive relationship between minimum wage and employment.

Stewart (2002) used treatment and control groups defined in many ways in order to find how minimum wage's introduction in the UK in 1999 affects employment of these groups. He exploited geographical variation in wages by assuming that due to this variation minimum wage effects would be different across different areas. Stewart also considered that the treatment group consisted of workers that were affected by the minimum wage change. Correspondingly, workers that were not affected consist the control group. He expected that minimum wage increase would decrease employment in low-wage areas, i.e. the areas with high proportion of low-wage workers. Stewart did not find much evidence of disemployment effects of minimum wage on young workers. He also found that low-wage areas were not so much affected by the minimum wage introduction.

Hyslop and Stillman (2004) also used a difference-in-differences method. They studied the effects of a large reform in minimum wage in New Zealand in 2001. The reform lowered the eligible age for the adult minimum wage to 18 (from 20) years and thus resulted in 69 percent increase for 18- and 19-year-old workers. Using data from the New Zealand Household Labour Force Survey between 1997 and 2003, they compared employment effects between two age groups: teenagers and adults between 20 and 25. They found a positive but insignificant effect on employment rates for all age groups. Also, an interesting finding of this study was that weekly hours worked earnings have been positively affected by the minimum wage reform. This was an expected result as the reform led to a higher minimum wage.

Dube et. al (2007) studied for the first time the economic effects of a citywide minimum wage in San Francisco. They used data from fast-food and table-service restaurants in San Francisco and the East Bay drawn by an independent surveying firm. They found insignificant effects of the minimum wage increase on employment or hours. Althouth, the most interesting finding of this study was the increasing transition of employers from part-time to full-time jobs possibly due to the aforementioned minimum wage increase.

Gindling and Terrell (2011) also supported that minimum wage increase do not necessarily harm employment especially under the assumption that the prevailing wage is lower than the marginal product of labour. Their predictions come from their study on minimum wage impact on employment, wages and poverty in Nicaragua.

In a more recent study, Dolton and Bondibene (2012) obtained new estimates of the employment effects of the minimum wage using panel data from 33 OECD and European (non-OECD members) countries. They found significant negative employment effects both for young people and for adults. Althouth, they mentioned that the effect for adults

are less significant than for young people. One of the innovations of this paper was that the authors focused on countries hit by recessions. In particular, they found that the negative minimum wage effects is larger in absolute terms in times of recession. Dolton and Bondibene's results verified the arguement that young people are more vulnerable to labour cost changes.

Regarding to the Greek literature about minimum wages, we have to mention that it is quite limited. The are only three main studies regarding to employment effects of minimum wages. Koutsogeorgopoulou (1994) investigated the minimum wage effect on adult industrial employment and found negative impact for both men and women. Karageorgiou (2004) carried out a time-series study using data for 1974-2001 period. He finds negative and insignificant effects for young adults and positive effects for teenagers. Karageorgiou concluded that employers substitute youths for teenage workers which are lower-paid.

Fotoniata and Moutos (2009) analysed the evolution of minimum wage in Greece adding a macroeconomic perspective. They also included interviews with representatives of social partners. Finally, they concluded that minimum wage was used by Greek governements as an income-related policy though doubting its effectiveness.

The most recent study about employment effects of minimum wages in Greece is that of Yannelis (2014). This study focused on the minimum wage cut adopted in 2012 and its impact not only on employment itself but also on employment dynamics. Yannelis concluded that the further cut in minimum wage for youths (aged less than 25 years old) has favoured this age group as they have been hired at a faster rate than workers aged more than 25 years old. Also, he argued that the minimum wage effects were more intensive for low paid workers, as expected. Regarding employment dynamics, Yannelis found that workers subject to the lower minimum wage are less likely to be fired and there is a lower hiring rate for 25 (or more)-year-old workers due to the higher minimum wage.

Finally, we have to note that the literature review presented above is selective. We choose to present the most important studies about employment effects of minimum wages as the relative literature is huge.

4. Labour Market Trends in Greece

The crisis has costed hundreds of thousands of jobs. Since the onset of the crisis, in 2009, the number of unemployed has almost tripled from 476 thousands in the first quarter of

2009 to 1,246 in the fourth quarter of 2014. The same happened to the unemployment rate, which increased from 9.5% to 26.1% during the same time period. We have to mention that the unemployment rate shows a downward trend by mid-2013. According to the OECD Employment Outlook 2015, despite the fact that there were some signs that this trend would be continued, any possible estimations are pretty unsafe as recent developments increase the uncertainty about labour market projections.

The employment rate has been significantly decreased from almost 48% to 38% especially due to the large decrease in the number of unemployed. Almost one million jobs have been lost since 2009 and this is the main reason of the employment rate's reduction. As presented in Figure 3, unemployment rate has been decreased during 2014 possibly revealing a positive sign for the Greek labour market.

[Figure 3]

The general picture of the Greek labour market is that of increasing unemployment. Beside that fact, due to the continuous decrease of wages during the crisis and the decreasing chances of being employed, there were many disappointed workers who left the labour force. Additionally, there were many workers who opted for early retirement as the government was legislating higher retirement ages and they selected to leave their job prematurely despite that they would receive a lower pension. Thus, it is of extreme interest to present the shares of employed, unemployed and inactive persons during the period under study.

These shares are presented in Figure 4 for those aged between 15 and 64 years. As expected, the share of employed to the total population aged 15-64 has declined from about 60% to almost 50% during the 2009-2014 period. On the other hand, the share of unemployed has increased from 6.5% to 17.6% taking its higher value at the first quarter of 2014. An important finding is that the share of inactive persons is almost stable around 32% during the period under study. Taking into account the circumstances described above in the Greek labour market, one could expect that this share would have been increased. On the contrary it remains almost constant.

[Figure 4]

After getting an initial snapshot of the Greek labour market, a further and more in-depth analysis is essential in order to find out the more vulnerable to unemployment population groups. Firstly, an age-oriented analysis is being presented. According to the data from Labour Force Surveys, young individuals are less likely to be employed. More specifically, the average unemployment rate for those aged between 15-19 years raised from 33.7% in 2009 to 61.5% in 2014. The respective increase for 20-24-year-olds was from 24.8% to 51.2%. Although, older age groups experienced relatively higher increases in unemployment, younger workers were hit more by the crisis. As shown in Figure 5a, in 2014, more than half of the active population aged between 15 and 24 was unemployed. As the majority of individuals aged between 15-24 years attend some kind of education and they are inactive, our analysis presents employment rates among age groups too. Figure 5b shows these rates among different age groups. As it could be expected from the previous figure, there is an increasing pattern in employment rates (- 30%) and the second largest decrease was that of 25-29-year-old group. This offers another clear argument that individuals aged between 15-24 years were the most vulnerable age group.

[Figure 5a]

[Figure 5b]

Another dimension of the descriptive analysis is the gender-oriented analysis. As expected, women are more likely to be unemployed than men. At the onset of the crisis in 2009, women unemployment rate was almost double in comparison with that of men. The annual average unemployment of women was 13.3% and that of men was 7%. Figure 6 shows that both unemployment rates move in parallel during the period between 2009 and 2014. Although, it cannot be argued that crisis affected both males and females in the same extent. We should be keep in mind that women are less active than men in the labour market.

[Figure 6]

In relative terms, 42% of the unemployed were men in 2009 on average. This share increased to 49.8% in 2014. In absolute terms, these shares can be translated to 203.9 thousands unemployed men out of 484.4 thousands unemployed in total in 2009 also on average. After five years, the number of unemployed men raised to 635.0 thousands out of 1,274.4 thousands unemployed. Using these figures, it can be argued that men were hit in a higher extent from the crisis relatively to women. This is pretty normal as men represent the largest part of the workforce.

The statistics above highlight two of the main structural characteristics of the Greek labour market as Fotoniata and Moutos (2009) described in their analysis about minimum wages in Greece. The first feature is youth unemployment. Greek labour market is characterized by the second highest youth unemployment rate among all EU countries in 2014 (52.4%). Spain has the highest youth unemployment rate which is 53.2%. Annual youth unemployment rates for all EU countries are presented in Figure 7 for years 2009 and 2014.

[Figure 7]

However, as shown in Figure 5, youth unemployment was at high levels before the crisis too. So, youth unemployment was a structural problem of the Greek labour market and its address consisted one of the main policy challenges during the crisis.

5. Economic background of the minimum wage in Greece

The severe economic crisis that hit Greece in 2009 led to the adoption of austerity programmes by the Greek government. Initially, the Greek crisis broke as a fiscal crisis due to the rapid increase of the public budget deficit and consequently the lending interest rates. Therefore, the Greek government was unable to service and refinance public debt.

Another dimension of the Greek problem was the current account deficit due to the poor export performance and hence the low competitiveness of the Greek economy. Beyond austerity measures taken from 2010 onwards, the Greek government was obliged to implement radical reforms aiming to labour cost decrease and improvement of the competitiveness of the Greek economy. The ultimate target was to reduce unemployment especially for vulnerable groups such young people. Under these circumstances, one of the most important reforms in this respect was the minimum wage cut adopted in February 2012.

Minimum wage-related reforms were mainly introduced by Act 4093/2012 and Act of Ministerial Council 6/2012. By these legislations, the legally-binding national minimum wage levels were reduced by 22%. Also, there was a further decrease (by 32 percentage points) in minimum wage for workers aged below 25 years introducing effectively a youth subminimum wage.

Furthermore, Act 4093 reformed the minimum wage setting system. Under the previous regime, minimum wage was determined through collective bargaining between social partners (employees' and employers' associations). The result of this process was the National General Collective Labour Agreement (*EGSSE* in Greek) which determined the national minimum wage levels. Acts 4093/2012 and 4172/2013 abolished the regulatory power of social partners as the national minimum wage will be determined by Ministerial Decision.

The minimum wage rates before and after the reform are presented in Table 1. As shown, there is a differentiation between non-manual and manual workers and workers aged above and below 25. The minimum wage for non-manual workers is determined on a monthly basis. On the contrary, the manual workers' minimum wage is expressed on a daily basis. These levels refer to workers without any working experience. Although, minimum wage level varies depending on worker's experience (for each every three years of employment) and/or the family status. In Tables 2 and 3, current minimum wage levels are presented. In Tables 2a and 2b, minimum wage levels for manual workers are presented and in Tables 3a and 3b these for non-manual workers.

Both manual and non-manual workers which are married receive marriage allowance which equals to 10% of the basic minimum wage (daily and monthly respectively). Regarding the extra allowance for every three years of service, it equals to 10% of the basic minimum wage and it doubles every three years of service for non-manual workers. For manual workers, it equals to 5% of the gross daily minimum wage.

Finally, private sector employees receive their wage 14 times per year as they are paid an extra wage in Christmas, an extra half-wage in Easter and another extra half-wage in summer.

	Befo	re	After			
	Non-manual	Manual	Non-manual	Manual		
Age	workers (daily)	workers (monthly)	workers (daily)	workers (monthly)		
Under 25 years	€ 33.57	€ 751.39	€ 22.83	€ 510.95		
Over 25 years	€ 33.57	€ 751.39	€ 26.18	€ 586.08		

Table 1. Minimum wage levels before and after the enactment of Law 4093/2012

Source: General Confederation of Labour in Greece (GSEE)

Lo years			
Years of	Gross daily	Trienniu	Marriage
experience	wage	m bonus	allowance
0-3	26,18	0	2,62
3-6	26,18	1,31	2,62
6-9	26,18	2,62	2,62
9-12	26,18	3,93	2,62
12-15	26,18	5,24	2,62
15-18	26,18	6,55	2,62
18 +	26,18	7,85	2,62

Table 2a. Minimum wage for manual workers aged over25 years

Source: Law 4046/2012, General Confederation of Labour in Greece (GSEE)

Table 2b. Minimum wage for manual workers agedbelow 25 years

Years of experience	Gross daily wage	Triennium bonus	Marriage allowance
0-3	22,83	0	2,28
3-6	22,83	1,14	2,28
6 +	22,83	2,28	2,28

Source: Law 4046/2012, General Confederation of Labour in Greece (GSEE)

Years of experience	Gross monthly wage	Triennium bonus	Marriage allowance
0- 3	586,08	0	58,61
3-6	586,08	58,61	58,61
6-9	586,08	117,22	58,61
9 +	586,08	175,82	58,61

Table 3a. Minimum wage for non-manual workers agedover 25 years

Source: Law 4046/2012, General Confederation of Labour in Greece (GSEE)

Table 3b. Minimum wage for non-manual workers agedbelow 25 years

Years of experience	Gross monthly wage	Triennium bonus	Marriage allowance		
0-3	510,95	0	51,1		
3 +	510,95	51,1	51,1		

Source: Law 4046/2012, General Confederation of Labour in Greece (GSEE)

The cut described in the table above brought back the nominal minimum wage in almost 2006 levels as shown in Figure 8. In the same figure, we present the evolution of the nominal and real minimum wage in Greece since 2000. The real minimum wage has been computed in 2000 terms. In real terms the minimum wage cut was even more dramatic than in nominal terms as real minimum wage in 2012 has been declined below its 2000 value.

[Figure 8]

However, it is worthy to focus on the minimum wage evolution before the crisis onset. For that purpose, we initially use Figure 6. As presented, nominal minimum wage had been increasing steadily since Greece joined the Eurozone. The first years of the crisis this rate

has been decreased but remained positive. From that point of view a minimum wage cut could be considered as a correction to the exceeding abovementioned increase.

In Figure 9a, we present nominal minimum wage levels in EU countries where minimum wage is set at the national level. Data are presented for the first semesters of 2010 and 2014 in order to show the evolution of minimum wage during the crisis. From this figure, we can conclude that Greece is the only country that minimum wage has been decreased. Countries presented in Figure 9a could be separated in three groups according to their minimum wage level. As shown, Greece belongs to the second group where minimum wage ranges from 500 up to 1,000 Euros. According to data available by Eurostat, the first group contains mostly new member states like Bulgaria, Romania or Croatia, while in the third group we find countries where minimum wage is above 1,000 Euros such as United Kingdom, France or Ireland. From this figure, we obtain that discrepancies related to minimum wage are large across the EU. Another very remarkable finding is that minimum wage in Luxembourg is almost 2.8 times larger than in Greece and more than 10 times larger than in Bulgaria.

[Figure 9a]

In order to make the comparisons among EU countries more sensible and understandable we present the minimum wage levels in Purchasing Power Standards (PPS) in Figure 9b. Conclusions based on this figure do not differ from those in Figure 9a. Greece is still the only country where minimum wage has been decreased and this decrease is considered to be significant (almost 16%). The corresponding nominal decrease between 2010 and 2014 is almost 20%. Furthermore, we observe that despite the fact that inequalities among countries seem smaller than in nominal terms, they still exist in a significant extent.

Except from minimum wage expressed in absolute terms or in Purchasing Power Standards, labour market researchers prefer to use different measures to achieve credible cross country comparisons. One of these measures is Kaitz index which is widely used in the relative literature. The Kaitz index is defined as the ratio of the minimum wage to the average (or the median) wage. Boeri and van Ours (2008) mention that minimum to average ratio is more sensitive to large values. Thus, it is preferable to use the median wage as denominator.

6. Employment in Greece after the cut in minimum wages

In this section, we present the descriptive findings of the current study. Initially, we focus on full-time employees of the private sector because of two reasons. The first is that minimum wage is applied only in the private sector. Second, regarding to the full-time employees, we separate them from the full sample as we want to study only possible disemployment effects of the minimum wage. Though minimum wage effects may not only concern job creation or destruction but also hours worked. Thus, a minimum wage decrease could possibly increase employment but decrease the hours worked per worker. Although, the effect of the minimum wage cut on hours worked is beyond the scope of the present paper.

To study any potential relative employment effect from the minimum wage cut and the youth subminimum introduction, we use a simple difference-in-differences method for employment rates for those aged between 20-24 and those aged between 25-29 years using data from Labour Force Surveys from 2009 to 2014. This separation was made as the minimum wage have been differentiated since 2012 for workers aged less than 25 years.

The method we use is the same with that of Hyslop and Stillman (2004). In summary, we calculated the employment rates of the aforementioned age groups and then we study their evolution during the crisis, i.e. 2009 and 2014. We also found their yearly changes between the same quarters of each year and finally we compare these changes in order to find out which age group is more affected by the minimum wage reform.

In Figure 10, we show the evolution of employment rates for the two age groups between 2009 and 2014. For full-time employees in the private sector aged between 25-29 years, the employment rates are higher over time than those aged 20-24 years. A possible explanation for that may be that inactive population aged between 20-24 years is higher and the main reason for that is related with tertiary education. A large part of the population aged 20-24 participates in tertiary education so it is considered to be inactive as they do not look for a job.

[Figure 10]

As expected, employment rates for both age groups have decreased since the early years of the crisis. This is a clear result of the recession that hit the Greek economy.

On the other hand, the main challenge of our study is to isolate the impact of the crisis and focus on the impact of the minimum wage on the evolution of employment rates. This is the reason we use the difference-in-differences method.

This method is advantageous due to the fact that we can study the relative changes in employment for two age groups over time. By getting the difference in differences of the employment rate or the number of employees, we can conclude to a possible positive or negative effect for one of the two age groups. In the current study, this method can lead us to important conclusions about the impact of the larger minimum wage increase for younger workers, i.e. those aged below 25, which effectively created a subminimum wage. For example, if there is an increase (or a smaller decrease) for younger workers, we can conclude that they were favoured by the larger minimum wage decrease for them. Then we can say that subminimum wage policy has achieved its goal which is tackling youth unemployment.

Returning to Figure 10, we have to mention that the red vertical line is drawn at the time point of the minimum wage cut, i.e. at the first quarter of 2012. Note that the minimum wage increase was imposed by the government in March 2012. So we expect that the first effects of this decrease could be appeared since the second quarter of 2012.

At first sight, in Figure 10, we can see that employment rates for both age groups were being decreased almost at the same rate up to the first quarter of 2012. But, in order to be more accurate, we present the above employment rates after setting first quarter of 2012 as the base quarter and the year-to-year changes in employment rates for each group during the same time period. In Figure 11 we use first quarter 2012 as the basis year because it was the timing of the minimum wage reform was adopted. As shown, employment rate for 20-24-year-old employees fell down in a higher extent at the first phase of the crisis. This decrease continued for 2012 too despite the lower minimum wage for these employees. Although, since 2013 we see a halting in this fall and the two 'equivalent' rates seem to converge. This may reveal a possible time-lagged effect of the minimum wage as the first evidence of a positive impact by the further cut appear almost one year after the legislation of the reform.

In Figure 12, we show year-on-year employment rate changes in quarterly basis. As shown, it is not accurate to support that employment rates have been decreased up to the second quarter of 2012 with the same rate for both age groups. In contrast with this, we obtain that employment rate for 20-24-year-old full-time employees in the private sector have been decreased with slightly higher rate than the corresponding rate for 25-29-year-old employees. Then we can conclude that the 'younger' employees were hit by the crisis in a higher extent than the 'older' ones in the first phase of the recession.

[Figure 11]

Since the second quarter of 2012 and after the minimum wage cut, the difference between the two employment rates remains higher for the 'younger' age group. In particular, annual employment rate decrease for 'younger' employees is almost 30% for three consecutive quarters.

[Figure 12]

This picture changes almost a year after the implementation of minimum wage reform. Since the second quarter of 2013, the employment rate decrease is higher for 25-29-year-olds than for the 'younger' age group. Indeed, in the following quarters the situation becomes even more favourable for 20-24-year-olds as their employment rate start to increase in contrast with the 25-29-year-olds whose rate is remaining to decline with the same pace of the previous period. More specifically, the employment rate for the 'younger' age-group is getting increased with higher pace. As far as the 25-29-year-olds, their employment rate is starting to increase but at a slower rate.

In the fourth quarter of 2014, we observe a deceleration in employment rates' increases. We estimate that this fact is due to the prevailed political uncertainty that Greece is still facing.

As a result, we can argue that according to the latest available data described above, 'younger' employees seem to be favoured by the minimum wage increase while employment rate for 25-29-year-olds is not recovering with the same speed. Figure 12 can be taken as a first indication of a possible employment effect of the subminimum wage. Although, this effect seems to be lagged as employment increases almost a year after the subminimum wage introduction. This means that workers aged between 25 and 29 years may be substituted by 'younger' workers whose minimum wage and hence the total wage cost was lower.

Below, in Figure 13, we present the difference-in-differences of the full-timers' employment rates of for both age groups. We have to mention that in this figure employment is presented in absolute terms. Also, the difference in employment for each age group is calculated from the formulae below:

$$diff_{20-24t} = empl_t - empl_{t-1}$$

$$diff_{25-29t} = empl_t - empl_{t-1}$$

Also, the difference in differences is calculated by the following form:

$$did = diff_{20-24} - diff_{25-29}$$

Thus, if the difference in differences is positive, then employment for 'younger' employees is getting increased in a larger extent than employment for 'older' ones. In case that employment is decreased for both age groups, as in Greece, then the decrease for the 'older' age group is larger than the decrease for the 'younger'. And this is the case in our study. In absolute terms, the decrease for 25-29-year-olds is much larger than this of the 20-24-year-old full-time employees. This does not necessarily means that the 'older' employees have been hit more by the recession. To clarify this we presented the above employment rates.

[Figure 13]

As far as the difference in differences, it significantly decreased a lot during the second and the third quarter of 2010 revealing that the employment changes for both age groups almost converged. Since the end of 2010 and up to the middle-2012 and the minimum wage decrease, this difference-in-differences has been increased as the job losses for 25-29-year-olds were larger in absolute terms and the difference was positive and growing. Since the minimum wage cut and its differentiation for workers aged below 25 years old, the difference-in-differences was getting even larger but not for a long time as in 2014 this difference turned to negative. So this finding lead us to the conclusion that the number of full-time employees in the private sector aged more than 25 years old has been decreased more than the corresponding number of 'younger' employees especially immediately before and after the minimum wage cut.

To sum up, we present the main findings of our difference-in-differences method in Table 4. We consider as treatment group 20-24-year-old full-time employees in the private sector and as control group the 25-29-year-old ones. As described in that table, we also consider 2011 as the period before the minimum wage decrease and 2014 the period after it. We select 2014 as the 'post-reform' period as it is likely to be a time-lag effect of the minimum wage on employment as shown in previous figure. We also set the third quarter of 2011 as the basis quarter in order to compute the equivalent number of private sector employees.

As shown in that table, numbers of full-time private sector employees have been decreased during the period we study. Although, for 25-29-year-olds this decrease was slightly larger (by 27.3%). On the contrary, the corresponding decrease for the 'younger' employees was 24.7%. These figures result in a positive (in the sense of less negative) difference-in-differences which means that the 'younger' age-group was possibly favoured by the minimum wage cut as this reform decelerated the decrease of employment for that age group.

	equivalent no. full-time private sector employees (2011g3=100)					
	treatment ³	control ⁴				
before ¹	100.0	98.6				
after ²	75.3	71.3				
Diff	-24.7	-27.3				
diff-in-diff	2.6					
¹ before: 2011q1-2011q4						
² after: 2014q1-2014q4						
³ treatment: aged 20-24						
⁴ control: aged 25-29						

Table 4. Results of difference-in-differences method

Source: Labour Force Surveys, Greek Statistical Authority (ELSTAT.)

To conclude up to this point, the above table summarizes all the findings from previous figures that have been presented. 'Younger' employees seem to be favoured by the minimum wage reform but the analysis is restricted to descriptive results. Despite the fact that both employment rates have been decreased due to the severe recession, we observe that both age groups' employment rates have followed the same path not only before the minimum wage reform but also for a year after it. However, since the mid-2013 employment for 'younger' employees appears to bounce up faster than for 'older' employees. This may be additional evidence for the existence of the time-lagged effect of the minimum wage reform.

7. Effect of youth subminimum wage introduction

The above descriptive analysis offers some first indications of a positive employment effect by the youth subminimum introduction. Although, it is necessary to conduct econometric analysis in order to get precise and well substantiated results. Using panel micro data from Labour Force Surveys from 2008 to 2014, we estimate employment probabilities conducting probit estimations. The basic specification of our estimations is the following:

$$Prob(emp_{it} = 1)$$

$$= \Phi(\beta_0 + \beta_1 * reform_t + \beta_2 * agebelow20_{it} + \beta_3$$

$$* agebelow20_{it} * reform_t + \beta_4 * age2024_{it} + \beta_5 * age2024_{it}$$

$$* reform_t + \beta_6 * age2529_{it} + \beta_7 * age2529_{it} * reform_t + \gamma X'_{it}$$

$$+ \varepsilon_{it}$$
(1)

where *emp* is an indicator whether individual *i* is employed or not, *reform* is a dummy for pre- and post-reform period (i.e. second quarter of 2012), *agebelow20* is a dummy for those aged below 20 years, *age2024* is a dummy for those aged between 20 and 24 years and *age2529* is a dummy for those aged between 25 and 29 years. To capture reform's effects on specific age groups, interactions are being added in the estimation.

X is a vector with other controls such as gender, marital status, nationality, geographical region, educational level and urbanity. Also, quarter and yearly dummies are included in the estimated equation.

The estimation strategy is as follows. Firstly, inactive individuals have been excluded from the sample. Secondly, the sample has been restricted to private sector workers aged over 15 years. Then equation (1) has been estimated. The results from that estimation are summarized in Table 5. In that table, all specifications estimated are being presented. Initially, employment probabilities have been estimated in a model including only a dummy for the minimum wage reform, age-group dummies and the corresponding interactions. Further, geographical, quarter and educational dummies have been added as long as dummies for gender, marital status and nationality. In all specifications, year fixed-effects have been included.

As shown in Table 5, the estimated coefficient for the minimum wage reform is negative and statistically significant. This means that employment probabilities have been decreased after the implementation of the reform. It is also shown that individuals aged below 20 years are less likely to be employed in comparison with the baseline group which is conducted by individuals aged above 30 years. Young people aged between 20 and 24 years are more likely to be employed than younger individuals, but less than those aged between 25 and 29. Regarding other individual characteristics, men are more likely to be employed in private sector than women as long as married and Greek. The coefficients of interests are those for the reform and the interactions between the reform dummy and the dummies for age-groups (i.e. β_1 , β_3 , β_5 and β_7). According to the results presented in Table 5, in three out of five specifications, youngsters aged between 20 and 24 years are less likely to be employed than the baseline group (i.e. those aged above 30 years). Individuals aged between 25 and 29 have less probabilities to be employed than those aged above 30 years in all specifications estimated. In the first two specifications, the coefficient of the interaction between the reform dummy and the dummy for the 20-24-age-group is statistically insignificant. Thus, we could argue that 20-24-year-old individuals have not been favored by the youth subminimum wage introduction as their employment probabilities have been decreased in comparison with the baseline group. The same could be stated for individuals aged below 20 years.

We now focus on active individuals aged between 20 and 29 years. As minimum wage has been differentiated for individuals below 25 years, 20-24 and 25-29-age-groups are of great interest as they are almost perfect substitute age-groups in the labour market. Thus, we conduct the same probit analysis but we then restrict the sample in those aged between 20 and 29 years. Following Yannelis (2014), we make the identifying assumption that the two age groups would behave similarly in the absence of the subminimum wage introduction as both individuals below and above 25 years face almost the same labour market conditions. The main difference between the present analysis and that of Yannelis (2014) is that the first one focus on a more extensive age group, as Yannelis focus on 22-27-year-old individuals.

In Table 6, estimations for 20-29-year-old sample are presented. As the sample is restricted, dummies for younger or older age-groups and the respective interactions are excluded. So, equation (2) is estimated.

$$Prob(emp_{it} = 1)$$

$$= \Phi(\beta_0 + \beta_1 * reform_t + \beta_2 * age2024_{it} + \beta_3 * age2024_{it}$$

$$* reform_t + \gamma X'_{it} + \varepsilon_{it}$$
(2)

In all specifications, dummy for minimum wage reform is estimated to be negative and statistically significant as in the previous estimation. 20-24-age-group dummy is also negative declaring that 20-24-year-old individuals are less likely to be employed than those aged between 25 and 29 years. Although, the coefficient of interest is that of the interaction between the dummy for 20-24-age-group and the reform dummy (i.e. β_3) In all specifications, the estimated coefficient is positive indicating that after the minimum

wage reform and the youth subminimum introduction, 20-24-year-old individuals were more likely to be employed than 25-29-year-old individuals. Consequently, in terms of employability they were favored by the reform.

Summarizing results in Tables 5 and 6, we argue that the results are conflicting. Estimating employment probabilities for active individuals aged between 15 and 64, youngsters were not favored by the reform and the subsequent subminimum introduction. However, the results are the opposite if the sample is restricted to 20-29-year-old individuals and in line with the descriptive analysis presented in previous sections.

8. Conclusions

During the last 5 years, Greek governments were obliged to adopt many reforms in exchange of the financial aid provided by the European Commission, the European Central Bank and the International Monetary Fund. These reforms aim at facing the twindeficits problem, i.e. the public budget and the current account deficit. One of the reforms related to the latter was the minimum wage reform which cut the general minimum wage and in essence introduced a youth subminimum. This reform adopted in 2012 in the context of the second Greek bail-out program.

In the present paper, we initially used a simple difference-in-differences approach to evaluate any potential employment effect of that reform. The descriptive analysis is focused on full-time private sector employees in two specific age-groups, 20-24 and 25-29-year-olds. Firstly, we selected full-time private sector employees as the minimum wage cut applied only to that sector. Secondly, we focus on the aforementioned age-groups as the reform implemented in 2012 effectively introduced a subminimum wage by further cut the basic minimum wage for workers and employees aged less than 25 years in order to halt high youth unemployment that was prevailing in Greece also before the crisis. Then we consider these two age groups as almost perfect substitutes and we expect that any effect of the youth subminimum is likely to affect these two groups more than others.

The difference-in-differences approach employed in this paper results that employment rates for 20-24-year-old employees have been decreased less than the corresponding rate for the 'older' age group. We could argue that this finding possibly reveals a positive employment effect as the further minimum wage cut applied to workers aged below 25 years may have favoured them. However, we have to note that employment rates for the 'younger' age group were initially lower and this may be a reason for lower volatility.

A more careful look at these results could reveal a possible lag effect of the minimum wage reform. We observed that employment performance for 20-24-year-old employees is getting improved almost a year after the legislation of the reform. At the same time, employment for the 'older' age group continued to decline. In 2014, it increased too but in lower rate than for 20-24-year-olds.

Furthermore, in this paper an analytical econometric method is being used. By estimating employment probabilities and controlling for reform, age-groups and individual characteristics, it is found that employment effect of youth subminimum wage was ranging from statistically insignificant to negative. Although, this results turned to positive and statistically significant when employment probabilities were estimated for a restricted part of the active population, those aged between 20 and 29 years.

References

- [1] Addison, J. T., Blackburn, M. L., & Cotti, C. D. (2013). Minimum wage increases in a recessionary environment. Labour Economics, 23, 30-39.
- [2] Bazen, S., & Martin, J. P. (1991). The impact of the minimum wage on earnings and employment in France. *OECD Economic Studies*, *16*, 199-221.
- Böckerman, P., & Uusitalo, R. (2009). Minimum wages and youth employment: Evidence from the Finnish retail trade sector. *British Journal of Industrial Relations*, 47(2), 388-405.
- [4] Boeri, T. & Ours, J. V. (2008). The Economics of Imperfect Labour Markets. s.l.:Princeton University Press.
- [5] Boeri, T. (2012). Setting the minimum wage. *Labour Economics*, *19*(3), 281-290.
- [6] Bonnet, F., Saget, C., & Weber, A. (2012). Social protection and minimum wages responses to the 2008 financial and economic crisis: Findings from the ILO/World Bank Inventory (No. 468480). International Labour Organization.
- [7] Brochu, P., & Green, D. A. (2014). Minimum wages: the effects on employment and labour-force turnover.
- [8] Brown, C., Gilroy, C. & Kohen, A. (1982). The Effect of the Minimum Wage on Employment and Unemployment. *Journal of Economic Literature, Volume 20, No.* 2, pp. 487-528.
- [9] Cahuc, P., & Michel, P. (1996). Minimum wage unemployment and growth. *European Economic Review*, 40(7), 1463-1482.
- [10] Card, D. (1992). Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage, *Industrial and Labour Relations Review*, *Volume 46, No. 1*, pp. 22-37.

- [11] Card, D., Katz, L. F., & Krueger, A. B. (1993). An evaluation of recent evidence on the employment effects of minimum and subminimum wages (No. w4528). National Bureau of Economic Research.
- [12] Card, D. & Krueger, A. (1994). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review, Volume 84, No. 4*, pp. 772-93.
- [13] Card, D. & Kruege.r, A. (1995). Myth and Measurement: The new economics of the minimum wage. Princeton, NJ.
- [14] Dickens, R., Machin, S., & Manning, A. (1999). The effects of minimum wages on employment: Theory and evidence from Britain. *Journal of Labour Economics*, 17(1), 1-22.
- [15] Dolado, J. et al. (1996). The Economic Impact of Minimum Wages in Europe. *Economic Policy , Volume 23*, pp. 317-372.
- [16] Dolado, J. J., Felgueroso, F., and Jimeno, J. F. (1997). 'The effects of minimum bargained wages on earnings: Evidence from Spain'. *European Economic Review*, 41-3, 713-721.
- [17] Dolton, P. & Bondibene, C. R. (2012). The International Experience of Minimum Wages in an Economic Downturn. *Economic Policy*, pp. 99-142.
- [18] Doucouliagos, H. and Stanley, T.D. (2009). Publication Selection Bias in Minimum-Wage Research? A Meta-Regression Analysis. *British Journal of Industrial Relations*. 3-1, 129-151.
- [19] Dube, A., Naidu, S., & Reich, M. (2007). The economic effects of a citywide minimum wage. *Industrial & Labour Relations Review*, 60(4), 522-543.
- [20] Dube, A., Lester, T. & Reich, M. (2010). Minimum wage effects across state borders: Estimates using contiguous countries. *Review of Economics and Statistics, Volume* 92, No. 4, pp. 945-64.

- [21] Freeman, R.B. (1994). 'Minimum Wages Again!', International Journal of Manpower, 15-2/3, 8-25.
- [22] Fotoniata, Eugenia and Moutos, Thomas, Minimum Wages in Greece (2009). Available at SSRN: http://ssrn.com/abstract=2001375 or http://dx.doi.org/10.2139/ssrn.2001375
- [23] Gindling, T. & Terrell, K. (2011). The Impact of Minimum Wages on Wages, Work and Poverty in Nicaragua. *Labour Economics*.
- [24] Harasztosi, P., Lindner, A., Bank, M. N., and Berkeley, H. U. (2014). Who Pays for the Minimum Wage?.
- [25] Herr, H., Kazandziska, M., and Mahnkopf-Praprotnik, S. (2009). The theoretical debate about minimum wages (No. 6). Global Labour University Working Paper.
- [26] Hyslop, D. & Stillman, S. (2004). Youth Minimum Wage Reform and the Labour Market. *IZA Discussion Paper No. 1091*.
- [27] Karageorgiou, L. (2004). The Impact of Minimum Wage on Youth and Teenage Employment in Greece. *Spoudai, Volume 54, No. 4*, pp. 39-67.
- [28] Katz, L. F., & Krueger, A. B. (1992). The effect of the minimum wage on the fast-food industry. *Industrial & Labour Relations Review*, 46(1), 6-21.
- [29] Koutsogeorgopoulou, V. (1994). The Impact of Minimum Wages on Industrial Wages and Employment in Greece. *International Journal of Manpower*, 15(2), 86-99.
- [30] Linde Leonard, M., Stanley, T. D., & Doucouliagos, H. (2014). Does the UK Minimum Wage Reduce Employment? A Meta-Regression Analysis. British Journal of Industrial Relations, 52(3), 499-520.
- [31] Neumark, D., Schweitzer, M. & Wascher, W. (2000). The Effects of Minimum Wages Throughout the Wage Distribution. *NBER Working Paper No. 7519*.

- [32] Neumark, D. & Wascher, W. (1992). Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws. *Industrial and Labour Relations Review, Volume 46, No. 1*, pp. 55-81.
- [33] Neumark, D. & Wascher, W. (1994). Employment Effects of Minimum and Subminimum Wages: Reply to Card, Katz and Krueger. *Industrial and Labour Relations Review, Volume 46, No. 1*, pp. 497-512.
- [34] Neumark, D. & Wascher, W. (2004). The Effects of Minimum Wages Throughout the Wage Distribution. *Journal of Human Resources, Volume 39 (2)*, pp. 425-50.
- [35] Neumark, D. & Wascher, W. (2004). 'Minimum Wages, Labour Market Institutions and Youth Employment: a Cross-national Analysis', *Industrial and Labour Relations Review*, 57-2, 223-48.
- [36] Neumark, D. & Wascher, W. (2007). Minimum Wages and Employment. *IZA Discussion Paper Series*.
- [37] Neumark, D., Salas, J. I., & Wascher, W. (2014). Revisiting the Minimum Wage—
 Employment Debate: Throwing Out the Baby with the Bathwater?. Industrial &
 Labour Relations Review, 67(3 suppl), 608-648.
- [38] Neumark, D., Salas, J. M., & Wascher, W. (2014). More on recent evidence on the effects of minimum wages in the United States (No. w20619). National Bureau of Economic Research.
- [39] Nikolitsa, D. (2014). Facing Unemployment: Cyclical Factors, Structural Shifts and Policy Implications. *Crisis Observatory, ELIAMEP, Volume Policy Paper*, p. Available in Greek.
- [40] Machin, S. and Manning, A. (1994). 'The Effects of Minimum Wages on Wage Dispersion and Employment: Evidence from the UK Wages Councils'. *Industrial and Labour Relations Review, Volume 47, No. 2*, pp. 319-329.
- [41] Meyer, R. H., & Wise, D. A. (1983). The Effects of the Minimum Wage on the Employment and Earnings of Youth. *Journal of Labour Economics*, 66-100.

- [43] Sabia, J.J., Burkhauser, R.V. and Hansen, B. (2012). 'Are the Effects of Minimum Wage Increases Always Small? New Evidence from a Case Study of New York State'. *Industrial and Labour Relations Review*. 58-1, 52-70.
- [44] Schmitt, J. (2013). Why Does the Minimum Wage Have No Discernible Effect on Employment? (No. 2013-04). Center for Economic and Policy Research (CEPR).
- [45] Stewart, M. B. (2002). Estimating the Impact of the Minimum Wage Using Geographical Wage Variation. Oxford Bulletin of Economics and Statistics, 64(supplement), 583-605.
- [46] Stewart, M. B. (2004). 'The Impact of the Introduction of the UK Minimum Wage on the Employment Probabilities of Low-Wage Workers'. *Journal of the European Economic Association*, 2-1, 67-97.
- [47] Stigler, G. J. (1946). The economics of minimum wage legislation. The American Economic Review, pp. 358-365.
- [48] Van Soest, A. (1989). 'Minimum wage rates and unemployment in the Netherlands'. *de Economist*, 137-3, 279-308.
- [49] Wolfson, P. J. and Belman, D. (2014). What does the minimum wage do?. WE Upjohn Institute.
- [50] Yannelis, C. (2013). The Minimum Wage and Employment Dynamics: Evidence from an Age Based Reform in Greece.
- [51] Zavodny, M. (2000). 'The effect of the minimum wage on employment and hours'. *Labour Economics*, 7-6, 729-750.



Figure 3. Unemployment rates (not seasonally adjusted) for total population, 2009 - 2014.

Source: Labour Force Surveys, Greek Statistical Authority (EL.STAT.)



Figure 4. Shares of employed, unemployed and inactive, 2009-2014

Source: Labour Force Surveys, Greek Statistical Authority (EL.STAT.)



Figure 5a. Unemployment rate for total workforce and specific age groups (%), 2009-2014.

Source: Labour Force Survey, Greek Statistical Authority (EL.STAT.)



Figure 5b. Employment rate for different age groups (%), 2009, 2014.

Source: Labour Force Survey, Greek Statistical Authority (EL.STAT.)



Figure 6. Unemployment rates by gender, 2009-2014.

Source: Labour Force Survey, Greek Statistical Authority (EL.STAT.)



Figure 7. Unemployment rates for individuals aged below 25 years, 2009-2014.

Source: Eurostat



Figure 8. Minimum wage in nominal and real terms, 2000-2014.

Source: Eurostat



Figure 9a. Nominal minimum wage levels in EU countries, 2010S1 and 2014S1.

Source: Eurostat



Figure 9b. Minimum wage levels in Purchasing Power Standards in EU countries, 2000S1 and 2014S1.

Source: Eurostat



Figure 10. Employment rates for full-time private-sector employees 20-24 and 25-29-year-old individuals (%), 2009-2014.

Source: Labour Force Survey, Greek Statistical Authority (EL.STAT.)



Figure 11. Employment rates for full-time private-sector employees 20-24 and 25-29-year-old individuals (2012q1=100), 2009-2014.

Source: Labour Force Surveys, Greek Statistical Authority (EL.STAT.)



Figure 12. Year-to-year changes in employment rates for full-time employees in private sector aged 20-24 and 25-29 (%), 2010-2014.

Source: Labour Force Surveys, Greek Statistical Authority (EL.STAT.)



Figure 13. Difference-in-differences in number of full-time employees of the private sector aged 20-24 and 25-29, 2009-2014.

Source: Labour Force Surveys, Greek Statistical Authority (EL.STAT.)

 Table 5. Employment probabilities' estimation, 15-64 years.

Dependent variable: employment status										
reform	-0.200	***	-0.172	***	-0.155	***	-0.165	***	-0.352	***
	(0.036)		(0.034)		(0.036)		(0.038)		(0.038)	
agebelow20	-5.454	***	-5.019	***	-2.622	***	-2.928	***	-3.938	***
	(0.097)		(0.089)		(0.084)		(0.100)		(0.102)	
age2024	-4.535	***	-4.138	***	-1.974	***	-2.239	***	-3.089	***
	(0.046)		(0.042)		(0.042)		(0.047)		(0.048)	
age2529	-2.497	***	-2.274	***	-0.928	***	-0.983	***	-1.468	***
	(0.036)		(0.038)		(0.032)		(0.037)		(0.036)	
postreformbelow20	-0.815	***	0.175		-0.937	***	-1.690	***	-0.554	***
	(0.140)		(0.273)		(0.143)		(0.157)		(0.177)	
postreform2024	0.228		0.016		-0.584	***	-0.987	***	-0.063	
	(0.169)		(0.064)		(0.062)		(0.069)		(0.084)	
postreform2529	-0.531	***	-0.487	***	-0.428	***	-0.541	***	-0.435	***
	(0.050)		(0.052)		(0.051)		(0.055)		(0.055)	
northgreece			0.504	***	0.098	***	0.259	***	-0.431	***
			(0.043)		(0.032)		(0.038)		(0.041)	
centrgreece			0.739	***	0.312	***	0.481	***	0.146	***
	•		(0.042)		(0.032)		(0.038)		(0.042)	
attiki	•		0.663	***	0.222	***	0.471	***	0.264	***
	•		(0.042)		(0.033)		(0.039)		(0.044)	
q1	•				-0.069	***	-0.103	***	0.009	
					(0.015)		(0.016)		(0.016)	
q2					0.203	***	0.216	***	0.285	***
					(0.015)		(0.016)		(0.016)	
q3					0.302	***	0.340	***	0.362	***
					(0.015)		(0.016)		(0.016)	
lessprim_prim							0.598	***	0.085	
							(0.095)		(0.115)	
lowersecon							0.376	***	-0.351	***
	•						(0.097)		(0.117)	
uppersecon	•						0.254	***	-0.520	***
	•		•				(0.094)		(0.113)	
postsecon	•		•				-0.005		-0.778	***
	•		•		•		(0.099)		(0.117)	
tertiary	•		•		•		0.239	**	-0.406	***
	•		•		•		(0.095)		(0.114)	
gender	•		•		•		•		2.212	***
	•		•		•		•		(0.026)	
marstat	•		•		•		•		2.565	***
	•		•		•		•		(0.027)	
nationality									0.792	***
	•		•		•		•		(0.041)	
year2008	2.755	***	2.279	***	1.315	***	1.277	***	2.314	***
	(0.051)		(0.048)		(0.046)		(0.051)		(0.053)	

year2009	2.302	***	1.944	***	1.075	***	1.075	***	1.938	***
	(0.049)		(0.045)		(0.044)		(0.049)		(0.050)	
year2010	1.885	***	1.621	***	0.840	***	0.869	***	1.567	***
	(0.047)		(0.044)		(0.043)		(0.047)		(0.048)	
year2011	1.244	***	1.052	***	0.431	***	0.456	***	0.945	***
	(0.046)		(0.043)		(0.042)		(0.046)		(0.047)	
year2012	0.436	***	0.336	***	0.066	**	0.065	**	0.293	***
	(0.033)		(0.030)		(0.028)		(0.031)		(0.032)	
year2013	-0.071	***	-0.161	***	-0.109	***	-0.130	***	-0.100	***
	(0.026)		(0.024)		(0.023)		(0.025)		(0.025)	
Constant term	7.263	***	7.256	***	4.706	***	5.637	* * *	4.391	***
	(0.043)		(0.053)		(0.049)		(0.106)		(0.135)	

Souce: LFS, 2008-2014

Notes: *p<.1, ** p<.05, *** p<.01.

Dependent variable: employment status										
reform	-0.257	***	-0.251	***	-0.232	***	-0.228	***	-0.234	***
	(0.050)		(0.050)		(0.054)		(0.055)		(0.057)	
age2024	-0.873	***	-0.855	***	-0.873	***	-0.970	***	-0.891	***
	(0.028)		(0.028)		(0.028)		(0.030)		(0.032)	
postreform2024	0.178	***	0.157	***	0.165	***	0.134	***	0.118	**
	(0.043)		(0.043)		(0.043)		(0.045)		(0.048)	
northgreece			-0.724	***	-0.724	***	-0.663	***	-0.677	***
			(0.040)		(0.041)		(0.043)		(0.047)	
centrgreece			-0.604	***	-0.605	***	-0.603	***	-0.627	***
			(0.041)		(0.041)		(0.043)		(0.047)	
attiki			-0.221	***	-0.222	***	-0.126	***	-0.151	***
			(0.041)		(0.042)		(0.043)		(0.048)	
q1					0.166	***	0.155	***	0.155	***
					(0.024)		(0.024)		(0.024)	
q2					0.230	***	0.225	***	0.230	***
					(0.022)		(0.023)		(0.023)	
q3					0.195	***	0.194	***	0.200	***
	•				(0.022)		(0.022)		(0.023)	
lessprim_prim	•						0.846	***	0.201	
							(0.107)		(0.124)	
lowersecon	•						0.830	***	0.286	**
	•		•		•		(0.105)		(0.121)	
uppersecon			•		•		0.620	***	0.310	***
							(0.099)		(0.114)	
postsecon							0.148		0.030	
							(0.102)		(0.116)	
tertiary							-0.154		-0.201	*
							(0.099)		(0.113)	
gender			•						0.867	***
	•		•		•		•		(0.028)	
marstat	•		•		•		•		0.650	***
	•		•		•		•		(0.043)	
nationality	•		•		•		•		-0.360	***
	•		•		•		•		(0.051)	
year2008	1.948	***	1.888	***	1.998	***	1.940	***	1.985	***
	(0.064)		(0.064)		(0.069)		(0.070)		(0.073)	
year2009	1.433	***	1.432	***	1.515	***	1.478	***	1.528	***
	(0.061)		(0.061)		(0.066)		(0.067)		(0.070)	
year2010	1.032	***	1.046	***	1.107	***	1.098	***	1.135	* * *
	(0.059)		(0.059)		(0.064)		(0.065)		(0.068)	
year2011	0.471	***	0.478	***	0.531	***	0.523	***	0.545	***
	(0.058)		(0.058)		(0.062)		(0.064)		(0.066)	
year2012	0.004		0.013		0.042		0.039		0.044	
	(0.038)		(0.038)		(0.039)		(0.040)		(0.043)	

Table 6. Employment probabilities' estimation, 20-29 years.

year2013	-0.211	***	-0.209	***	-0.189	***	-0.188	***	-0.195	***
	(0.033)		(0.033)		(0.033)		(0.034)		(0.036)	
Constant term	0.713	***	1.162	***	0.972	***	0.613	***	0.641	***
	(0.055)		(0.065)		(0.072)		(0.121)		(0.146)	

Souce: LFS 2008-2014

Notes: *p<.1, ** p<.05, *** p<.01.