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Unemployment transitions and the role of minimum wage:
from pre-crisis to crisis and recovery

Abstract

During the last decade, unemployment in Greece climbed up to 28%, almost tripled by the economic crisis that hit Greece. In the present paper, we examine the determinants of the unemployment dynamics and the impact of the minimum wage on the probability of making a transition into and out of unemployment. We use micro-level data from the Greek Labour Force Survey for the period 2004-2019 and control for several demographic factors, macro-economic conditions, regional differences and changes in statutory minimum wage. The results suggest that individual-level characteristics play an important role in making a transition into or out of unemployment. Changes on the real minimum wage are estimated to have either a statistically insignificant or a very small impact on unemployment entries and exits. Further, the impact of economy's growth rate follows the theoretical predictions as higher growth rates increase unemployment outflows and decrease inflows, while the regional differences are also important. Our findings persist even when we split the sample in three periods (pre-crisis, crisis, recovery). The results have important policy implications. Given that the disemployment effect of the minimum wage seems to be very limited in the Greek labour market, while the socioeconomic characteristics and regional characteristics play an important role, improving the skills of individuals through educational system and reskilling or up-skilling programs, while targeting specific regions, may facilitate labour market mobility.

Keywords: minimum wage, unemployment, labour mobility, Greek crisis

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1. Introduction

In the last decades, the issue of mobility in the labour market has been in the core of the policy making agenda in terms of increasing flexibility and ensuring higher levels of labour market participation and employment. There are different types of labour market mobility that can be studied such as geographical mobility of workers, mobility across different sectors, changing jobs within the same sector, shifts from full time to part time and *vice versa*, as well as transitions from employment to unemployment or inactivity, and *vice versa*. Particularly, in times of economic downturns, labour market flexibility is considered to be an important tool in order to restore unit labour cost and competitiveness. This was the case of Greece during the recent economic crisis, as in the pre-crisis era wages grew faster than the productivity growth and much faster than the Euroarea average¹. Thus, already from the first economic adjustment program, the implementation of labour market reforms in order to reduce rigidities in the labour market legislation and institutions was a priority. By increasing flexibility in the labour market, along with the measures of fiscal consolidation, it was expected that nominal wages and relative prices would adjust. In the absence of exchange rate and monetary policy tools, the internal devaluation path was the preferred scenario for correcting the large external imbalances. Labour market reforms were also expected to increase mobility in the labour market and in particular ease entry to the formal labour market for groups like women and the young, and facilitate transition from temporary to permanent contracts (see European Commission 2010, p. 27).

The labour market measures pursued during the three bailout programs focused on the framework of collective bargaining², the national minimum wage setting, enhance flexible forms of employment and ease firing protection³, tackle undeclared labour

¹ In particular, the wage growth consistently outpaced productivity gains (31.3% vs 6.8%) over the decade preceding the Greek crisis, in part reflecting spillovers from high public wage increases.

² The reforms related to collective bargaining included: a) the reduction of length of collective contracts' validity and revisions of the 'after effects' of collective contracts, b) the removal of 'tenure' in all existing legacy contracts in all companies, c) the freeze of 'maturity' until unemployment falls below 10 percent, d) the decentralization of collective bargaining even at individual level.

³ Reforms concerning the employment protection legislation included: a) the elimination of workers' unilateral recourse arbitration, b) the revision of firing rules and costs, c) the extension of probationary

and to a lesser extent lower non-wage labour costs⁴ (European Commission 2010, 2012, 2015). One of the most important policy changes concerned the adjustment in minimum wage that took place in 2012, which foresaw the immediate realignment of the minimum wage level determined by the national general collective agreement by 22 percent at all levels based on seniority, marital status and daily/monthly wages and its freeze until end programme period, as well as the introduction of a sub-minimum wage for youth 10% lower than the general statutory minimum wage.

Most of the labour market measures were front-loaded in the program period and in fact the liberalization of the labour market moved in a much faster pace than the product market deregulation. Despite the reforms undertaken the unemployment in Greece skyrocketed from 7.8% in 2008 to 27.5% in 2013, while the equivalized disposable income declined by 42% much more than the decline in GDP per capita that was 26% in real terms⁵. Yet after 2013, the rate of decrease in unemployment was much higher than the rate of increase in the mean equivalized disposable income and GDP per capita (Andriopoulou et al. 2019). In 2019, the minimum wage was increased back to pre-crisis levels (by 11%) and the sub-minimum wage for the youth was abolished.

Given all the above, we observe that the period of the Greek economic adjustment programs offers a unique case for studying the effect of labour market reforms including changes in the minimum wage on labour market outcomes such as employment levels and mobility. The current paper focuses on the examination of unemployment exits and entries and tries to identify what are the determinants that could enhance or disrupt labour market mobility. The fact that two large changes in the statutory minimum wage took place, also in opposite directions (one in 2012

period, d) the recalibration rules collective dismissal, e) the revision of part-time and temporary work regulations in order to facilitate the use of part-time work.

⁴ Most of the reforms were legislated with omnibus laws e.g. laws 4024/2011, 4046/2012, 4093/2012, 4172/2013, 4254/2014, and Law 4583/2018 for subsidizing social insurance contributions for workers below 24 years old.

⁵ The largest drop in disposable income is between 2009-2014, while the largest drop in GDP is between 2007-2013. 2007 is the last year with a positive growth rate before the crisis, 2009 is the year with the highest disposable income, while 2013 is the peak of the crisis in terms GDP drop.

during the second economic program and one in 2019 in the early post-program period) offers also the opportunity to examine whether the minimum wage plays a role as determinant of transitions from unemployment to employment and vice versa. This question is particularly interesting given that a vast amount of empirical literature has explored the relationship between minimum wage and employment through aggregate data or employment data from the side of firms, but less attention has been paid to the possible effect of minimum wage to transitions from employment to unemployment and vice versa. We aim to fill this literature gap by analyzing whether a change in the minimum wage level affects the probability of exiting or entering unemployment measured at the individual level, while at the same time controlling for a series of other determinants (individual characteristics, macroeconomic conditions, regional characteristics etc.) as well as unobserved heterogeneity across individuals. The particular characteristics of the examination period offer also the opportunity to split the sample in sub-periods defined by the growth rate of the economy and thus examine whether the effect of the traditional determinants such as age, gender, marital status and educational endowment differentiate during economic downturns and to what extent they account for individuals' transition from employment to unemployment in comparison to reform effects such as the minimum wage changes.

The paper findings are useful for policy making not only at national but also at the EU level and can contribute to the discussion that has started for the Directive of the European Parliament and of the Council on adequate minimum wages in the European Union. In the legislative proposal the European Commission (2020a) considers adequate wages an essential component of the EU model of a social market economy and presents a clear position that convergence across Member States in this area contributes to improving the fairness of the EU labour market, stimulating productivity improvements and promoting economic and social progress. It also states that the role of minimum wages becomes more important during economic downturns. As a reaction to the proposal directive on adequate minimum wages, a general discussion has been activated, with the IMF purporting wage restraint in countries with a weaker external position and sluggish productivity growth and faster wage growth in countries with a stronger external position to help the rebalancing process

(Detragiache et al. 2020). The debate is highly relevant for the current juncture of the Covid-19 crisis, which has particularly hit sectors with a higher share of low-wage workers such as retail and tourism and has had a stronger impact on the disadvantaged groups of the population. It is also relevant for the post-Covid period, given that the increased automation, digitization, and robotization are expected to contribute even further to job polarization in the EU, as a decline of employment in medium-paid occupations and a simultaneous increase of low and high-paid occupations is on-going (Sebastian and Biagi 2018; European Commission 2020b).

All the above, make the study of the Greek case even more interesting for estimating the effects of changes in minimum wage in different phases of economic cycles. The rest of the paper is structured in the following way: the second section presents a literature review, while the third the data and the methods used in the applied analysis. The results are outlined in the fourth section, while the fifth section concludes.

2. Literature review

The paper touches upon two distinct fields in the literature of labour economics: the one of employment/unemployment dynamics and that of the economics of minimum wage. We combine elements of both fields in order to identify the determinants of mobility in the labour market from the perspective of identifying what are the factors that affect the individual probability of making a transition into or out of unemployment.

In the relevant literature, there are studies focusing on individual characteristics, such as demographics, on the phase of the economic cycle and on the impact of specific labour market institutions, such as the minimum wage.

A significant part of this literature focus on the relation between past unemployment experience and its impact on the predicted unemployment probability rather than individual characteristics (Akerlof and Main, 1980; Arulampalam et al., 2000; Arulampalam, 2002; Burgess and Turon, 2005).

Bradley et al. (2003) focus on skills and find that high-skilled workers are more likely to keep a “good” job, but unskilled workers seem to be trapped in a vicious cycle of employment in the low-skilled sector, unemployment, or inactivity. They also find evidence of scarring effect. Gang (2003) confirms this finding for United States and Germany concluding that high-skilled workers experience shorter spells of unemployment.

Uhlendorff and Zimmermann (2014) also focused on individual characteristics and especially on nationality, finding that despite the fact that there are no differences in the probability per se between migrants and native Germans, the latter are estimated to spend less time in job search. However, they detect variations in probability of exiting from unemployment across ethnicities. Caliendo and Uhlendorff (2008) analyze the mobility between self-employment, wage employment and unemployment. They find that being non-employed in the past increases the probability of being self-employed and vice versa. Also, other individual-based determinants are examined like marital status, disability, nationality, number of children, and higher educational level attained. The relevant results reveal that these characteristics significantly affect the probability of moving from wage employment to self-employment or unemployment.

Apart from individual characteristics, a part of the literature has been dedicated to the link between the phases of economic cycle and unemployment transitions. Firstly, Cockx and Dejemeppe (2005) find that exit from unemployment is significantly affected by seasonal and cyclical variations but the skills deterioration and demotivation also play an important role on the unemployment probability. The relation between cyclical variations and unemployment transitions has also been studied by Shimer (2012) who find that the workers’ separation probability in the US was weakly countercyclical until the mid-1980s and during the last two decades is almost acyclic. Furthermore, Garcia and van Soest (2017) use administrative data from Spain Social Security for dynamic analysis of unemployment. They find that unemployment to employment transition is pro-cyclical while the opposite is counter-cyclical. Also, they argue the crisis impact was stronger in the job finding rates and

weaker in the separation rates highlighting the importance of policies that connect individuals with the labour market during recession.

Regarding the impact of minimum wage on labour market flows, there is a number of studies focusing especially on that [Portugal and Cardoso (2006), Brochu and Green (2011), Dube et al. (2015)] All these studies are mainly conducted with either aggregate or individual-level data and find that a minimum wage increase is followed by a decrease in job separations.

Regarding minimum wage in Greece, Yannelis (2014) and Kakoulidou et al. (2018) focus on the 2012 minimum wage reform and its impact on employment and employment dynamics. A substitution channel between workers below and above 25 years is found by Yannelis due to the youth subminimum wage introduction. As for employment dynamics, the positive employment effect is through new hires and there is no effect through job destructions. On the contrary, Kakoulidou et al. do not find significant changes in employment probability between two close substitute age-groups (22-24 and 25-27), but they find a positive impact on job-finding rate and no significant impact on job losses.

In EU level, the most important studies are Ward & Macchiarelli (2014) and Monastiriotis et al. (2019). Both find significant differences in transitions patterns especially between countries of Southern Europe and Nordic countries. Moreover, these transitions are found to be sensitive to economic conditions as also found by Fontaine (2016) in the case of France. Hence, economic downturns are estimated to lead to higher probability of moving into unemployment and vice versa.

Cassandro et al. (2020) present a novelty by adding to the determinants of individual probability of getting unemployed the routine-task intensity of the occupation. They find that workers employed in routine-intensive occupations do not display higher unemployment risk than the rest of the workforce. However, when cognitive and manual tasks are distinguished, it turns out that workers employed in occupations entailing a large proportion of routine cognitive tasks (such as workers employed in service occupations as cashiers or call-center operators) are in fact exposed to a relatively higher risk of becoming unemployed.

By exploring the effect of the minimum wage on unemployment transitions, controlling for other socioeconomic, macroeconomic and regional factors the study adds to the relevant literature. The key elements of the present paper's contribution are the introduction of a minimum wage – related variable, individual characteristics and economic growth into a single model in order to estimate the effect of minimum wage on unemployment transition. Further the estimation is conducted for a long period including a deep and prolonged economic crisis period when the national minimum wage was cut and a youth subminimum wage was introduced.

3. Methodology & data

The analysis of this paper is based on quarterly longitudinal micro data from Greek Labour Force Survey (LFS) between 2004 and 2019. The Greek LFS, produced by Hellenic Statistical Authority (EL.STAT.) in quarterly basis, provides data on labour force participation of people aged above 15 years and on persons that do not participate actively in the labour force. LFS dataset is a rotating panel dataset as one sixth of the sample is replaced each quarter. Thus, each individual can participate in the survey for up to six quarters (q1 to q6). In total, the pooled panel we use comprises of 4,320,662 observations corresponding to 832,542 individuals participating in the survey for at least one quarter. The dataset used in the logit analysis is the unbalanced one. Yet, for spell analysis also the balanced panel is used, which includes only those individuals who participate in the sample for six consecutive quarters. The balanced dataset includes 1,433,022 observations corresponding to 238,837 individuals. In the analysis below, both balanced and unbalanced datasets have been restricted to those who actively participated in the labour force, i.e. those who were employed or unemployed. Therefore, transitions from inactivity to employment and vice versa are excluded.

One way to study unemployment transitions is through individuals' employment and unemployment spells (Kaitz 1970; Akerlof and Main 1980). An unemployment spell can be defined as a continuous period during which the individual is unemployed and, thus, the beginning of an unemployment spell in our analysis is

the first quarter that the individual is unemployed, and it ends the quarter that he finds a job. In this way, the total period of survey for each individual is divided into smaller periods (spells into and out of unemployment). The study of frequency and duration of unemployment spells is important for policy making as it offers indication of the size of mobility in the labour market and of the extent to which unemployment is transitional or more permanent. The main discrepancy of spell analysis is the problem of left and right censoring, caused by the fact that the length of spells is limited by the observation window of the survey (six months in the case of the LFS).

Apart from studying the frequency, duration and recurrence of unemployment through spell analysis, we also examine the determinants of transitions into and out of unemployment, focusing on the role of minimum wage, certain individuals socioeconomic variables controlling also for macroeconomic, regional determinants as well as for the unobserved heterogeneity. The model used is a simple binary multivariate logistic model:

$$Pr(y_{it} = 1) = F(\beta x_i) = p_{it}$$

and

$$Pr(y_{it} = 0) = 1 - F(\beta x_i) = 1 - p_{it},$$

where y_{it} is the dependent variable capturing the transition in question (transition into or out of unemployment). $y_{it} = 1$ when the individual has a transition (enters or exits unemployment) and $y_{it} = 0$ when the individual is in the same status as in the previous year. F is the logistic distribution $F(z) = \frac{\exp(z)}{1 + \exp(z)} = \Lambda(z)$, x and β , the vector of explanatory variables and their respective coefficients. When we control for unobserved heterogeneity or frailty, an individual-specific unobserved characteristic u is added.

$$Pr(y_{it} = 1) = F(\beta x_i + u_i) = p_{it}$$

We estimate u using random effect techniques, in particular Gauss-Hermite quadrature. In the tables, we present the standard deviation of the heterogeneity variance, “sigma_u”, and “rho” which is the ratio of the heterogeneity variance to one

plus the heterogeneity variance⁶ and in a way indicates how much of the model variance is due to unobserved heterogeneity.

In the basic specification of the model for unemployment entry or exit, the estimated X is a vector included three groups of independent variables. One group with the variables related to the minimum wage (percentage difference and interaction with age groups). A second group with variables related to the socioeconomic status of the individuals such as age group, gender, marital status, nationality. Finally, a third one another group with vars capturing geographical regions, seasonality and the difference in growth rate (q-o-q).

4. Results

4.1 Spell analysis results

In this section, a set of graphs is included presenting the main descriptives of the spell analysis. Graph 1 illustrates several descriptive statistics using both the balanced and the unbalanced panel. Firstly, number of spells that an individual experienced is presented. The number of spells increases with labour market mobility. However, the majority of individuals (more than 95% using the unbalanced panel and more than 93% using the balanced) have experienced only one spell in employment or unemployment, offering a clear indication of low mobility.

[Graph 1 here]

Another dimension of labour market mobility is the length of spells experienced. The higher the length the lower the mobility as individuals stay in the sample for six quarters. Hence, a 6-quarter spell means no transition between any of labour market statuses during the stay in the sample. Results indicate the low mobility model in the Greek labour market. 85.6 per cent of individuals in the balanced and 62.5 percent in

⁶ $\rho = \frac{(\sigma_u)^2}{1 + (\sigma_u)^2}$. If the hypothesis that rho is zero cannot be rejected then frailty is unimportant.

the unbalanced panel have experienced spells (either in employment or unemployment) that last six quarters.

Considering those who have experienced at least one spell in unemployment, we focus on the duration of biggest spell in this status. The higher the duration of the biggest spell in unemployment the more persistent unemployment is. It is observed that the largest part of the sample both in balanced and unbalanced panel have experienced unemployment spells at their maximum duration, i.e., six quarters. As a result, unemployment seems to be a permanent situation. So, if an individual moves into unemployment it is more likely to stay there for a long time. On the other side, especially regarding the unbalanced panel, unemployment is either a permanent or a temporary situation. 17.3 percent of individuals included in the unbalanced panel have experienced a single-quarter spell in unemployment meaning that they have move quickly back in employment.

Low mobility is also confirmed by the number of total quarters in unemployment. It is found that 65.8 percent of individuals in the balanced panel and 42.1 percent in the unbalanced panel have experienced six quarters in unemployment in total. Thus, they have not experienced even the minimum employment spell during their stay in the sample.

Focusing more on time spent in unemployment, in Graph 2, we split the sample period into three subperiods: 2004q1 – 2008q3, 2008q4 – 2016q1, 2016q2 – 2019q4. The first period is the period just before the crisis that hit Greece in the end of 2000s. The second period is the 'crisis period' while the third is the 'recovery period' as the economy started to recover after a deep and prolonged recession. However, the same pattern is obtained again. Regardless the period, most of individuals have experienced six quarters in unemployment. Hence, the low mobility model has survived even during the severe economic crisis that hit Greece. An interesting result from the unbalanced panel is that the distribution of unemployment duration moved slightly towards the right (higher duration) during the crisis period, i.e., 2008q2 – 2016q1. At this period, more people moved into unemployment and stayed there for more time as job creation was low and unemployment was in unprecedented levels.

4.2 Logit regression results

The estimations presented in this paper have been conducted for the entire sample period (2004 – 2019), but also for three separate periods: 2004q1 – 2008q3, 2008q4 – 2016q1, 2016q2 – 2019q4.

The explanatory variable of main interest is the percentage difference of the minimum wage from year to year⁷. Regarding unemployment entries (Table 1), the percentage change of minimum wage is estimated not to have statistically significant effect on them. The opposite would be expected, as unemployment entries equal to job losses (firing, quits or contract terminations) and the increase of minimum wage would be expected to increase the probability of having a transition into unemployment. The same result is obtained in the model where interactions between the minimum wage change and several age-groups are introduced in order to examine whether the changes in minimum wage in the period of crisis had a different impact across age-groups (specification 2⁸).

The most important finding is that individual characteristics seem to play a more important role on the transition probabilities. Starting from the age, the probability of entering unemployment decreases as age increases and for all age groups the probability to enter unemployment is higher than the baseline group (i.e., 50-64). This finding does not differ in the three periods examined: post-crisis, crisis and recovery and is compatible with the theory that predicts higher mobility in younger groups (see Dorsett, R., & Lucchino, P., 2018).

Further, women and unmarried individuals have higher probabilities of entering unemployment than men and married individuals in all periods under examination. What is interesting is that when we interact the gender with marital status, the married women seem to have much less probabilities to enter unemployment than the other groups as the odds-ratio drops significantly below one. When we split into the three sub-periods we observe that this effect occurs mainly from the period of crisis. This finding is particularly interesting because it means that married women

⁷ We have tried various forms for this explanatory variable: the level of minimum wage, the log of minimum wage, the difference of difference. The results do not change the assumptions that occur from the selected specification.

⁸ Both the Akaike Information Criterion (AIC) and the Bayesian Information Criterion are smaller in the first specification (for the same dataset used) indicating that the first specification fits better.

sustained their jobs during the crisis much more than the men or unmarried women, this could be attributed due to particular characteristics or skills of married women or favourable treatment from the side of the employers.

As for education, a negative relationship between the level education and unemployment entry probability would be expected. The results are quite surprising although. In most specification, less than primary, primary, and lower secondary education attendants have not significantly different probabilities to move into unemployment in comparison with the baseline group (i.e., secondary education attendants). Post-secondary education attendants are less likely to move into unemployment than the baseline. As expected, higher educational levels decrease the probability of entering unemployment in most specifications estimated. The pattern is the same in all periods examined⁹.

Surprisingly, probability of entering unemployment is not statistically different for immigrants. However, regarding immigrants, we should highlight that they usually work on more flexible types of jobs, and they are more likely to work in the informal sector. These two features make them attractive especially to employers offering low-skilled jobs (especially in agriculture), which probably protects them against getting unemployment, given that they are employed. This is also in accordance with the findings of Filinis et al. (2018) which demonstrate that during the crisis the low-skilled individuals maintained their jobs as opposed to the medium skilled. The same pattern has also been observed in Italy after the 2008 crisis, where there was growth of low-technology- and low-knowledge-intensive sectors which account for the entry of low-skilled and high-routine workers into the Italian labor market (Céline et al. 2019; Cassandro et al. 2020).

Unemployment transitions are more likely to happen for individuals living in all regions than Attica. The main reason for that might be the high mobility observed in all regions. Higher mobility may be attributed mainly on seasonal tourism-related activities, like accommodation, restaurant sector etc. Hence, people working on these sectors move into unemployment during the so-called touristic period. Higher coefficients implying higher mobility are observed in more touristic areas like the

⁹ We have also tried various interactions of education and age, or gender but the model's explanatory power did not improve.

Aegean islands (particularly the region of Southern Aegean), the Ionian Islands and Crete.

In addition, the effect of growth rate of the economy, as depicted in the qoq difference, on the probability of entering unemployment is mixed. For the total period (2004 – 2019), it is estimated that this probability decreases with the growth rate of the economy. This finding is compatible with the theoretical predictions. However, this finding differs when estimations are done for different time periods. For the first period, before the crisis onset in Greece, higher growth rate is estimated to imply a higher probability of entering unemployment in contrast with what expected. Finally, the unobserved heterogeneity, as measured by σ_u and ρ is significant at the 0.1% level of significance. This practically means that there are unobserved characteristics across individuals such as skills, capabilities, commitment that affect the probability of exiting unemployment.

The other side of mobility includes transitions from unemployment to employment, i.e., unemployment exits or equally job findings, the result of which are presented in Table 2. It would be expected that minimum wage increases will lower exits from unemployment as labour cost increases.. However, the finding is the opposite. In almost all specifications, minimum wage increase is estimated to slightly increase the probability of exiting unemployment (as the odds-ratio slightly higher than 1) This slightly positively relationship between unemployment exits and minimum wage is present even during the period of crisis (period 2). This is a very interesting finding that needs further investigation particularly from the supply side of the labour market as it may capture the positive effects of increases in minimum wage on the labour market participation incentives of the individuals. Yet, it may also relate to the various forms of segmentation that exist in the Greek labour market, as well as to changes at the level of informality.

Regarding age, all age-groups are more likely to move into employment in comparison with the baseline group (i.e., those aged above 50 years), verifying once again the higher mobility across the younger cohorts. In particular those aged 25-34 seem to have the higher probabilities of finding a job in all periods. However, the differences across groups are smaller and less significant in the pre-crisis period. The interactions between change in the minimum wage and age do not have a statistically significant

effect on the probability of exiting unemployment with the exception of the first period, up to 2008. In this specification, the effect of minimum wage change is not statistically significant, but all interactions are, implying a higher probability.

The results for unemployment exit probability confirm the lower mobility for women, as the estimated coefficient for unemployment exits is negative, implying that women are less likely to find a job probably due to family reasons. This finding is even stronger during the period of crisis (odds-ratio is significantly smaller 0.50). On the contrary, married individuals are more likely to find a job. This might be attributed to higher economic needs and especially for men higher labour supply. For married women, the probability of finding a job is even lower revealing the possible effect of family obligations.

Mixed results are obtained regarding the effect of education on transition out of unemployment which also vary across the different periods. When the sample is pulled the probability of exiting unemployment seems to be higher for the very low skilled individuals (those that have completed primary or less than primary education), as well as high skilled individuals (having completed tertiary education) as compared to the baseline group (secondary education). When splitting the sample into the three periods the results differentiate. In the pre-crisis the low skilled (less than primary, primary and lower secondary), as well as the very high-skilled (post-tertiary) have higher probabilities of exiting unemployment. During the period of crisis, this positive effect restricts only to the very low skilled (primary or less than primary) and tertiary education, and is not significant for lower secondary or post-tertiary education. Finally, in the recovery period most odds-ratio are significant indicating that the educational level does not make a difference in the probability of exiting unemployment, excluding the lower secondary for which the probability decreases compared to the graduates of secondary education. This effect probably signals a changing role of the typical education in protecting people from unemployment and enhance job finding. The result relates also to similar findings from income distribution studies for the period of crisis concluding that changes in relative group incomes and population shares result in a very substantial decline in the contribution of inequality 'between education groups (Andriopoulou et al. 2018).

Nationality seems to be a decisive factor in exiting unemployment. Immigrants are estimated to have lower probabilities of finding a job revealing the lower access to employment compared to that of Greeks.

The pattern of higher mobility in all regions than Attica remains also for unemployment exits. Individuals living in these regions are more likely to find a job and the corresponding probability is many times higher in areas with high share of tourism-related activity like the regions of Southern Aegean, Ionian Islands and Crete. Finally, the estimations on the impact of growth rate are fully compatible with the theoretical predictions. Higher growth rate implies a higher probability of exiting unemployment confirming what expected. The estimated effect is not statistically significant only for the 'recovery period' which may be related to the rate of the recovery of unemployment that might be higher in the initial years of recovery following a so long and deep recession.

Finally, It is logical to assume that the unobserved characteristics that affect the probability of exit may also affect the probability of entry. For instance "more able" individuals are more likely to exit unemployment quickly and also less likely to enter unemployment. Unobserved heterogeneity across individuals remains an important factor also for unemployment exits as verified by σ_u and ρ .

5. Conclusions and policy implications

In the paper, we examined the determinants of the unemployment dynamics and the impact of the minimum wage on the probability of making a transition into and out of unemployment. We used micro-level data from the Greek Labour Force Survey for the period 2004-2019 and controlled for several demographic factors, macro-economic conditions, regional differences and the change in national minimum wage.

Overall, the finding suggests that there is no causal relationship between minimum wage changes and transitions into unemployment, while transitions out of unemployment seem to be slightly positively affected by increases in minimum wage, which is contrary to what we would expect particularly for the period of the economic crisis. Splitting the sample into three different periods does not alter this main finding.

The results also suggest that individual-level characteristics both observed and unobserved play an important role in making a transition into or out of unemployment. Age seems to be negatively related with the probability of entering unemployment, while on the other hand younger cohorts especially those aged 25-24 have the highest probabilities to find a job. Thus, we could conclude that the youth, in general, experiences higher mobility (in both directions into and out of unemployment) than the elderly in the labour market in the period under examination and this is consistent with the relevant literature and can be attributed both to employee and employer choices. Another interesting finding relates from gender and marital status. Women have higher probabilities to entry unemployment and much lower probabilities to exit unemployment. Yet, married women have much lower probabilities to lose their job, but at the same time, they also have lower probabilities to find a job once they enter unemployment. A further investigation of these causal effects would be interesting in order to see whether it is the labour demand or supply side that drives what it is observed. In a similar way, immigrants are estimated to have lower probabilities of finding a job revealing the lower access to employment compared to that of Greeks. Yet, given that they are employed, they have less probability to lose their job than Greeks. The effect of typical education seems to be mixed signaling that the tradition protective effect of education towards unemployment has been eliminated.

As far as the regional variables are concerned, estimates reveal a higher mobility in all regions than Attica both for unemployment entries and exits and the corresponding probabilities are higher in areas with high share of tourism-related activity like the regions of Southern Aegean, Ionian Islands and Crete. Further, the impact of economy's growth rate follows the theoretical predictions as higher growth rates increase unemployment outflows and decrease inflows.

In total, the paper findings indicate that the mobility in the Greek labour market remains low in all periods of examination, despite the numerous reforms that have taken place during the three economic adjustment programs in relation to labour market institutions and regulations towards increasing the flexibility. The majority of

individuals (more than 90%) have experienced only one spell in employment or unemployment, while most of the unemployed (65%) are unemployed for more all the observation period (1.5 year), which depicts the large increase of long-term unemployment during the crisis. Thus, it is not clear to what extent the reforms were successful in reducing inequalities between labour market insiders and outsiders and the fragmentation of the labour market.

The results have important policy implications, given that the disemployment effect of the minimum wage seems to be very limited in the Greek labour market, while the socioeconomic characteristics and regional characteristics seem to play an important role. The paper can contribute to the on-going discussion on the adequate minimum wage in the EU, as it offers an indication that the minimum wage increases do not induce unemployment entries and at the same time may be slightly related with higher exits from unemployment, particularly for the youth. Yet, this finding should be interpreted with care as it may be related to the high level of job informality and segmentation in the Greek labour market. It certainly offers a change to re-think of the effectiveness and scope of sub-minimum wage policies.

Policies that improve the labour market participation incentives for women and eliminate any differentiation in costs between genders for the employer may help reduce the adverse effects that we observe for females in relation to exiting unemployment.

The large differences across regions in labour market mobility from the perspective of transitions into and out unemployment reveal that there is room for public policies to exploit the dynamics that exist in labour demand in the different regions, which to a large extent has seasonal characteristics, but with the appropriate investment could lead to the creation of permanent job positions. In addition, improving the skills of individuals through educational system and reskilling or up-skilling programs, while targeting specific regions, may facilitate labour market mobility. Finally, interventions that will enhance labour market mobility across all dimensions, including different sectors, are important for the adaptation of skills and the reallocation that may be needed in order to face the new challenges of the automation and digitalization in the post-Covid era.

References

Akerlof, G. A., & Main, B. G. (1980). Unemployment spells and unemployment experience. *The American Economic Review*, 885-893.

Andriopoulou, E., & Tsakoglou, P. (2015). *Mobility into and out of poverty in Europe in the 1990s and the precrisis period: The role of income, demographic and labour market events* (No. 15/13). Herman Deleeck Centre for Social Policy, University of Antwerp.

Arulampalam, W., Booth, A. L., & Taylor, M. P. (2000). Unemployment persistence. *Oxford Economic Papers*, 52(1), 24-50.

Arulampalam, W. (2002). State dependence in unemployment incidence: evidence for British men revisited.

Böheim, R., & Taylor, M. P. (2000). *Unemployment duration and exit states in Britain* (No. 2000-01). ISER Working Paper Series.

Bontemps, C., Robin, J. M., & Van den Berg, G. J. (1999). An empirical equilibrium job search model with search on the job and heterogeneous workers and firms. *International Economic Review*, 40(4), 1039-1074.

Bontemps, C., Robin, J. M., & Van den Berg, G. J. (1999). An empirical equilibrium job search model with search on the job and heterogeneous workers and firms. *International Economic Review*, 40(4), 1039-1074.

Bontemps, C., Robin, J. M., & Van den Berg, G. J. (2000). Equilibrium search with continuous productivity dispersion: Theory and nonparametric estimation. *International Economic Review*, 41(2), 305-358.

Bradley, S., Crouchley, R., & Oskrochi, R. (2003). Social exclusion and labour market transitions: a multi-state multi-spell analysis using the BHPS. *Labour Economics*, 10(6), 659-679.

Brochu, P., & Green, D. A. (2011). *The impact of minimum wages on quit, layoff and hiring rates* (No. 11, 06). IFS working papers.

Burgess, S., & Turon, H. (2005). Unemployment dynamics in Britain*. *The Economic Journal*, 115(503), 423-448.

Caliendo, M., & Uhlenhorff, A. (2008). Self-employment dynamics, state dependence and cross-mobility patterns.

Cappellari, L., & Jenkins, S. P. (2004). Modelling low income transitions. *Journal of Applied Econometrics*, 19(5), 593-610.

Cappellari, L., & Jenkins, S. P. (2008). Estimating low pay transition probabilities accounting for endogenous selection mechanisms. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 57(2), 165-186.

Croda, E., Kyriazidou, E., & Polycarpou, I. (2011). Intertemporal labor force participation of married women in Germany: A panel data analysis. *University Ca'Foscari of Venice, Dept. of Economics Research Paper Series No, 17*.

Cockx, B., & Dejemeppe, M. (2005). Duration dependence in the exit rate out of unemployment in Belgium. Is it true or spurious?. *Journal of Applied Econometrics, 20*(1), 1-23.

Corcoran, M., & Hill, M. S. (1985). Reoccurrence of unemployment among adult men. *Journal of Human Resources, 165-183*.

Daouli, J., Demoussis, M., Giannakopoulos, N., & Laliotis, I. (2017). The wage curve before and during the Greek economic crisis. *Empirical Economics, 52*(1), 59-77.

Dorsett, R., & Lucchino, P. (2018). Young people's labour market transitions: the role of early experiences. *Labour Economics, 54*, 29-46.

Dube, A., Lester, T. W., & Reich, M. (2013). Minimum wage shocks, employment flows and labor market frictions.

Flinn, C. J. (2006). Minimum wage effects on labor market outcomes under search, matching, and endogenous contact rates. *Econometrica, 74*(4), 1013-1062.

Fontaine, I. (2016). French unemployment dynamics: a "three-state" approach. *Revue d'économie politique, 126*(5), 835-869.

Gangl, M. (2003). Labor market structure and re-employment rates: unemployment dynamics in West Germany and the United States. *Research in Social Stratification and Mobility, 20*, 185-224.

Garcia, A., & van Soest, A. (2017). Unemployment exits before and during the crisis. *Labour, 31*(4), 337-368.

Heckman, J. J. (1981). Heterogeneity and state dependence. In *Studies in labor markets* (pp. 91-140). University of Chicago Press.

Heckman, J. J., & Borjas, G. J. (1980). Does unemployment cause future unemployment? Definitions, questions and answers from a continuous time model of heterogeneity and state dependence. *Economica, 47*(187), 247-283.

Hyslop, D. R. (1999). State dependence, serial correlation and heterogeneity in intertemporal labor force participation of married women. *Econometrica, 67*(6), 1255-1294.

Kakoulidou, T., Konstantinou, P., & Moutos, T. (2018). The Subminimum Wage Reform in Greece and the Labour-Labour Substitution Hypothesis.

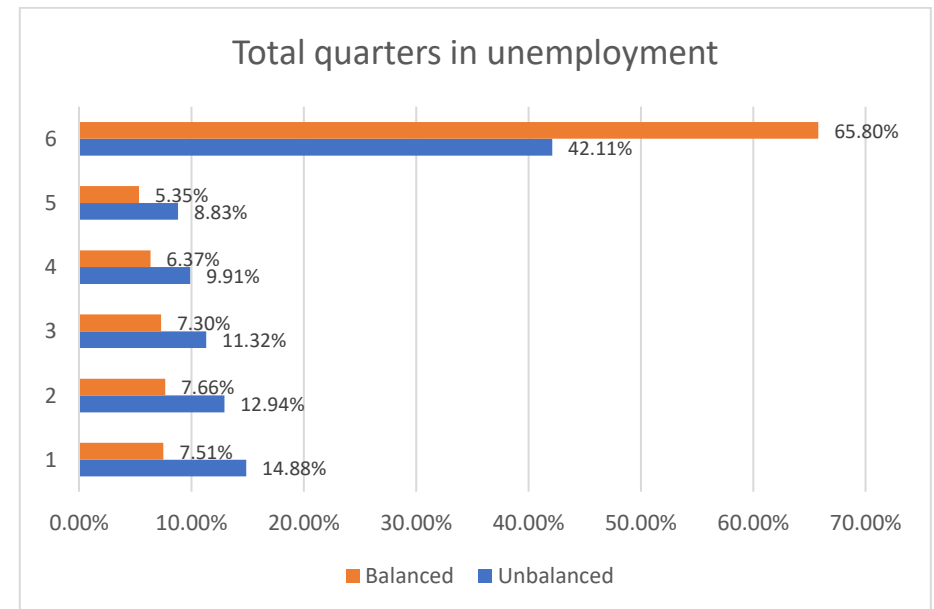
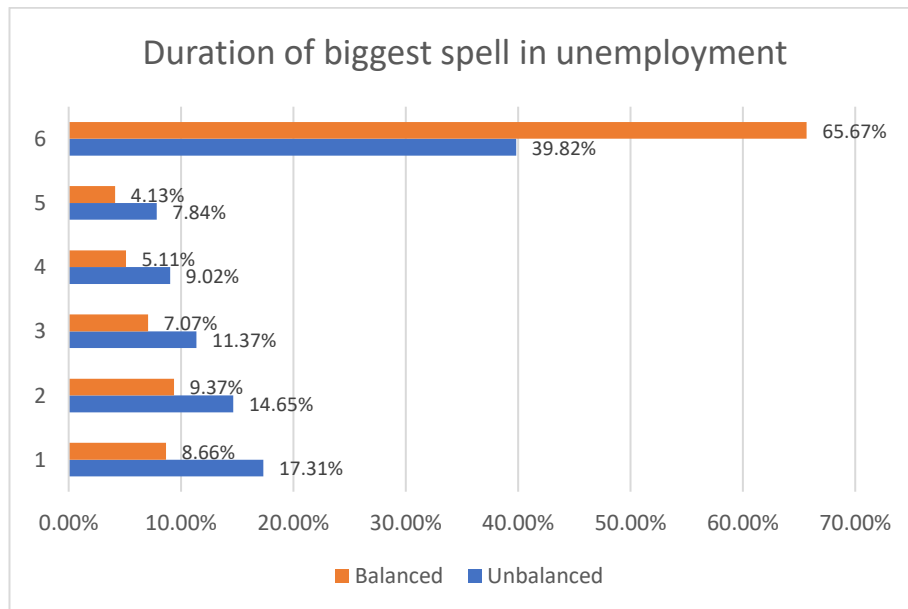
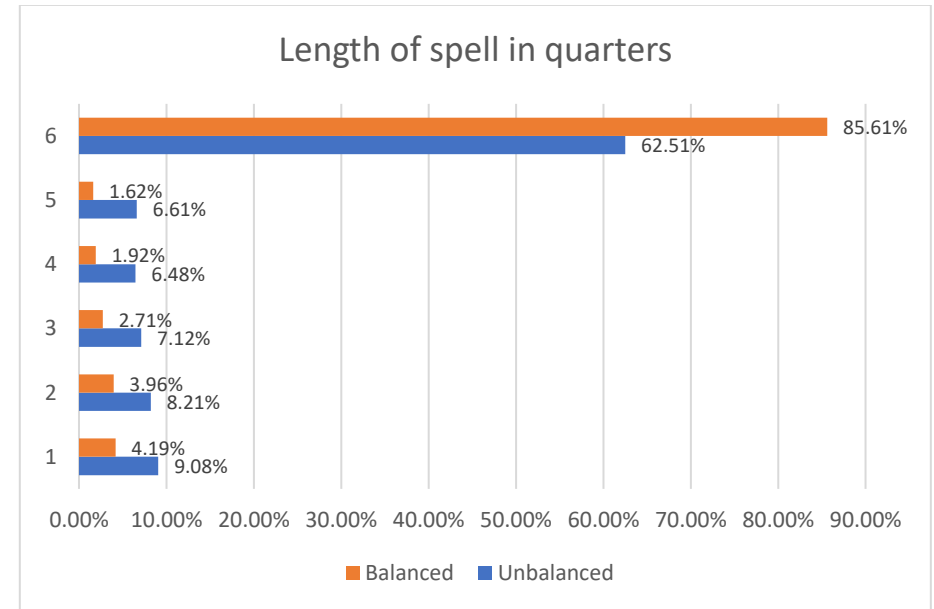
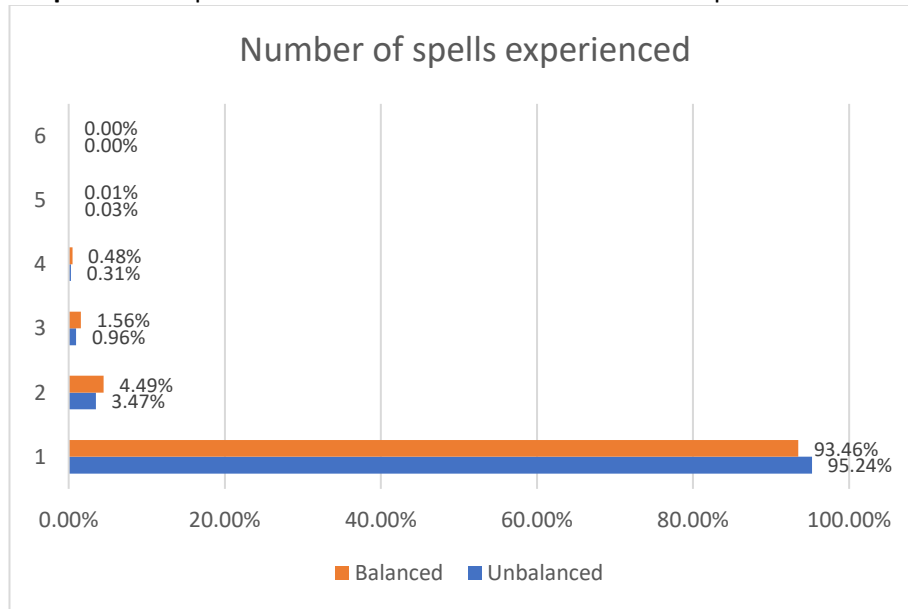
Kalwij, A. S. (2004). Unemployment Experiences of Young Men: on the Road to Stable Employment?*. *Oxford Bulletin of Economics and Statistics, 66*(2), 205-237.

Kandoussi, M., & Langot, F. (2020). *Uncertainty Shocks and Unemployment Dynamics*. IZA-Institute of Labor Economics.

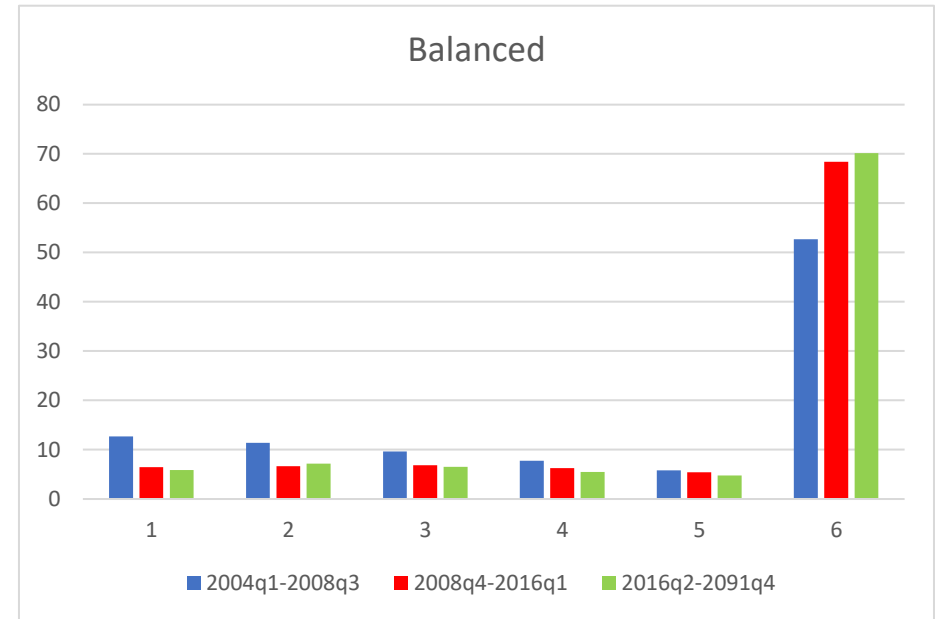
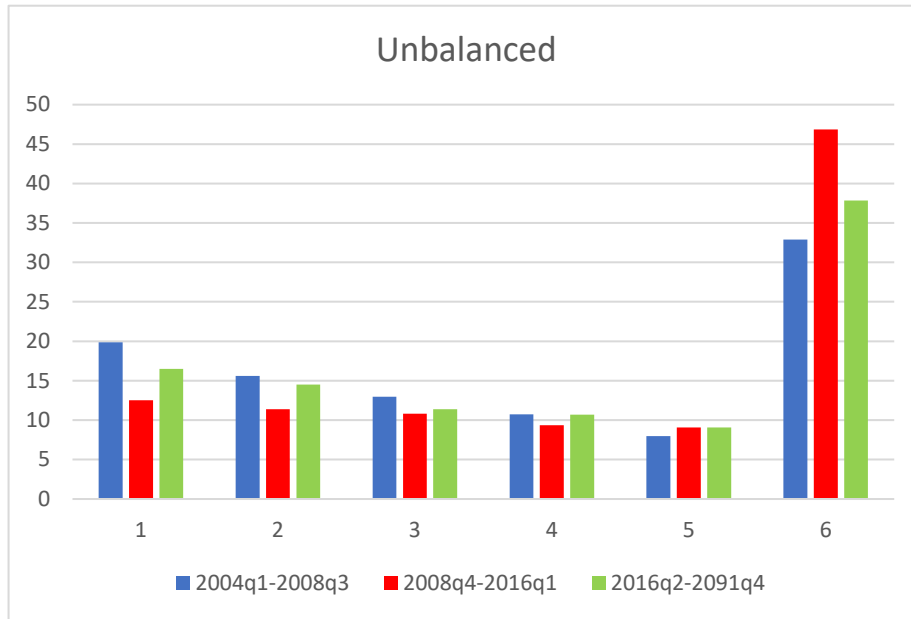
- Kanellopoulos, C. (2015). The Effects of Minimum Wages on Wages and Employment. *Bank of Greece Economic Bulletin*, No 41.
- Kasy, M. (2011). A nonparametric test for path dependence in discrete panel data. *Economics Letters*, 113(2), 172-175.
- Mabli, J., & Flinn, C. (2007). On-the-Job Search, Minimum Wages, and Labor Market Outcomes in an Equilibrium Bargaining Framework. In *2007 Meeting Papers* (No. 791). Society for Economic Dynamics.
- Michaud, P. C., & Tatsiramos, K. (2005). Employment Dynamics of Married Women in Europe.
- Meyer, B. D. (1990). Unemployment Insurance and Unemployment Spells. *Econometrica*, 58(4), 757-782.
- Monastiriotis, V., Macchiarelli, C., & Lampropoulou, N. (2019). Transition dynamics in European labour markets during crisis and recovery. *Comparative Economic Studies*, 61(2), 213-234.
- Murtin, F., & Robin, J. M. (2018). Labor market reforms and unemployment dynamics. *Labour Economics*, 50, 3-19.
- Nagypal, E. (2005). The Extent of Employment to Employment Transitions. *Unpublished paper. Northwestern University*.
- Neumark, D., & Wascher, W. (2007). Minimum wages, the earned income tax credit, and employment: evidence from the post-welfare reform era.
- Portugal, P., & Cardoso, A. R. (2006). Disentangling the minimum wage puzzle: an analysis of worker accessions and separations. *Journal of the European Economic Association*, 4(5), 988-1013.
- Shimer, R. (2012). Reassessing the ins and outs of unemployment. *Review of Economic Dynamics*, 15(2), 127-148.
- Stewart, M. B., & Swaffield, J. K. (1999). Low pay dynamics and transition probabilities. *Economica*, 66(261), 23-42.
- Tatsiramos, K. (2009). Unemployment insurance in Europe: unemployment duration and subsequent employment stability. *Journal of the European Economic Association*, 7(6), 1225-1260.
- Uhlenhorff, A., & Zimmermann, K. F. (2012). Unemployment Dynamics among Migrants and Natives.
- Ward-Warmedinger, M. E., & Macchiarelli, C. (2013). Transitions in labour market status in the European Union. *LEQS paper*, (69).
- Yannelis, C. (2014). The minimum wage and employment dynamics: evidence from an age based reform in Greece. In *Royal Economic Society Annual Conference*.

Annex

Graph 1. Descriptive statistics of unbalanced and balanced panel.



Graph 2. Total quarters in unemployment.



Source: LFS 2004 – 2019.

Table 1: Logit analysis of unemployment entries (transitions from employment to unemployment)

| | Specification 1 | | | | Specification 2 | | | |
|------------------------------|-----------------|----------------------|------------------|--------------------|-----------------|----------------------|------------------|--------------------|
| | Total Period | Period1 (pre-crisis) | Period2 (crisis) | Period3 (recovery) | Total Period | Period1 (pre-crisis) | Period2 (crisis) | Period3 (recovery) |
| per_dif_minwage | 1.00 | 1.05 | 0.98*** | 0.98 | 0.99 | 1.06 | 0.98 | 0.95 |
| per_dif_minwage # 15-24 | . | . | . | . | 1.01 | 1.01 | 1.00 | 1.03 |
| per_dif_minwage # 25-34 | . | . | . | . | 1.01 | 1.01 | 1.00 | 1.09* |
| per_dif_minwage # 35-49 | . | . | . | . | 1.00 | 0.99 | 1.00 | 1.02 |
| 15-24 | 4.17 | 3.59*** | 5.98 | 4.23*** | 4.17 | 3.78 | 5.20*** | 4.22*** |
| 25-34 | 2.83*** | 2.63*** | 3.63*** | 2.58*** | 2.82*** | 2.73*** | 3.25*** | 2.54*** |
| 35-49 | 1.93*** | 1.99*** | 2.16*** | 1.57** | 1.93*** | 2.08*** | 2.05*** | 1.57** |
| Female | 2.40*** | 2.59*** | 2.30*** | 2.31*** | 2.40*** | 2.72*** | 2.13*** | 2.32*** |
| Married | 0.57*** | 0.45*** | 0.71* | 0.45** | 0.57*** | 0.44*** | 0.74 | 0.45*** |
| Female # Married | 0.76*** | 1.01 | 0.58*** | 1.03 | 0.76*** | 1.01 | 0.61*** | 1.03 |
| Less than primary/Primary | 0.66 | 0.42*** | 0.83 | 0.65 | 0.66 | 0.41 | 0.84 | 0.65 |
| Lower Secondary | 1.37 | 1.39 | 1.63 | 0.81 | 1.37 | 1.41 | 1.54 | 0.81 |
| Post-secondary | 0.14*** | 0.20*** | 0.11*** | 0.10*** | 0.14*** | 0.19*** | 0.14* | 0.10*** |
| Tertiary | 0.79*** | 0.65 | 0.99 | 0.55*** | 0.79*** | 0.64*** | 1.00 | 0.55*** |
| Post-tertiary education | 0.83** | 0.69 | 0.90 | 0.64*** | 0.83** | 0.69** | 0.90 | 0.64*** |
| Immigrant | 0.45 | 0.89 | 0.42 | 0.31 | 0.45 | 0.89 | 0.45 | 0.31 |
| Eastern Macedonia and Thrace | 3.63*** | 4.79*** | 3.67*** | 2.49*** | 3.63*** | 5.11*** | 3.31*** | 2.50*** |
| Central Macedonia | 3.24*** | 3.84*** | 2.60*** | 4.45*** | 3.24*** | 4.05*** | 2.42*** | 4.46*** |
| Western Macedonia | 9.45*** | 9.35*** | 7.71*** | 14.37*** | 9.45*** | 10.30*** | 6.37*** | 14.40*** |
| Epirus | 2.66 | 2.47*** | 2.67*** | 2.72*** | 2.66 | 2.56*** | 2.49*** | 2.73*** |
| Thessaly | 3.87*** | 4.02*** | 3.69*** | 3.94*** | 3.87*** | 4.24*** | 3.32*** | 3.95*** |
| Ionian Islands | 13.96*** | 24.72*** | 10.82*** | 12.74*** | 13.95*** | 28.59*** | 8.75*** | 12.78*** |
| Western Greece | 2.87*** | 2.16*** | 2.71*** | 4.07*** | 2.87*** | 2.23*** | 2.51*** | 4.08*** |
| Stereia Ellas | 3.25*** | 5.35*** | 2.67*** | 2.49 | 3.25*** | 5.73*** | 2.49*** | 2.49 |
| Peloponnese | 2.23*** | 2.59*** | 1.85 | 2.60*** | 2.23*** | 2.69*** | 1.79*** | 2.61*** |
| Northern Aegean | 4.58*** | 2.98*** | 3.14*** | 10.34*** | 4.58*** | 3.11*** | 2.88*** | 10.36*** |
| Southern Aegean | 16.93*** | 23.15*** | 15.17*** | 14.89*** | 16.93*** | 26.61*** | 12.06*** | 14.93*** |
| Crete | 9.53*** | 9.41*** | 9.80*** | 9.47*** | 9.52*** | 10.35*** | 7.96*** | 9.49*** |
| q1 | 2.39*** | 1.84** | 2.05*** | 2.94*** | 2.38*** | 1.88*** | 2.00*** | 2.96*** |
| q3 | 1.01 | 0.86 | 1.16 | 0.93 | 1.01 | 0.85 | 1.19 | 0.94 |

| | | | | | | | | |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|
| q4 | 2.14*** | 2.00*** | 1.88*** | 3.28*** | 2.14*** | 2.02*** | 1.90*** | 3.29*** |
| qoq_diff | 0.94*** | 1.13*** | 1.01 | 0.96 | 0.94*** | 1.14*** | 1.01 | 0.96 |
| _cons | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | |
| /Insig2u | 9.17*** | 8.73*** | 9.45*** | 9.81*** | 9.16*** | 9.93*** | 7.50*** | 9.86*** |
| AIC | 124,738 | 31,264 | 66,363 | 26,336 | 124,742 | 31,256 | 66,343 | 26,337 |
| BIC | 125,043 | 31,564 | 66,637 | 26,610 | 125,083 | 31,577 | 66,694 | 26,641 |
| Prob>chi2= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Table 2: Logit analysis of unemployment exits (transitions from unemployment to employment)

| | Specification 1 | | | | Specification 2 | | | |
|------------------------------|-----------------|----------------------|------------------|--------------------|-----------------|----------------------|------------------|--------------------|
| | Total Period | Period1 (pre-crisis) | Period2 (crisis) | Period3 (recovery) | Total Period | Period1 (pre-crisis) | Period2 (crisis) | Period3 (recovery) |
| per_dif_minwage | 1.04*** | 1.07*** | 1.03*** | 1.04*** | 1.02*** | 1.02 | 1.03** | 1.05** |
| per_dif_minwage # 15-24 | . | . | . | . | 1.03** | 1.08*** | 1.01 | 1.00 |
| per_dif_minwage # 25-34 | . | . | . | . | 1.02 | 1.05* | 1.01 | 0.99 |
| per_dif_minwage # 35-49 | . | . | . | . | 1.01 | 1.05* | 1.01 | 0.99 |
| 15-24 | 1.51*** | 1.01 | 1.35*** | 1.76*** | 1.52*** | 0.99 | 1.36*** | 1.76*** |
| 25-34 | 1.71*** | 1.20* | 1.61*** | 1.91*** | 1.71*** | 1.19* | 1.62*** | 1.92*** |
| 35-49 | 1.48*** | 1.16* | 1.49*** | 1.60*** | 1.48*** | 1.15 | 1.50*** | 1.61*** |
| Female | 0.71*** | 0.50*** | 0.76*** | 0.92 | 0.71*** | 0.50*** | 0.76*** | 0.92 |
| Married | 1.72*** | 1.74*** | 1.62*** | 1.89*** | 1.72*** | 1.74*** | 1.62*** | 1.89*** |
| Female # Married | 0.54*** | 0.54*** | 0.53*** | 0.49*** | 0.54*** | 0.54*** | 0.53*** | 0.49*** |
| Less than primary/Primary | 1.30*** | 1.56*** | 1.25* | 1.10 | 1.30*** | 1.56*** | 1.25* | 1.10 |
| Lower Secondary | 1.31 | 2.57*** | 0.99 | 0.28* | 1.31 | 2.56*** | 0.99 | 0.28* |
| Post-secondary | 1.10 | 1.29 | 1.02 | 0.52 | 1.10 | 1.28 | 1.02 | 0.52 |
| Tertiary | 1.33*** | 1.34 | 1.37** | 1.24 | 1.33*** | 1.34 | 1.37** | 1.25 |
| Post-tertiary education | 1.12 | 1.42* | 1.08 | 1.00 | 1.12 | 1.42* | 1.08 | 1.00 |
| Immigrant | 0.52*** | 0.50*** | 0.52*** | 0.42*** | 0.52*** | 0.51*** | 0.52*** | 0.42*** |
| Eastern Macedonia and Thrace | 2.54*** | 2.17*** | 2.96*** | 2.28*** | 2.55*** | 2.17*** | 2.96*** | 2.28*** |
| Central Macedonia | 2.30*** | 2.11*** | 2.16*** | 2.74*** | 2.30*** | 2.11*** | 2.16*** | 2.74*** |
| Western Macedonia | 1.79*** | 1.30* | 1.87*** | 2.13*** | 1.79*** | 1.29* | 1.87*** | 2.14*** |
| Epirus | 2.11*** | 1.05 | 2.84*** | 2.39*** | 2.11*** | 1.05 | 2.84*** | 2.39*** |
| Thessaly | 3.00*** | 1.77*** | 3.87*** | 3.04*** | 3.00*** | 1.77*** | 3.87*** | 3.04*** |

