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1. May 2015

Online at https://mpra.ub.uni-muenchen.de/66299/
MPRA Paper No. 66299, posted 28. August 2015 05:21 UTC

The ins and outs of Greek unemployment in the Great Depression

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Abstract

We investigate the unemployment inflows and outflows using micro-data from the Greek Labour Force Survey (1998-2013). Focusing on the post-2008 recessionary period, aggregate unemployment decompositions show that both, inflow and outflow rates affect unemployment variations. In particular, early in the recession the inflow rate dominates while later the outflow rate takes over. These findings remain unaltered when unemployment persistence and low transition rates are taken into account. Furthermore, applying multinomial regression techniques we find that the ins and outs of unemployment vary with individual-specific heterogeneity (gender, age, education, etc.). This heterogeneity however exhibits a differentiated impact in the pre- and post-2008 periods. Overall, the design of an effective employment policy in Greece needs to take into consideration the exceptionally low job finding rate (10%) and its composition in the ongoing labour market crisis.

Keywords: Unemployment, worker flows, transition probabilities, unemployment decomposition
JEL Classification: J64; E32; C5

Acknowledgments: The authors thank several participants for useful discussions and comments at the 26th Annual Conference of the European Association of Labour Economists, at the 5th International Ioannina Meeting on Applied Economics and Finance and the 2nd International PhD Meeting of Thessaloniki in Economics. This work was supported by the Research Committee of the University of Patras [Caratheodory Basic Research Grant, D160].

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1. Introduction

High and persistent unemployment rates constitute a permanent feature of the Greek economy. During the last three decades (1984-2014) the annual unemployment rate oscillated around the 11.0 % mark and never fell below 7.0 %. In the latter part of this period, the labour market conditions in Greece deteriorated substantially due to the 2007-2008 global financial crisis, which affected the country around the end of 2008, and the outburst of the sovereign debt crisis two years later. Specifically, the 2nd quarter of 2008 marks the end of a rather long period of low unemployment rates (7.25 % in May) while in the post-2008 period joblessness exploded reaching for the first time the 27.9 % mark in September 2013. Comparative data show that the Greek unemployment rate is always higher than those in major Anglo-Saxon counties (US, UK and Germany) and, in addition, it has responded to the global recession of 2007-2008 with a significant delay (Fig. 1). It is well documented that the Greek labour market suffers from deep rooted structural problems which call for urgent and effective public policy responses (Blanchard, 2006). While some reforms have been adopted in Greece, under the Memorandum signed by the Greek government and the Troika, unemployment accelerated rapidly due to the implementation of fiscal austerity measures and structural reforms (Tagkalakis, 2013; Pissarides, 2013; Venetis and Salamaliki, 2015). Undoubtedly, the design of an effective employment policy requires a good understanding of unemployment dynamics, which in turn requires knowledge of the "ins and outs" of unemployment (Mortensen and Pissarides, 1999; Hall, 2005; Petrongolo and Pissarides, 2008; Fujita and Ramey, 2009; Elsby *et al.* 2009; Campolieti, 2011; Smith, 2011; Shimer, 2012; Nordmeier, 2014). The present study investigates the relative importance of inflows and outflows in shaping unemployment variation during the recent economic crisis in Greece.

For analytical purposes we employ quarterly individual-level data, drawn from the Greek Labour Force Survey (LFS) for a period of 16 years (1998-2013) and a "worker-flow" approach (Davis *et al.* 2006).[1] We rely on repeated LFS cross-sectional data and, for identification purposes, we follow Elsby *et al.* (2011) in order to calculate, for all surveyed individuals, the annual transitions between activity statuses for the survey week and for the same period one year ago (the so-called "recall status" in the LFS questionnaire).[2] Relevant evidence regarding the Greek labour market is limited to the work of Kanellopoulos (2011) who utilized LFS data for the period 2004-2009, during which only minor changes were observed in the unemployment rate, and concluded that the "ins and outs" of Greek unemployment are relatively minor, stable and countercyclical. He also suggested that the unemployment inflow rate (job separation) dominates slightly the outflow rate (job finding) in this period. The present study covers a longer period (1998-2013) during which unemployment variations increased drastically and rapidly especially after 2009. Furthermore, it provides fresh evidence on the qualitative differences in the "ins and outs" that are expected to have taken place due to significant variations in aggregate demand factors. In addition, we apply a non-steady state aggregate decomposition, for the first time with Greek data, and examine whether the "ins and outs" of unemployment vary with observed individual-specific heterogeneity.

Our empirical strategy relies on aggregate and micro-level methodological tools and adopts a three-state model of worker flows (employment, unemployment

[1] Usually, data on workers who move "in" or "out" of the unemployment pool are either administrative (unemployment benefit claimants/registered unemployment) or survey-based (e.g., US Current Population Survey, British Household Panel, European Labour Force Survey). In addition, the reference period is usually a monthly one (primarily because of the longitudinal dimension of the datasets). Since the rotated-panel dimension of the Greek LFS does not cover the entire period 1998-2013 but only the period 2004-2009 (Kanellopoulos, 2011) we perform the analysis of the "ins" and "outs" using repeated cross-sections.

[2] We acknowledge that recall data are not a good substitute for longitudinal data regarding the transitory components of certain labour market outcomes. Paull (2002) discusses analytically the problems that are related with the use of recall data. However, Ward-Warmedinger and Macchiarelli (2014) and Casado *et al.* (2014) utilize the EU-LFS dataset in order to calculate annual transition probabilities (using the recall status variable) for European Union member states.

and non-participation). The use of a three-state model is necessary because in periods of limited employment opportunities, unemployment fluctuates not only due to employment flows but also due to transitions from non-participation. At the aggregate level, we explore unemployment dynamics by using either a typical steady state decomposition technique or a non-steady state one, which takes into account unemployment persistence. The latter technique is more appropriate in continental European countries where labour market transition rates are low (Smith, 2011, p.440). At the micro-level, the data allow us to define at the individual level annual transitions across employment, unemployment and non-participation and to investigate the heterogeneous nature of the ins and outs of unemployment (Lundberg, 1985; Gomes, 2012; Krueger *et al.* 2014). This approach could lead to significant policy implications since particular worker groups (e.g., young, old, women, low-educated) face differentiated risks of losing their jobs during severe recessions. In the absence of employment opportunities, certain groups of workers may be trapped in the unemployment pool thus increasing unemployment persistence. For estimation purposes we apply multinomial logistic regression techniques to estimate annual transitions between activity statuses (Clark and Summers, 1979; Bellman *et al.* 1995).

Regarding the aggregate unemployment dynamics, our results show that in the beginning of the recession the unemployment rate deviates substantially from its steady state level and the inflow rate dominates. In contrast, the outflow rate takes over in the later phases of the recession. Furthermore, it appears that in the pre-2009 period unemployment inflows are rather acyclical and they become pro-cyclical in the post-2009 period. Turning to the micro-level analysis, our results indicate that the ins and outs of unemployment vary with individual-specific heterogeneity, which however differs substantially between the examined periods. For example, the relative

risk of moving from employment to unemployment increased in the post-2009 period for male workers (compared to female ones).

The rest of the paper is organized as follows. In Section 2 we present the data and their sources and we discuss the Greek unemployment composition. Section 3 presents the labour market flows and the results of the aggregate unemployment decomposition. In Section 4 we model the relationship between transitions in-and-out of unemployment and several individual specific characteristics. Section 5 presents the results of the micro-econometric estimations and Section 6 concludes.

--Figure 1--

2. Data and preliminary analysis

2.1 Data sources

Data are drawn from the Greek Labour Force Survey (LFS) which is conducted by the Hellenic Statistical Authority (EL.STAT) on a quarterly basis since 1998 and provides information on several labour market outcomes. The survey concerns a sample of 25,000-30,000 households in each quarter (approximately 65,000-80,000 individuals). We focus on the survey years 1998Q1-2013Q4 and the data provide representative aggregates for the entire economy since they are adjusted by the LFS sampling weights. The LFS database includes information on several individual-specific characteristics such as gender, age, years of education, marital status, nationality, region, degree of urbanization, labour market status, economic activity, duration of job search, reasons for becoming unemployed and other elements. In order to derive worker flows at the individual level, we rely on the ILO definition of the current labour market status and on the recall question regarding last year's labour market

status ("Situation with regard to activity one year before survey").[3] We are thus able to designate individuals as employed (E), unemployed (U) or inactive (I) in the current year (t+1) and at one year before the survey (t). We focus on two distinct periods (1998Q1-2008Q3 and 2008Q4-2013Q4) given that a break in the unemployment series is observed at the third quarter of 2008 (Venetis and Salamaliki, 2015), which coincides with the beginning of the recessionary period (Tsouma, 2014).

2.2. Unemployment composition

As it can be seen in Fig. 1, the Greek unemployment rate after the end of 2007 is characterized by a continuous increase which, however, intensified at the beginning of 2010. Theoretically, unemployment can increase due to various cyclical and/or structural reasons. In the Greek case, the recent upsurge of unemployment seems to be the consequence of a cyclical decline in demand and, to a much lesser extent, due to the changing structure/composition of the labour force. Table 1 presents the unemployment rates for selected time periods and for groups of workers defined according to basic demographic and socio-economic characteristics. We observe that the average annual unemployment rate for the period 1998Q1-2008Q3 stands at the neighbourhood of the 10 % mark and for the crisis period (2008Q4-2013Q4) at the 16 % mark. The same overall pattern is observed for specific groups of individuals as well but the variations differ substantially between groups. For example, while the aggregate unemployment increased, on average, by 65 % between the two sub-periods, the unemployment rate for men increased by 128 % (from 6.5 % to 14.95 %) and for women by 40 % (from 15.38 to 21.61). Similarly, unemployment rates have risen disproportionately among age groups. For instance, the unemployment rate for older individuals (over 45 years old) between the two periods has risen substantially more than for younger ones. Furthermore, unemployment has increased considerably

[3] The recall status allows us to identify individuals as employed, unemployed and inactive. The latter category includes students or apprentices, retired, permanently disabled, housewives, military service personnel, etc.

more for married and formerly-married (separated-widowed) than for unmarried individuals (87 vs.64 %). It also appears that the increased unemployment rate concerns mostly the non-EU born individuals. The breakdown of unemployment rates by educational level reveals that the increase in unemployment declines steadily with increased education indicating that joblessness concerns mostly those workers that lack skills. Lastly, the increase in unemployment rates is also characterized by a regional dimension. The highest unemployment increase between the two periods is observed in rural areas even though the level of unemployment is higher in urban centres.

--Table 1--

In order to form a more complete picture of the rising unemployment rate, we present at Table 2 statistics regarding the decomposition of unemployment by reason of unemployment and duration of job search by the unemployed. Most of the increase in unemployment over the last sub-period (2008Q3-2013Q4) is identified among job losers (lay-offs and contract termination). However, the more pronounced increase concerns laid-off workers. In particular, the share of unemployed who are laid-off rose from 16.8 % in the period 1998Q1-2008Q3 to 30.3 % in the period 2008Q3-2013Q4. The share of workers who became unemployed because their contract was terminated increased from 21.1 % to 25.8 % between the two periods. Consequently, the share of workers who lost their job for "other reasons" (i.e., resignation, early and/or normal retirement, etc.) decreased. Thus, involuntary separation seems to be the major reason of the rising unemployment rates of the crisis years 2008Q4-2013Q4. Lastly, we note that long-term unemployment is a rather permanent feature of the Greek labour market. Even in the pre-crisis period more than 55 % of the unemployed were searching for a job more than 12 months.

--Table 2--

3. Labour market flows and unemployment decomposition

In an attempt to fully gauge the flows in the Greek labour market, we rely on the movements -at the individual level- across different states (E,U and I) between two discrete time periods (t, t+1). This transmission mechanism is a Markov process, which can be illustrated by a 3×3 matrix. In this context, the probability P^{ij} that a person will move from state i to state j (where i, j=E,U and I) between t and t+1 equals the ratio of the number of persons who move from state i at t to state j at t+1to the total number of persons in the original state i at t. For instance, P^{EU} represents the probability of a worker moving from employment to unemployment and is given by $P^{EU}=EU_{t+1}/E_t$. All rates are seasonally adjusted (X-12-ARIMA Seasonal Adjustment Program) and weighted using the cross-sectional LFS population weights. Table 3 presents the average annual transition probabilities between the three labour market states for the two sub-periods in question and the entire period as well. In the pre-crisis period, an employed individual had a probability of 96 % to classify him/herself as employed after one year and it decreased slightly to 94 % during the crisis years. Similarly, an individual who classifies him/herself as unemployed had a probability of 64 % to remain at this state after one year during the period 1998Q1-2008Q3. This probability increased further in the crisis years reaching the 77 % mark. Thus, unemployment persistence in the Greek labour market, although widespread during the pre-crisis period, has dramatically deteriorated during the crisis years. In addition, we observe that unemployed workers have a close to 10 % probability of moving out of the labour force in both sub-periods. Furthermore, the probability that inactive individuals will become unemployed in the next year increases over time indicating that the contribution of non-participation to unemployment is increasing. Lastly, significant reductions are observed in the transition probability from unemployment to

employment. This probability was 26 % in the first sub-period and it dropped to 12 % in the second.

--Table 3--

Figure 2 presents graphically the annual transition probabilities for every possible pair of the E, U and I statuses. Panel A of Fig. 2 presents the annual unemployment inflow rate (EU) which, as expected, exhibits a countercyclical behaviour. During the period 1998Q1-2008Q3, a period of substantial economic growth, the annual employment to unemployment transition probability was decreasing (from 2.4 % in 1998Q1 to 1.4 % in 2008Q3). In the period 2008Q4-2013Q4, a period of unprecedented economic regression, the probability in question was increasing (from 1.7 % in 2008Q4 to 5.6 % in 2012Q2). Panel B presents the UE transition rate. This rate appears to be acyclical in the period 1998Q1-2008Q3 and pro-cyclical in the upcoming recessionary period (2008Q4-2013Q4). Specifically, in the first sub-period of declining unemployment the annual rate of unemployment outflow fluctuated around 25 %. In contrast, in the second sub-period the UE transition rate dropped to 8 % in the 2nd quarter of 2012 and stabilized at around 10 % in the last quarter of 2013. Panel C presents the IU transition rate which appears to be countercyclical, as expected. We observe that this transition probability dropped from 3.8 in 1999Q2 to 2.1 in 2008Q3 and increased again from 2.2 in 2008Q4 to 4.0 % in 2013Q2. In other words, as the economy grows a smaller number of inactive individuals move into the unemployment pool. For example, young individuals move directly into the employment state (new entrants) or they may remain inactive (e.g., due to human capital investments). In contrast, when the economy shrinks more inactive individuals move into the unemployment state. Panel D presents the UI transition rate which appears to be rather acyclical in both periods (around 10 %). This implies that even in periods of unfavourable employment prospects and growing

unemployment rates the flow from the unemployment pool into the inactivity state remains at the same level as in periods of rising prospects. Panel E presents the IE transition rate which appears to be countercyclical in the period 1998Q1-2008Q3 and pro-cyclical in the period 2008Q4-2013Q4. It is obvious that the rate of new-entry or re-entry in the employment state is low and declining in the Greek labour market. Panel F presents the EI transition rate which appears to be countercyclical in both periods. That is, when the economy grows the rate at which the employed become inactive is falling and when the economy shrinks this rate is increasing.

Greek unemployment grows because of sizeable inflows from employment and inactivity (non-participation). At the same time, the unemployment pool expands because of low unemployment outflows. Is the rising Greek unemployment due to sizeable inflows or insufficient outflows? To answer this question we need to conduct a decomposition analysis of the aggregate unemployment dynamics. A required first step in answering the above question is to examine whether the actual unemployment rate deviates from its steady state level. We note that the majority of the available decomposition techniques assume that the actual unemployment rate is identical to the steady state one (Hall, 2005; Shimer, 2012; Petrongolo and Pissarides, 2008; Elsby *et al.* 2009; Fujita and Ramey, 2009). However, Smith (2011) proposes a dynamic non-steady state decomposition in cases where the transition rates between labour market statuses are very low and consequently current unemployment is determined primarily by its lagged values (persistence). Actual and steady state unemployment rates for Greece using LFS quarterly data on annual flows are shown at Fig. 3. We observe that in the period 1998Q1-2008Q3 the steady state unemployment rate is very similar to the actual one. In the period 2008Q3-2013Q4 however, significant deviations between the two unemployment rates are observed, indicating that the steady state unemployment rate does not approximate adequately the real one. Such deviations are

evident in periods of accelerating unemployment rates while when the actual unemployment rates stabilize then the two rates seem to be converging. Thus, for the period 1998Q1-2008Q3 the steady state decomposition constitutes an appropriate technique for explaining unemployment dynamics. In contrast, for the recessionary years (2008Q4-2013Q4) the non-steady state decomposition is more appropriate. For comparison purposes we proceed with both techniques (steady state and non-steady state) in the context of a three-state world where individuals are employed, unemployed or inactive.

--Figure 3--

Table 4 includes the results of the steady state unemployment decomposition. When we consider the entire period (1998Q1-2013Q4), changes in the inflow rate account for 63 % of the variation in steady state unemployment. This percentage is composed by a direct (separation) and an indirect effect (unemployment via inactivity). We observe that changes in the separation rate accounts for 42 % of the steady-state unemployment dynamics (66.7 % of the total inflow rate). The contribution of the outflow rate is lower and explains the remaining 37 %. This percentage is composed by a direct (job finding) and an indirect effect (employment via inactivity). Changes in the job finding rate account for 31 % of the steady state unemployment variation. The inflow rate via inactivity exhibits a beta value of 21 % which is much higher than the effect of changes in outflow rate via inactivity, i.e., 6 %. These results exhibit the same patterns in the pre-crisis years (1998Q1-2008Q3). In the crisis period (2008Q4-2013Q4) and in comparison with the pre-crisis period we observe that the effect of the direct inflow rate has increased substantially while the indirect effect dropped significantly. Regarding the outflow effect we observe that both the direct and the indirect effects increased with the former exhibiting a higher rate. These findings indicate that the impact of the inflow rate becomes weaker and

the impact of the outflow rate becomes stronger in explaining unemployment dynamics. Finally, it should be noticed that in the crisis period, the indirect effects (for both inflows and outflows) appear to be very low and thus inadequate to explain unemployment variations. Panel B of Table 4 shows the evolution of the contribution of current changes in transition rates to the variance of steady-state unemployment (beta) for a 3-year rolling window period (2008Q4-2013Q4). We observe that as the recession deepens the job finding rate exceeds the job separation rate indicating that early in the recession the inflow rate dominates while later in the recession the outflow rate governs the unemployment dynamics. Our results seem to be in accordance with those reported by Petrongolo and Pissarides (2008), Elsby *et al.* (2009), Fujita and Ramey (2009), and Smith (2011), highlighting the qualitative differences of the ins and outs of unemployment during recessions. In addition, our results confirm those reported by Kanellopoulos (2011) for Greece with respect to the slightly dominant role of unemployment inflows in explaining unemployment variations in the pre-crisis years (2004-2009).

--Table 4 --

Figure 4 shows the results of the non-steady state unemployment decomposition. For interpretation purposes we focus on the relative contributions of inflow and outflow rates during the crisis years (2008Q4-2013Q4). It is evident that early in the recession, the inflow rate is dominant and the opposite is observed after 2009Q3. These results are quite similar to those obtained by the steady-state unemployment decomposition. Overall, our findings suggest that at times of accelerating unemployment the separation rate dominates while at times in which unemployment changes are ordinary the job finding rate seems to play the primary role.

--Figure 4 --

4. Ins and outs of unemployment: micro-econometric evidence

In this section we model individual transitions in and out of unemployment. Since the employed data allow us to determine at the individual level the annual transitions for specific pairs of activity statuses, we apply typical multinomial logit regression techniques to estimate the individual correlates of the corresponding transition probabilities. For interpretation purposes we focus on the notion of the relative risk ratio which shows how a variable of interest influences the probability of moving out of a specific state relative to the probability of remaining at the same state (Wooldridge, 2010). All possible annual transition probabilities have been estimated but for presentation purposes we focus only on the ins and outs of unemployment.[4] The analysis is carried out for the pre-crisis period (1998Q1-2008Q3) and the recessionary one (2008Q4-2013Q4). This will allow us to highlight the changes that occurred in the two periods.

The inclusion of several explanatory variables is expected to provide evidence – in terms of correlations rather than causal effects – regarding the differentiated patterns of entering or exiting the unemployment pool across the entire Greek population (i.e., economically active and non-participating). This exercise is of considerable importance given the depth and duration of the post-2008 economic crisis in Greece, a crisis that is associated with a significant deterioration of all labor market outcomes. In such circumstances the employment adjustment process is expected to be thorny and discriminatory for numerous demographic groups (Elsby *et al.* 2010). The literature pertaining to movements between pairs of activity statuses highlight the role of gender (Theodossiou, 2002; Booth, 2009), age (Bell and Blanchflower, 2011), education (Nickel, 1979; Theodossiou and Zangelidis, 2009;

[4]The results for the transitions from employment or unemployment to inactivity are available by the authors upon request.

Riddell and Song, 2011), marital status (Mussida and Fabrizi, 2014) and geographical differentials (Bertola and Garibaldi, 2003). Given the availability of such information in the LFS dataset we present at Table 5 averages of these variables for selected transitions (unemployment inflows and outflows) and time periods. Indicatively, we observe that IU and UI transitions are more pronounced for females in both periods (i.e., 67 and .62 in the first period and .63 and .62 in the second). However, a different pattern is identified when the EU and UE transitions are considered. In particular, females in the second period, compared to the first one, are less frequently observed in the EU transition (.48 vs .41). The same holds for the UE transition. Regarding the age component of the inflows and outflows, we observe that the age distribution of the EU transition has shifted to the right in the second period. These indicative findings highlight the potential importance of individual-specific heterogeneity in modelling the ins and outs of unemployment.

--Table 5 --

5. Estimation results

5.1 Unemployment inflows

In this sub-section we explore the relationship between the aforementioned individual-specific correlates and the annual transition rates from employment to unemployment (EU) and from inactivity to unemployment (IU). The effects of the independent variables are represented by the relative risk ratio (exponential value of the estimated coefficient) for both periods (1998Q1-2008Q3) and (2008Q4-2013Q4) and are presented at the 2nd and 3rd column of Table 6. In the case of the EU transition we employ the continuously employed (EE) as the base category. We have chosen not to present the estimated results for the EI transition since we are mainly interested in the unemployment inflows originating from the employment pool. Similarly, in the

case of the IU transition we use the continuously inactive (II) as the base category and we do not report the estimated results for the IE transition.

According to the obtained results for the first period (1998Q1-2008Q3), the EU-transition relative risk ratio for females- relative to males- is 1.62. That is, the relative risk of moving from the employment state to the unemployment one (EU) is higher for female workers. This finding continuous to be valid in the second period (2008Q4-2013Q4) albeit it is now of a lower magnitude (1.15) . The reduction in the estimated coefficient (from 1.62 to 1.15) implies that in the second period the probability of making the EU transition has increased for males relative to females. Thus, unemployment inflows in Greece is a phenomenon that affects mostly female workers although in the post-2008 period the relative position of male workers has worsened. With regard to the inflows coming from the inactivity state (IU) we observe that females are slightly more likely to make this transition in the first period. However, this gender difference vanishes in the second period. Thus, unemployment inflows embody a gender-bias which is attributed exclusively to the separation rate (EU).

Regarding the effects of age we observe that younger workers face increased risk of making the annual transition from employment to unemployment (EU). This finding concerns both time periods while the relative risk of the younger (15-24) and the older (45-54) has increased in the crisis years. Concerning the IU transition we observe, as expected, that the younger are more likely to enter (new entry or re-entry) the labour force as unemployed. During the crisis years however this likelihood is reduced implying that the non-participation of the younger has increased. This might indicate that the increased joblessness problem in the post-2008 period has negatively affected the expected returns of job search.

Regarding the marital status, we observe that married individuals are less likely to make the transitions EU or IU even though this risk is upgraded in the crisis period. Similarly, foreign-born individuals (relative to natives) face increased risks of making the transitions EU or IU. In addition, highly educated individuals run lower risks of losing their jobs (EU) and it appears that they are only slightly affected by the ongoing crisis. Concerning the flow IU, we observe that the highly educated have an increased probability of entering (new entry or re-entry) the labour force as unemployed rather than to continue in the inactivity state. However, in the crisis years, due to the limited employment opportunities, the highly educated inactive individuals face even greater risks of entering the labour market as unemployed. Thus, the unemployment inflow concerns primarily the low educated and in the crisis years it concerns more and more even the highly educated. Lastly, the EU transition concerns primarily those workers residing in urban areas and it appears to be unaffected by the ongoing crisis. In contrast, the IU transition is more prevalent in semi-urban and rural areas.

5.2 Unemployment outflows

We now turn our attention on the relationship between the aforementioned individual-specific characteristics and the annual transition from unemployment to employment (UE) and from unemployment to inactivity (UI). Again, the effects of the independent variables are represented by the relative risk ratio for the two periods under examination and are presented at the 4th and 5th columns of Table 6. In this case, we use the continuously unemployed (UU) as the base category.

The obtained results indicate that in the pre-crisis period the UE transition relative risk ratio for females- relative to males- is 0.51 suggesting that the relative likelihood of moving from the unemployment state to the employment one (UE) is

lower for unemployed women. This finding continuous to be valid in the crisis years but its value (0.65) indicates that the probability of exiting unemployment has decreased more for unemployed males. Thus, unemployment outflows (job finding) in Greece is a phenomenon that concerns primarily male unemployed individuals although in the post-2008 period the relative position of females has improved slightly. With regard to outflows concerning the non-participation state (UI) we observe that females are more likely to be found in this position in the crisis years. Thus, in the crisis period, departures from the pool of unemployed are more likely to end up into employment for males and into non-participation for females.

Regarding the effects of age we observe that younger unemployed individuals face increased probability of making the annual transition from unemployment to employment (UE). This finding concerns both time periods although it is less important in the crisis years. Turning now to the UI transition we observe, as expected, that the younger (compared to older) are less likely to exit the labour market and prefer to be continuously unemployed than to become inactive. We also observe that married unemployed individuals are less likely to make the transition UE and more likely to move from U to I. In addition, foreign-born unemployed individuals (relative to natives) have a greater chance of finding a job (UE).

Unemployed individuals with high education have a greater probability of finding a job (UE) and it appears that their relative position (compared to unemployed with low education) has improved substantially in the crisis years. Furthermore, unemployed individuals with higher education have a smaller chance to become inactive (UI). Lastly, those residing in urban areas are more likely to find a job (UE) but this likelihood vanishes during the ongoing crisis. In contrast, the movement towards non-participation (UI) is more prevalent in rural areas.

6. Conclusions

The present study analyses the ins and outs of the Greek unemployment in the presence of the ongoing economic crisis. We employ quarterly individual-level data, drawn from the Greek Labour Force Survey (LFS) for a period of 16 years (1998-2013) and utilize relevant aggregate decomposition techniques and micro-level methodological tools in a three-state model of worker flows (employment, unemployment and non-participation). Aggregate unemployment dynamics are analysed by using either a typical steady state decomposition technique or a non-steady state one. The latter takes into account the fact that Greek unemployment is characterized by high persistence and low labour market transition rates. At the micro-level, the data allow us to define at the individual level annual transitions across employment, unemployment and non-participation and to investigate the heterogeneous nature of the ins and outs of unemployment using multinomial regression techniques.

The major finding of the aggregate analysis is that in the beginning of the crisis (2008Q4-2011Q4) inflows dominated the outflows in explaining unemployment variations. Later in the recession, the outflows contribute more than the inflows to the rising unemployment rates. Thus, both, job separation and job finding rates shape unemployment fluctuations. These findings are in agreement with those reported for Anglo-Saxon and other Continental Europe countries (Petrongolo and Pissarides, 2008; Elsby *et al.* 2009; Fujita and Ramey, 2009; Smith, 2011). However, due to the high unemployment persistence (a currently unemployed individual has a probability of 78 % of being unemployed one year ahead) and the low transition rates that characterize the Greek labour market, the unemployment rate peaked at the extraordinary level of 28 % during the ongoing crisis. This rate is substantially higher than the unemployment rates observed in other western economies during their recent

recessionary experience (around 10-12 %). Given that in the last phase of the Greek recession the "outs" win, a noticeable reduction in the unemployment rate could result from a rise in the job finding rate, which currently stands at the meagre level of around 10 % (annually). An additional characteristic of the flows in the Greek labour market concerns the absence of unemployment to inactivity transitions, due probably to lack of inactivity related benefits. On methodological grounds, our results suggest that the use of a three-state analysis of labour market flows is more appropriate in cases of rising unemployment rates due to flows from inactivity. Furthermore, in recessionary periods the assumption that the steady state unemployment rate is close to the actual rate is questionable and thus the non-steady state unemployment decomposition becomes more relevant (Smith, 2011).

Notwithstanding the importance of the aggregate analysis, we offer additional micro-level evidence on the heterogeneous nature of the ins and outs of Greek unemployment. In particular, we found that the flows in question vary with gender, age, marital status, country of birth, education and residence. These variations are of a different magnitude in the examined sub-periods. For example, in the pre-crisis years women in the Greek labour market, relative to men, faced increased separation and lower job finding rates. During the ongoing crisis, this gender-bias continuous to exist but now the relative position of women has improved. The relative risk ratio for females in the period 2008Q4-2013Q4 has decreased for the EU transition and increased for the UE one. In this period women face also rising non-participation rates. The latter finding indicates that a "discouraged worker effect" (Lundberg, 1985) might be in operation and is in line with the argument put forward by Krueger *et al.* (2014) who advocate that the longer workers are unemployed the less attached they become to the labor market. In addition, we found that the highly educated youth in Greece face rising unemployment rates that are primarily due to large inflows from

inactivity, highlighting the scarcity of jobs in the Greek labour market. This finding has significant policy implications regarding the deterioration of human capital investments, international labour mobility and the long-term consequences of the current economic crisis (Genda *et al.* 2010; Kahn, 2010).

Our results should be interpreted with some caution since data limitations/problems and methodological shortcomings are present. For example, our estimates are drawn from cross sectional survey data instead of longitudinal datasets. This prevents us from measuring monthly or quarterly transitions and performing well known techniques for eliminating possible biases, i.e., the time aggregation bias. However, we do not expect that these biases could alter substantially our findings given the low level of labour market transitions in the Greek economy. In addition, we are not able to fully identify the individual's employment history (duration dependence), within an unemployment-spell approach. Furthermore, we cannot provide evidence regarding alternative measures of unemployment by including the marginally unemployed individuals, who are expected to increase in number during recessions. Lastly, at the aggregate level, future research could explore unemployment evolution and persistence in a framework of a nonlinear unobserved components model, as suggested by Pérez-Alonso and Di Sanzo (2011). At the individual level, and given that Greece records the highest self-employment rates in the EU, one may want to explore a four-state model of worker flows (paid employment, self-employment, unemployment and non-participation).

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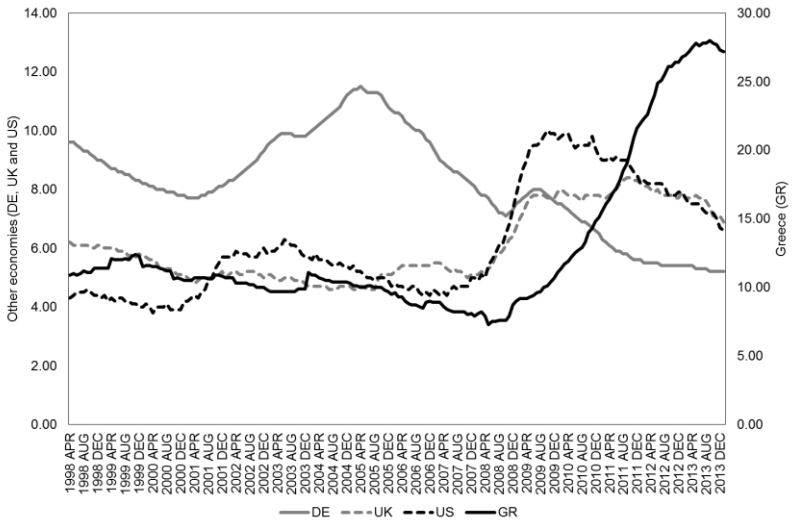
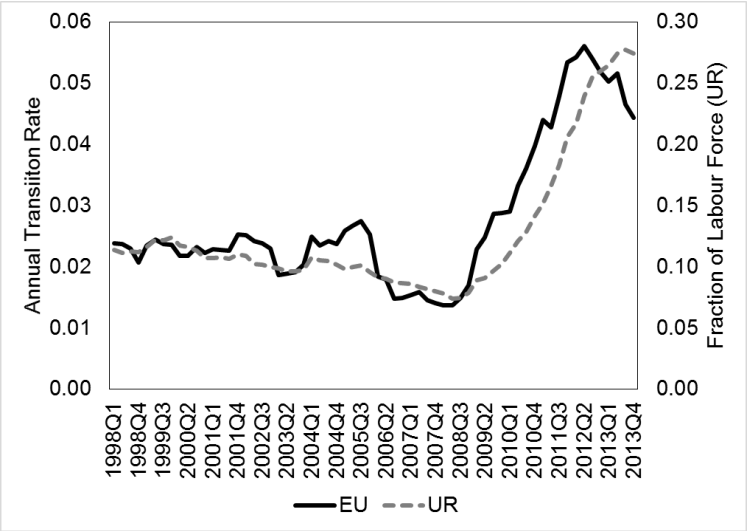
Figures

Figure 1. Unemployment in Greece and selected countries (1998-2013)

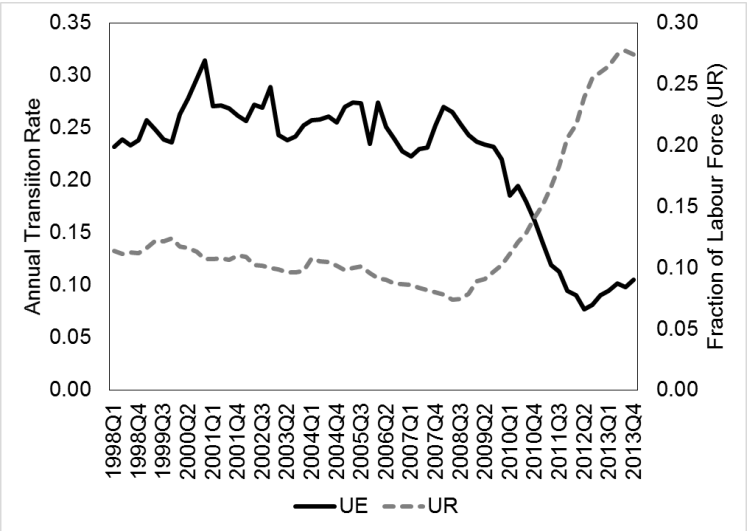


Source: Office for National Statistics (http://www.ons.gov.uk/), Time Series Dataset: Labour Market Statistics (Seasonally adjusted ILO monthly unemployment rates, 1998 April -2013 December)

Figure 2. Annual transition probabilities and unemployment rate

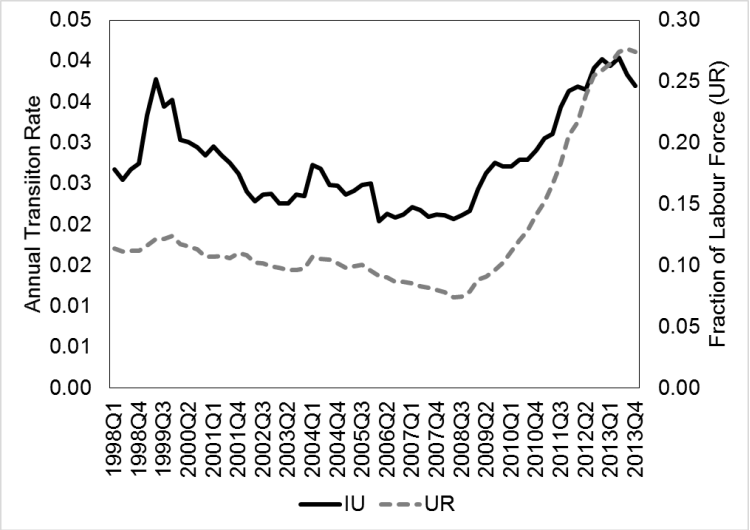


(A): Employment to Unemployment (EU) vs. Unemployment rate (UR)

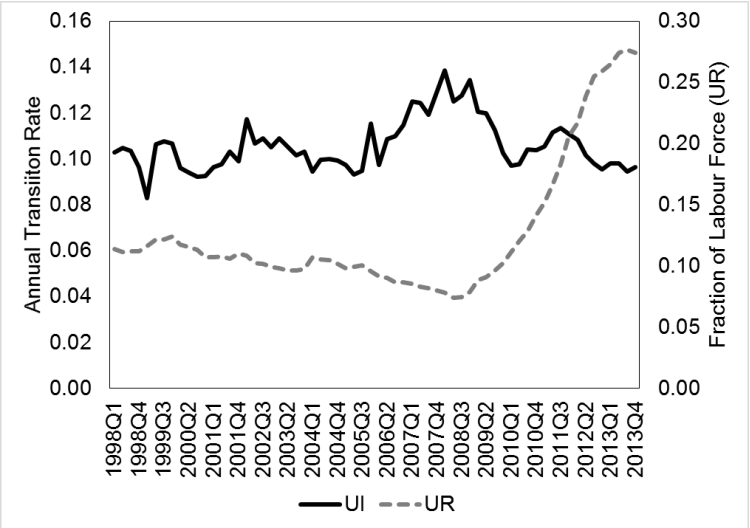


(B): Unemployment to Employment (UE) vs. Unemployment rate (UR)

Figure 2. Annual transition probabilities and unemployment rate (continued)

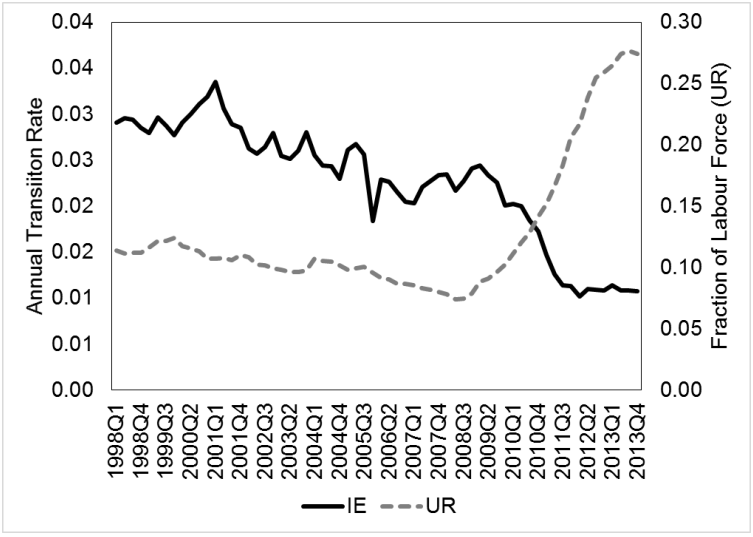


(C): Inactivity to Unemployment (IU) vs. Unemployment rate (UR)

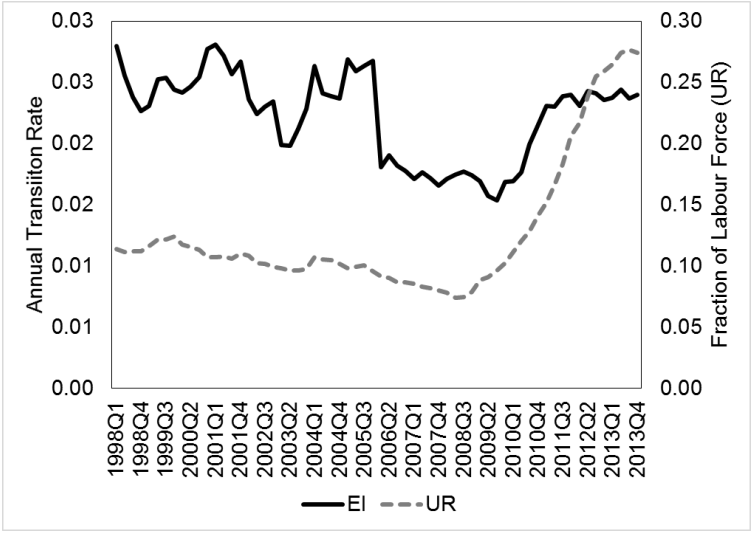


(D): Unemployment to Inactivity (UI) vs. Unemployment rate (UR)

Figure 2. Annual transition probabilities and unemployment rate (continued)



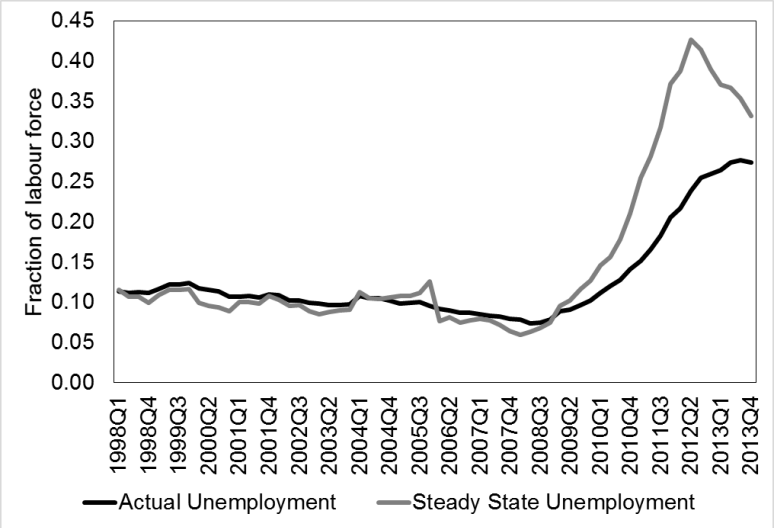
(E): Inactivity to Employment (IE) vs. Unemployment rate (UR)



(F): Employment to Inactivity (EI) vs. Unemployment rate (UR)

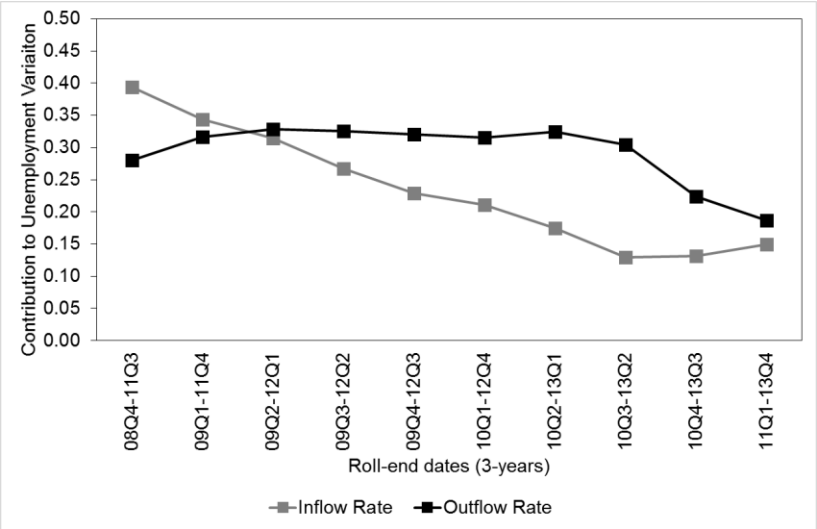
Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT).

Figure 3. Actual and steady state unemployment rates



Source: Labour Force Survey (1998Q1-2013Q2).Hellenic Statistical Authority (EL.STAT).
Notes: The steady state unemployment rate was calculated according to Smith (2011, p.413, eq. 6). Both lines are seasonally adjusted (X-12-ARIMA).

Figure 4. Non-steady state unemployment decomposition



Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT).
Notes: The actual unemployment rate and the worker flows series are seasonally adjusted (X-12-ARIMA). Both lines are derived according to Smith (2011, p. 418).

Tables

Table 1.Unemployment by demographic and socio-economic characteristics (in %)			
Groups of individuals	1998Q1-2013Q4	1998Q1-2008Q3	2008Q4-2013Q4
Total	11.93	9.98	16.51
Gender			
Males	9.33	6.55	14.95
Females	17.56	15.38	21.61
Age			
15-24	30.61	27.82	40.34
25-34	16.06	13.41	22.88
35-44	9.75	7.56	14.61
45-54	7.41	5.32	11.80
55-64	5.19	3.60	8.47
65-74	1.59	1.15	2.82
Current marital status			
Never married	20.64	18.13	26.33
Married	7.79	6.21	11.62
Separated/Widowed	13.40	11.02	18.03
Birthplace			
Native-born	11.56	9.81	15.84
EU-born	16.59	14.72	18.42
Non EU-born	16.14	11.95	23.19
Education			
Ph.D.-M.Sc.	8.69	6.48	11.03
University degree (AEI	8.33	6.82	11.62
Technological degree (TEI)	12.61	9.65	17.30
Post-secondary non-tertiary	15.85	13.51	20.76
Upper secondary (High school)	14.51	12.67	18.52
Lower secondary (Gymnasium)	13.54	11.51	18.31
Primary school	8.71	7.20	13.52
Never in school	8.63	6.19	21.07
Urbanization			
Urban	13.23	11.19	18.26
Semi-urban	11.45	9.41	15.78
Rural	9.08	7.33	13.02
Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT). Notes: Individuals aged 15-74. Figures are weighted averages multiplied by 100 to represent percentages.			

Table 2. Unemployment by reason and duration (%)			
	1998Q1-2013Q4	1998Q1-2008Q3	2008Q4-2013Q4
Reason for unemployment			
Lay-off	22.36	16.77	30.31
Contract termination	23.08	21.13	25.84
Resignation	3.96	5.01	2.49
Other reasons	50.60	57.09	41.36
Total	100.00	100.00	100.00
Duration of unemployment			
0-2months	15.29	15.26	15.33
3-5 months	12.94	13.29	12.44
6-11 months	16.04	16.24	15.76
12-23 months	23.31	22.53	24.43
24 months or more	32.41	32.68	32.03
Total	100.00	100.00	100.00
Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT). Notes: Individuals aged 15-74. Figures are weighted averages multiplied by 100 to represent percentages.			

Table 3. Annual transition probabilities between statuses of economic activity				
	Current status (t+1)			
	Employed	Unemployed	Inactive	Sum
Recalled status (t)				
	1998Q1-2013Q4			
Employed	95.06	2.73	2.21	100.00
Unemployed	19.66	69.89	10.45	100.00
Inactive	2.29	2.77	94.94	100.00
	1998Q1-2008Q3			
Employed	95.62	2.11	2.27	100.00
Unemployed	25.60	63.87	10.53	100.00
Inactive	2.62	2.56	94.82	100.00
	2008Q4-2013Q4			
Employed	93.90	4.01	2.09	100.00
Unemployed	12.48	77.16	10.36	100.00
Inactive	1.56	3.24	95.20	100.00
Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT). Notes: Figures are weighted averages multiplied by 100 to represent percentages.				

Table 4. Steady state unemployment decomposition						
	Inflow rate			Outflow rate		
Rolling dates	Direct (β^{EU})	Indirect (β^{EIU})	Total (β^{S})	Direct (β^{UE})	Indirect (β^{UIE})	Total (β^{F})
Panel A: Entire period, pre- and post-crisis years						
1998Q1-2013Q4	.42	.21	.63	.31	.06	.37
1998Q1-2008Q3	.37	.31	.68	.28	.04	.32
2008Q4-2013Q4	.51	.07	.58	.36	.06	.42
Panel B: Crisis years (3-year rolling window)						
2008Q4-2011Q3	.70	.06	.76	.13	.11	.24
2009Q1-2011Q4	.74	.03	.77	.15	.08	.23
2009Q2-2012Q1	.32	.15	.47	.52	.01	.53
2009Q3-2012Q2	.40	.13	.54	.45	.01	.46
2009Q4-2012Q3	.36	.12	.48	.51	.01	.52
2010Q1-2012Q4	.33	.11	.44	.55	.01	.56
2010Q2-2013Q1	.35	.11	.46	.51	.03	.54
2010Q3-2013Q2	.33	.11	.44	.53	.03	.56
2010Q4-2013Q3	.36	.10	.46	.49	.05	.54
2011Q1-2013Q4	.34	.08	.42	.52	.06	.58
Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT). Notes:$\beta^{EU} + \beta^{EIU} = \beta^{S}$; $\beta^{UE} + \beta^{UIE} = \beta^{F}$; $\beta^{S} + \beta^{F} = 1$.						

Table 5. Averages of independent variables for unemployment inflows and outflows								
	1998Q1-2008Q3				2008Q4-2013Q4			
	Inflows		Outflows		Inflows		Outflows	
	EU	IU	UE	UI	EU	IU	UE	UI
Gender								
Female	.48	.67	.50	.62	.41	.63	.46	.62
Age								
15-24	.15	.51	.28	.23	.08	.47	.15	.12
25-34	.41	.28	.46	.31	.36	.31	.45	.22
35-44	.25	.13	.17	.18	.30	.12	.25	.24
45-54	.14	.06	.08	.14	.20	.07	.12	.19
55-64	.05	.02	.02	.11	.06	.03	.04	.17
65-74	.01	.01	.01	.03	.01	.01	.01	.05
Current marital status								
Never married	.47	.64	.63	.44	.34	.69	.55	.31
Married	.47	.33	.33	.52	.51	.29	.39	.62
Separated/Widowed	.06	.03	.04	.05	.06	.02	.05	.07
Birthplace								
Native-born	.88	.92	.90	.91	.79	.90	.85	.88
EU-born	.02	.02	.01	.02	.03	.02	.03	.02
Non EU-born	.10	.06	.09	.07	.17	.08	.12	.10
Education								
Ph.D.-M.Sc.	.01	.02	.01	.01	.02	.03	.02	.01
University degree (AEI	.10	.13	.14	.12	.10	.18	.15	.10
Technological degree (TEI)	.04	.07	.07	.03	.07	.12	.10	.04
Post-secondary non-tertiary	.18	.16	.19	.10	.17	.15	.17	.13
Upper secondary (High school)	.31	.38	.32	.31	.32	.37	.31	.33
Lower secondary (Gymnasium)	.15	.12	.14	.16	.16	.08	.12	.14
Primary school	.21	.11	.14	.25	.16	.07	.12	.21
Never in school	.01	.01	.01	.02	.01	.01	.01	.02
Urbanization								
Urban	.76	.73	.74	.63	.74	.71	.67	.66
Semi-urban	.11	.12	.11	.14	.12	.13	.13	.14
Rural	.13	.15	.15	.23	.14	.16	.18	.20
Source: Labour Force Survey (1998Q1-2013Q4). Hellenic Statistical Authority (EL.STAT).								

Table 6. Results of Multinomial Logistic Regression, ins and outs of unemployment				
Independent Variables	Inflows		Outflows	
	EU	IU	UE	UI
Female				
1998Q1-2008Q3	1.62 (0.02) [a]	1.06 (0.02) [a]	0.51 (0.01) [a]	1.02 (0.02)
2008Q4-2013Q4	1.15 (.020) [a]	1.04 (0.03)	0.65 (0.02) [a]	1.588 (0.04) [a]
Age 15-24				
1998Q1-2008Q3	3.06 (0.12) [a]	35.9 (1.98) [a]	3.41 (0.16) [a]	0.54 (0.02) [a]
2008Q4-2013Q4	3.23 (0.15) [a]	23.07 (1.91) [a]	2.86 (0.21) [a]	0.59 (0.36) [a]
Age 25-34				
1998Q1-2008Q3	2.73 (0.09) [a]	41.50 (2.12) [a]	2.97 (0.13) [a]	0.38 (0.01) [a]
2008Q4-2013Q4	2.67 (0.10) [a]	30.73 (.234) [a]	2.66 (0.17) [a]	0.30 (0.02) [a]
Age 35-44				
1998Q1-2008Q3	1.84 (0.06) [a]	23.51 (1.22) [a]	2.14 (0.09) [a]	0.37 (0.01) [a]
2008Q4-2013Q4	1.87 (0.07) [a]	15.91 (1.26) [a]	2.00 (0.13) [a]	0.35 (0.02) [a]
Age 45-54				
1998Q1-2008Q3	1.35 (0.04) [a]	7.51 (0.40) [a]	1.56 (0.07) [a]	0.47 (0.02) [a]
2008Q4-2013Q4	1.53 (0.06) [a]	6.03 (0.48) [a]	1.43 (0.09) [a]	0.38 (0.02) [a]
Never married				
1998Q1-2008Q3	1.03 (0.03)	0.61 (0.03) [a]	0.74 (0.02) [a]	1.01 (0.05)
2008Q4-2013Q4	1.06 (0.42)	1.17 (0.09) [b]	0.82 (0.05) [a]	0.82 (0.05) [a]
Married				
1998Q1-2008Q3	0.57 (0.02) [a]	0.40 (0.01) [a]	0.87 (0.03) [a]	1.54 (0.07) [a]
2008Q4-2013Q4	0.70 (0.02) [a]	0.64 (0.05) [a]	1.01 (0.05)	1.53 (0.08) [a]
EU-born				
1998Q1-2008Q3	1.27 (0.08) [a]	0.94 (0.06)	1.03 (0.06)	0.94 (0.08)
2008Q4-2013Q4	1.55 (0.08) [a]	1.14 (0.08) [c]	1.57 (0.11) [a]	1.07 (.08)
Non EU-born				
1998Q1-2008Q3	1.39 (0.04) [a]	1.31 (0.04) [a]	1.33 (0.03) [a]	1.04 (0.04)
2008Q4-2013Q4	1.83 (0.05) [a]	1.51 (0.07) [a]	1.22 (0.04) [a]	0.78 (0.03) [a]
Ph.D.-M.Sc.				
1998Q1-2008Q3	0.40 (0.05) [a]	21.61 (2.23) [a]	2.06 (0.23) [a]	0.57 (0.12) [a]
2008Q4-2013Q4	0.35 (0.04) [a]	28.43 (4.54) [a]	3.12 (0.49) [a]	1.20 (0.19)
University degree (AEI)				
1998Q1-2008Q3	0.43 (0.03) [a]	8.77 (0.58) [a]	1.79 (0.13) [a]	1.44 (0.11) [a]
2008Q4-2013Q4	0.39 (0.04) [a]	15.72 (2.19) [a]	2.70 (0.35) [a]	0.88 (0.09)
Technological degree (TEI)				
1998Q1-2008Q3	0.52 (0.04) [a]	13.8 (0.97) [a]	1.87 (0.14) [a]	0.82 (0.07) [b]
2008Q4-2013Q4	0.55 (0.05) [a]	26.20 (3.69) [a]	2.74 (0.37) [a]	0.57 (0.07) [a]
Post-secondary non-tertiary				
1998Q1-2008Q3	0.99 (0.06)	11.22 (0.75) [a]	1.50 (0.10) [a]	0.66 (0.05) [a]
2008Q4-2013Q4	0.88 (0.08)	14.30 (2.01) [a]	1.92 (0.25) [a]	0.70 (0.07) [a]
Upper secondary (High school)				
1998Q1-2008Q3	0.78 (0.05) [a]	1.83 (0.12) [a]	1.16 (0.08) [b]	0.93 (0.06)
2008Q4-2013Q4	0.78 (0.07) [b]	2.89 (0.40) [a]	1.88 (0.24) [a]	0.85 (0.09)
Lower secondary (Gymnasium)				
1998Q1-2008Q3	0.97 (0.06)	0.57 (0.03) [a]	1.12 (0.08)	1.07 (0.08)
2008Q4-2013Q4	1.02 (0.09)	0.68 (0.10) [a]	1.70 (0.22) [a]	0.88 (0.09)
Primary school				
1998Q1-2008Q3	1.09 (0.07)	1.76 (0.11) [a]	1.07 (0.07)	0.97 (0.07)
2008Q4-2013Q4	1.06 (0.10)	2.87 (0.41) [a]	1.72 (0.22) [a]	0.80 (0.08) [b]

Semi-urban				
1998Q1-2008Q3	0.71 (0.01) [a]	1.11 (0.02) [a]	0.88 (0.01) [a]	1.15 (0.03) [a]
2008Q4-2013Q4	0.76 (0.19) [a]	1.33 (0.04) [a]	0.96 (0.03)	1.03 (0.04)
Rural				
1998Q1-2008Q3	0.46 (0.01) [a]	1.12 (0.02) [a]	0.92 (0.01) [a]	1.32 (0.03) [a]
2008Q4-2013Q4	0.57 (0.14) [a]	1.40 (0.04) [a]	1.02 (0.31)	1.11 (0.04) [a]
Number of observations				
1998Q1-2008Q3	1,246,205	801,993	139,138	
2008Q4-2013Q4	508,231	303,961	89,514	
Pseudo R-squared				
1998Q1-2008Q3	0.0749	0.1980	0.0406	
2008Q4-2013Q4	0.0707	0.2229	0.0567	

Source: Labour Force Survey. Hellenic Statistical Authority (EL.STAT).
Notes: Estimates are relative risk ratios (i.e., exponential of the estimated coefficient) from a multinomial logit model. The reference categories for the independent variables are the following: male, age 55-64, previously married, native-born, primary education and urban area. All models include region, year and quarter dummies. The estimate of the constant term is not reported. Standard errors are heteroskedasticity corrected.
[a], [b] and [c] denote statistical significance at 1%, 5% and 10% levels, respectively.