



Gender Aspects of Unemployment Dynamics in the Greek Labour Market

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The present dissertation entitled

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was submitted by **Mary Papachristopoulou, Sid 1057172**, in partial fulfillment of the requirements for the degree of Master of Science in *«Applied Economics & Data Analysis»* at the University of Patras and was approved by the Dissertation Committee Members.

I would like to dedicate my dissertation to my family who has provided me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this dissertation. I owe it all to you.

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Summary

In this dissertation, we investigate the relative contribution of the "ins" and "outs" of Greek unemployment, using micro-data from the Greek Labour Force Survey for the period 2004-2015. We proceed to an aggregate and a micro-level analysis, as well, in order to examine what drives unemployment fluctuations. We employ relevant decomposition techniques to explore unemployment dynamics at an aggregate level, using a three-state model of worker flows (employment, unemployment, inactivity). At the micro-level, data allow us to estimate quarterly transition probabilities across the main labour market statuses. We investigate the individual specific characteristics that determine transition probabilities using multinomial regression techniques. We especially focus on the changing role of factors that may affect labour market transitions in the presence of the Greek economic crisis.

Keywords: Unemployment, labour market flows, transition probabilities, unemployment dynamics, unemployment decomposition

Περίληψη

Στην παρούσα διπλωματική εργασία μελετάται η σχετική συμβολή των εισροών και των εκροών της ανεργίας στην Ελλάδα, με τη χρήση μικροδεδομένων από την Έρευνα Εργατικού Δυναμικού της Ελλάδας για την περίοδο 2004-2015. Η ανάλυσή μας γίνεται τόσο σε συνολικό, όσο και σε μικροοικονομικό επίπεδο, ώστε να ερευνησουμε τί προκαλεί τις διακυμάνσεις της ανεργίας. Όσον αφορά την συνολική ανάλυση, χρησιμοποιούμε σχετικές τεχνικές αποσύνθεσης της ανεργίας προκειμένου να διερευνήσουμε τη δυναμική της, χρησιμοποιώντας ένα μοντέλο τριών καταστάσεων για τις μεταβάσεις εντός και εκτός της ανεργίας (απασχολούμενοι, άνεργοι, δεν συμμετέχουν). Όσον αφορά τη μικροοικονομική ανάλυση, τα δεδομένα μας επιτρέπουν να εκτιμήσουμε τις τριμηνιαίες πιθανότητες μετάβασης εντός και εκτός της ανεργίας. Χρησιμοποιώντας σχετικές τεχνικές παλινδρόμησης, εξετάζουμε τα μεμονωμένα ατομικά χαρακτηριστικά που καθορίζουν τις πιθανότητες μετάβασης. Ειδικότερα, επικεντρωνόμαστε στον μεταβαλλόμενο ρόλο των παραγόντων που μπορεί να επηρεάσουν τις μεταβάσεις στην αγοράς εργασίας, παρουσία της ελληνικής οικονομικής κρίσης.

Λέξεις κλειδιά: Ανεργία, μεταβάσεις αγοράς εργασίας, πιθανότητα μετάβασης, δυναμική ανεργίας, αποσύνθεση ανεργίας

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Chapter 1

Introduction

Greece is currently undergoing the deepest structural crisis in its recent history, triggered by a sovereign debt crisis which erupted in late 2008 and the economic adjustment program applied in the Greek economy. One of the tremendous consequences of the crisis has been the growth of the unemployment rate. Troika, which is constituted by European Union (E.U.), International Monetary Fund (I.M.F.) and European Central Bank (E.C.B.) tried to face labour market rigidities and consequently, unemployment, with some restructuring measures but the results were not as expected. High unemployment rate combined with the austerity measures cure affected negatively individuals, society and economy in many sectors.

The annual unemployment rate increased from about 8.5 % in December of 2008 to 27.9 % in July of 2013; it then declined slightly to 26 % in October of 2014. It continued its downward trend during the following years reaching the percentage of 23.6 % in 2016 and it is predicted to decline further, according to the European Commission reaching to 22 % in 2017. It still, however, remains extremely high leading to social and economic problems to the community as a whole. The impact of high unemployment is particularly observed among young individuals, who currently face unemployment rates close to 50 %. Another noticeable fact is that, more than two thirds of the currently unemployed are without a job for more than a year, which is quite discouraging.

It is well documented that the Greek labour market suffers from major structural problems which call for efficient public policy measures. Although massive reforms have been adopted in Greece, unemployment accelerated rapidly due to the contractionary fiscal policy and austerity measures imposed by Troika. The crucial problem of unemployment, however, can have severe economic and social consequences, in terms of isolation of the people, political instability and human capital loss, which threaten the future growth prospects of the Greek economy. Thus, the design of an effective employment policy is urgent and requires a good understanding of the unemployment dynamics.

Motivated by the above statements, this dissertation investigates the determinants of unemployment dynamics in Greece. In particular, it studies the relative importance of inflows and outflows in shaping unemployment variation during the current economic crisis. We employ quarterly individual level data, drawn from the Greek Labour Force Survey (LFS) for a period of 11 years (2004-2015). We use a "worker-flow" approach (Davis et al.2006) and we calculate, for all surveyed individuals, the quarterly transitions between activity statuses, according to Elsby et al.(2011). Furthermore, we provide new evidence on qualitative differences in the "ins" and "outs" of unemployment on an aggregate level and then we examine whether these differences depend on individual-specific characteristics.

Our empirical methodology follows the work of Smith (2011) and relies on aggregate and micro-level methodological techniques. We make use of a three-state model of worker flows where individuals can be either employed, unemployed or inactive. The advantage of using three states to model unemployment dynamics lies in precisely capturing the influence of flows between employment and unemployment and being able to distinguish the separate flows involving non-participation. At the aggregate level analysis, since Greece has on average low transition rates, in order to explore unemployment dynamics it is more appropriate to use either a typical steady state decomposition technique, or a non-steady state one. Thus, we proceed with both techniques. At the micro-level analysis, we estimate indi-

vidually quarterly transitions across employment, unemployment and inactivity to investigate the heterogenous behaviour of the ins and outs of unemployment. (Lundberg, 1985; Gomes, 2012; Krueger et al. 2014). This approach could lead us to effective policy suggestions since specific worker groups (e.g., young, old, women, low-educated) confront different risks of losing their jobs during the crisis. Moreover, due to limited employment opportunities, certain groups of workers may be trapped in the unemployment pool causing an increase of the unemployment persistence. For estimation purposes we apply multinomial logistic regression techniques to estimate quarterly transitions between activity statuses.

As regards the aggregate unemployment dynamics, our results indicate that after the beginning of the recession the actual unemployment rate deviates from its steady state level. Furthermore, for the entire study period the inflow rate dominates, whereas during the recession the outflow rate plays the primary role in explaining unemployment variations. It also appears that unemployment inflow rate exhibits a countercyclical behaviour, while the outflow rate is rather acyclical in the pre-2009 period and it becomes pro-cyclical in the post-2009 period. Turning to the micro-level analysis, from our results emerges that the ins and outs of unemployment differ substantially among individuals with specific characteristics and between specific sub-periods. For instance, the relative risk of moving from employment to unemployment is higher for male workers (compared to female ones) in the post-2009 period.

The structure of the present dissertation is organized as follows. In Chapter 2, we present evidence from related studies, their approaches and their results. In Chapter 3, we present the data and their sources and we discuss the Greek unemployment composition. In Chapter 4, we describe our approach and methods for both, aggregate and micro-level analysis. In Chapter 5, we present the results of the aggregate unemployment decomposition and the micro-econometric estimations. In Chapter 6 we conclude and provide directions for future work.

Chapter 2

Literature Review

The phenomenon of high and persistent unemployment in Greece can have critical repercussions in Greek economy and its prospects for future growth. Changes in the unemployment rate, imply movements of worker flows between employment, unemployment and non-participation. These movements have attracted a lot of attention, since they compose the origin of labour market dynamics. How do labour market flows contribute to the overall unemployment variability? Do inflows or outflows from unemployment drive the fluctuations of unemployment rate?

Several authors have recently stressed the controversial subject of employment dynamics. Mortensen and Pissarides (1999), introduced a labour market model where, job creation and job destruction decisions generate worker flows in and out of unemployment. Their model was founded on two principles: a matching function that represents the search and recruiting process, by which new job-worker matches are created, and an idiosyncratic productivity shock that captures the reason for job reallocation. Let the function $m(v, u)$ represent the matching rate, where jobs are created. Let also v denote the vacancy rate and u denote the unemployment rate. The matching function is increasing, concave, and homogenous of degree 1. All jobs have the same productivity denoted as p . Employer and worker negotiate a wage when they meet and subsequently produce until an idiosyncratic shock arrives that destroys the job match. At separation, the firm leaves the mar-

ket and the worker joins unemployment to look for another job. The arrival rate of the idiosyncratic shock is a constant δ . The evolution of unemployment is given by

$$\dot{u} = \delta(1 - u) - m(v, u) \quad (2.1)$$

Mortensen-Pissarides matching theory framework was the onset of understanding the determinants of unemployment. Yet, there has been some controversy in the recent literature, regarding what constitutes the main driver of unemployment. According to Hall (2005) and Shimer (2005), the outflow rate has been found to play the dominant role of unemployment dynamics in the United States. Shimer (2012) pointed that the outflow rate from unemployment explains three-quarters of the volatility in the unemployment rate during the period 1948-2010 in the USA, while the inflow rate only one quarter. Specifically, since 1987, the contribution of the outflow rate has been estimated to reach about 90 % of the volatility of the US unemployment, whereas the contribution from the inflow rate has been quantitatively irrelevant. This urges Shimer to conclude that there are considerable variations in the outflow rate over the business cycle, while the inflow rate is rather acyclic.

Fujita and Ramey (2009) and Elsby et al.(2009) using US data, provided some rather contradictory evidence relative to the previous studies. They have challenged the conclusions of Shimer (2005, 2012) by showing that inflows to unemployment are the main drivers of the unemployment rate fluctuations. Petrongolo and Pissarides (2008), as well as Smith (2011), have reached the same conclusion as the above-mentioned, using UK data in their analysis. They found that the inflow rates are quantitatively relevant with unemployment dynamics. Furthermore, according to Smith (2011), when there is a rise in the unemployment rate, the inflow rate is the major determinant of unemployment dynamics. In contrast, at times when the unemployment rate declines, the outflow rate plays the main role in explaining unemployment changes.

Elsby et al.(2013) have shown that OECD economies can be naturally divided

into two groups: the ones with more flexible labour markets and the less flexible ones. For instance, Anglo-Saxon and Nordic economies exhibit increased exit rates from unemployment (nearly 20 %), while Continental European economies have lower exit rates (nearly 10 %). As regards the inflow rates to unemployment, Anglo-Saxon and Nordic economies have monthly inflow rates of 1.5 %, whereas the inflow rates decrease to 0.5–1 % in Continental Europe. Elsby et al.(2013) have also shown that, both the inflow and outflow rate contribute in explaining unemployment dynamics. Specifically, the contribution of inflow and outflow rates to unemployment variations is about 20:80 in Anglo-Saxon economies, a result closer to the earlier US findings. In case of Nordic and Continental European economies however, the authors notice a 50:50 inflow/outflow split. More recently, Elsby et al.(2015) shed light on the non-negligible role of non-participation in accounting for unemployment variations.

As regards the case of the Greek labour market, it has also attracted a great deal of attention in the literature. According to Kanellopoulos (2011), the flows in and out of unemployment during the period 2004-2009, are low, stable and countercyclical. Moreover, he suggested that both the inflow and outflow rate are relevant to unemployment rate fluctuation, with the inflow rate to slightly prevail. Demoussis et al.(2015) have reached to similar results for a larger survey period (1998-2013), by showing that in the beginning of the recession the inflow rate dominates, while later, the outflow rate becomes predominant. They have also shown that the ins and outs of unemployment vary with individual specific heterogeneity. Tagkalakis (2016) suggested that the Greek crisis, alongside with the necessary reforms, caused the inflow rate to rise and the outflow rate to decrease. In contrast, the following normalization of the economic conditions, inverted the situation by decreasing the inflow rate and increasing the outflow rate.

Chapter 3

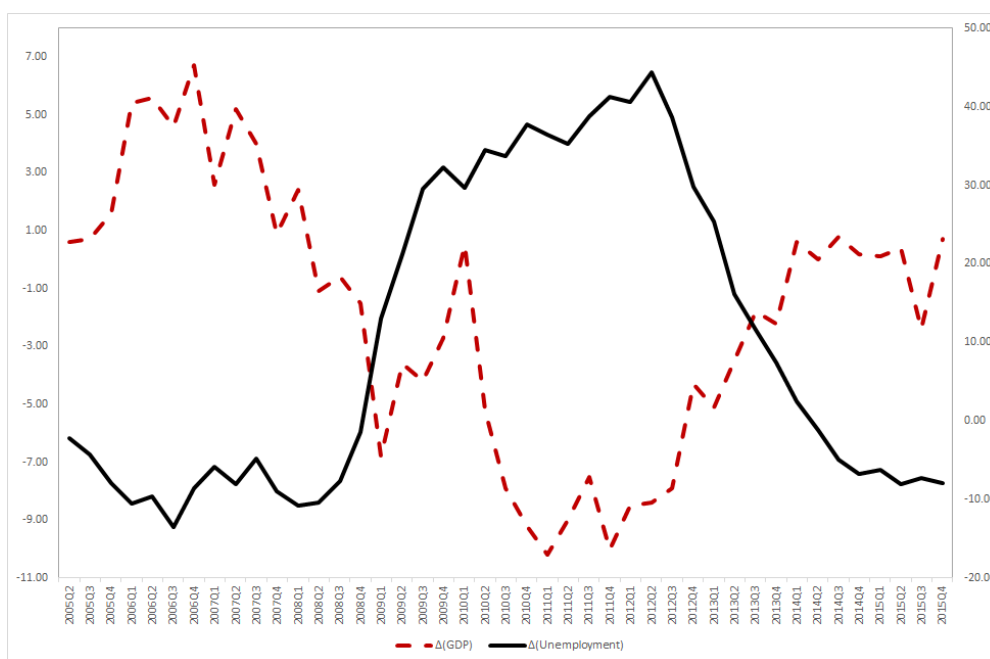
Data

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 2,686,950 individuals in each quarter and it is focused on the years 2004Q1-2015Q4. We use weights to adjust our data in order to ensure that sample remains representative for the entire economy. The LFS database includes a rotating panel with information on several individual specific characteristics such as gender, age, years of education, nationality, marital status, region, degree of urbanization, labour market status and other elements. In order to derive worker flows, we aggregate the labour market statuses and we categorize individuals as employed (E), unemployed (U) or inactive (I) regarding their activity between the quarters t and $t + 1$. The advantage of using a three state model of unemployment dynamics lies in accurately capturing the effect of flows between employment and unemployment involving the transitions from non-participation. These distinctions are missed by many non-micro data sources, because they allow only two states to be examined. We focus on three distinct periods for our analysis: pre-recession (2004Q1-2008Q2), recession (2008Q3-2013Q4) and post-recession (2014Q1-2015Q4).

Figure 3.1 plots the growth rate of the real gross domestic product $\Delta(GDP)$

and the change in the unemployment rate $\Delta(\text{Unemployment})$ in Greece between 2005Q2 and 2015Q4. Data have been obtained from the Hellenic Statistical Authority. Since the data were not adjusted for seasonality, we have used the X-12-ARIMA program for quarterly seasonal adjustment. We observe that, from the second quarter of 2007, which coincides with the eruption of the Greek debt crisis, the GDP growth started to decelerate, and the economy slipped gradually into recession in the third quarter of 2008. On the other hand, the change in unemployment rate has displayed mild fluctuations up to the second quarter of 2008, and since then it has steadily accelerated, reaching a peak value of 44 percentage points in the second quarter of 2012. Regarding all three periods of our survey we are able to observe that unemployment is negatively correlated with GDP, which leads us to the conclusion that unemployment is countercyclical.

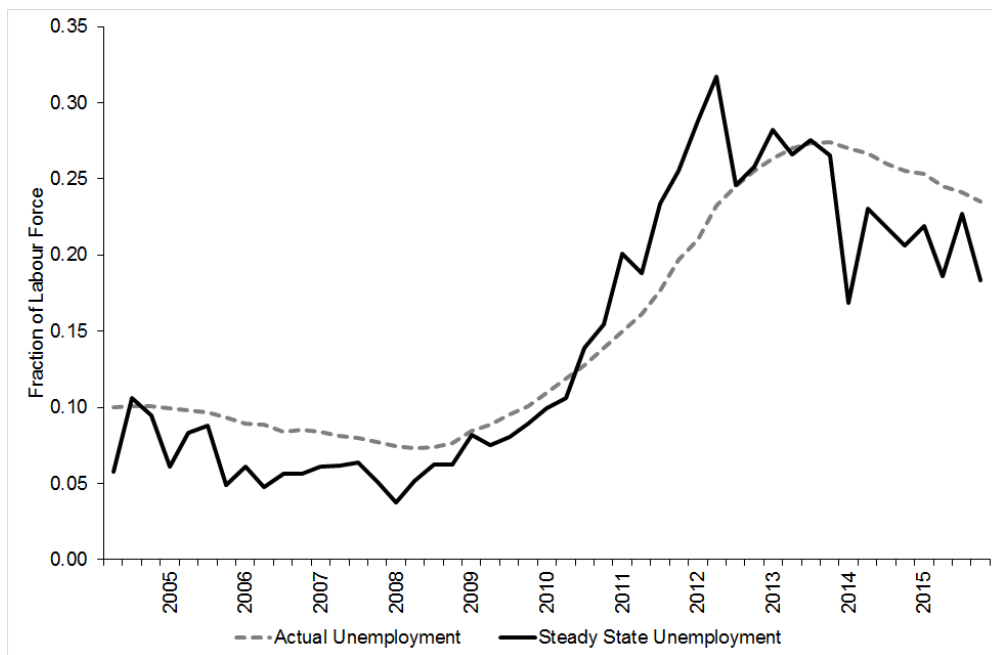
Figure 3.1: Changes in Unemployment Rate and Gross Domestic Product in Greece (2005Q2-2015Q4)



Source: Hellenic Statistical Authority (EL.STAT.)

Greek unemployment grows because of substantial inflows from employment and inactivity. At the same time, there are not sufficient unemployment outflows causing the unemployment pool to expand. Thus, it is firmly necessary to examine

what mainly causes the rising Greek unemployment: sizeable inflows or insufficient outflows? To answer this question we need to decompose the aggregate unemployment dynamics. First, we need to examine whether the actual unemployment rate deviates from its steady state level. The majority of decomposition techniques are based on the assumption that current unemployment does not deviate from its steady state counterpart (Hall, 2005; Shimer, 2012; Petrongolo and Pissarides, 2008; Elsby et al. 2009; Fujita and Ramey, 2009). However, this assumption could induce misleading results. Smith (2011), proposes a non steady state dynamic decomposition for economies that their labour market transition rates are very low. Greece belongs to this type of economies with rather low worker flows. Actual and steady state unemployment rates for Greece using LFS data on quarterly flows are shown at Figure 3.2. We observe that the two series co-move in general yet, for some points, there are substantial differences between them. In the period 2004Q1-2008Q2 the two series exhibit mild deviations, while in the period 2008Q3-2010Q2 the steady state unemployment rate is a very good approximation of the actual one. In the period 2010Q3-2015Q4 however, we observe significant deviations between the two unemployment rates. Initially, steady state unemployment is higher than the actual one and this is due to the employment-to-unemployment transitions in the Greek labour market. Then, actual unemployment seems to decline, the decrease rate of steady state however, is higher. This deviation is essentially explained by the fact that, steady state unemployment does not take into account the long term unemployed individuals. This indicates that for the recessionary years, the use of the steady state decomposition does not constitute an appropriate technique for explaining unemployment dynamics. For comparison purposes, we proceed with both techniques (steady state and non steady state decomposition) in a three-state world where individuals can be employed, unemployed or inactive.

Figure 3.2: Actual and Steady State Unemployment in Greece (2004-2015)

Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT.)

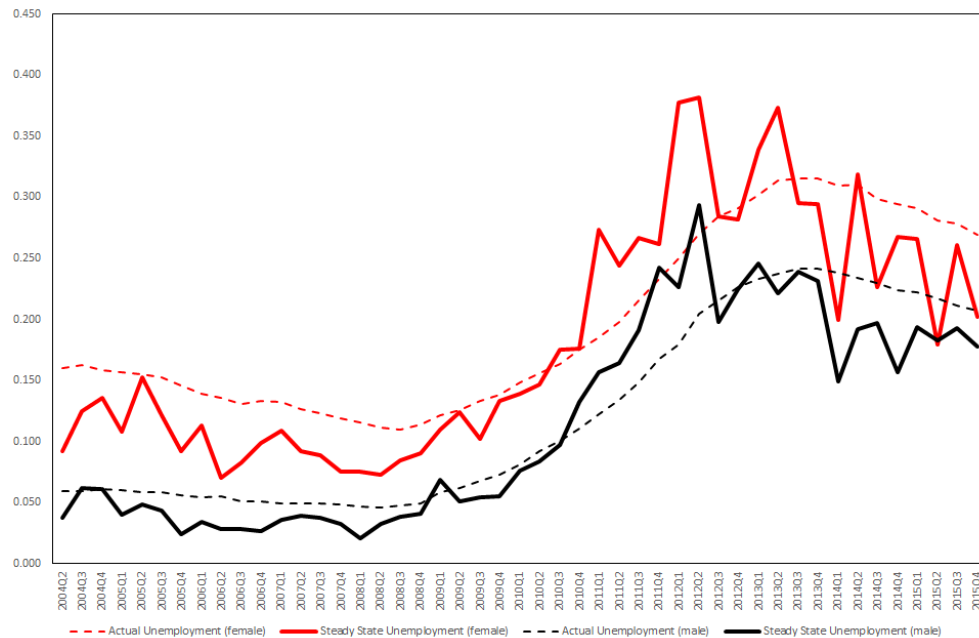
Notes: The steady state unemployment rate was calculated according to Smith (2011, p.413, eq.6). Both lines are seasonally adjusted (X-12-ARIMA).

Gender aspects of unemployment

A major extension of the problem of the Greek unemployment is the way it has been shaped among males and females and which of the two genders has suffered the most, before and during the crisis. Figure 3.3 compares unemployment rates, both steady state and actual, between men and women. We observe that over time, the unemployment rate of both sexes rose, with female unemployment to be substantially above male. Since both, female and male unemployment rose in parallel, the unemployment gap remained stable except for the period 2008Q3-2013Q1 where it starts to narrow. The gap narrowed during this period in Greece, with the major factor being the poor macroeconomic conditions resulting from the 2008 recession, which dramatically worsened employment opportunities for men. Thus, we can conclude that, although both men and women were affected

by the crisis, the unemployment rate increased faster in the case of men, especially during the recession (2008Q3-2013Q4).

Figure 3.3: Male and Female Unemployment Rate in Greece (2004Q1-2015Q4)

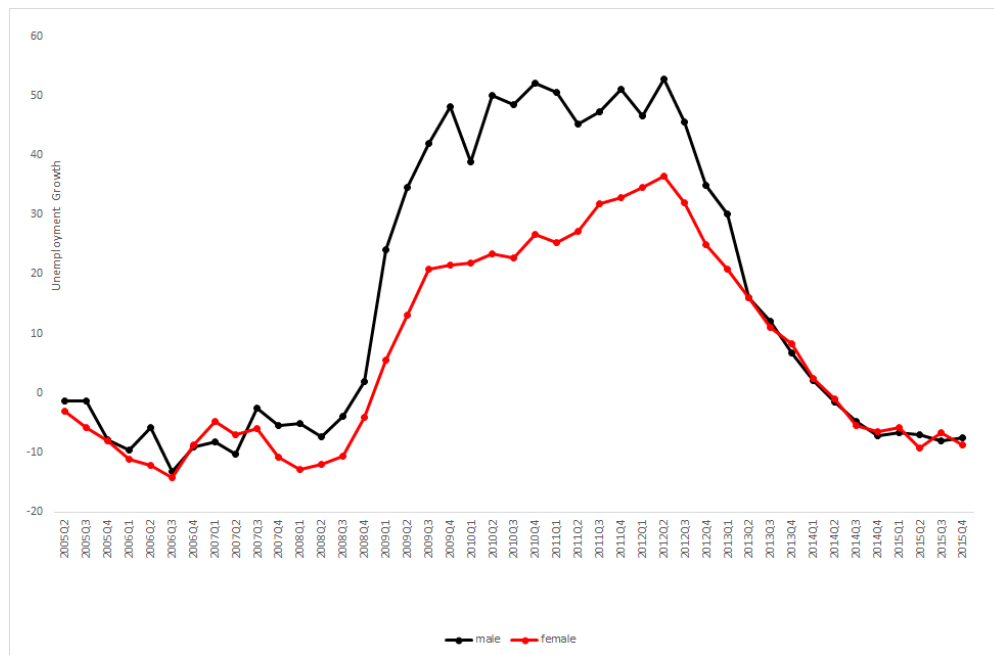


Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT.)

The fact that during the recession, unemployment discriminated against men, is strongly confirmed in Figure 3.4. Here, it is presented the unemployment growth rate of males and females in Greece during the survey period. It is evident that there has been a massive and fast increase in the unemployment growth rate of males, starting from the third quarter of 2008, which coincides with a break in the unemployment series (Venetis and Salamaliki, 2015) and the beginning of the recessionary period (Tsouma, 2014). It reaches the peak value of 52 percentage points during the fourth quarter of 2010 and the second quarter of 2012. As regards females' unemployment growth rate, it reaches the peak value of 36 percentage points in the second quarter of 2012. We observe thus, that during the recession, there has been a substantial difference in the unemployment growth rate between males and females with male unemployment growth rate to be predominant. This is mainly due to the sector segregation since male-dominated sectors were more

affected by the ongoing crisis. We finally observe that, since the second quarter of 2013 and then, the growth rates of male and female unemployment respectively, become quite similar and gradually decelerate.

Figure 3.4: Unemployment Growth Rate of Males and Females in Greece (2004Q1-2015Q4)



Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT.)

Descriptive Statistics

Table 3.1 presents the unemployment rates for selected time periods and selected groups of workers, defined in terms of basic demographic and socio-economic characteristics. We observe that the average quarterly unemployment rate is characterized by a continuous increase throughout the three survey periods. It stands around 9 % mark in the pre-crisis period (2004Q1-2008Q2), for the crisis period (2008Q3-2013Q4) at the 16 % mark, and for the post-crisis period (2014Q1-2015Q4) at the 25 % mark. The groups of individuals examined, exhibit the same overall pattern as well, but with substantial differences between them, however. For example,

the unemployment rate of males has increased sharply from 5.30 % pre-crisis, to 13.24 % in the crisis period and then to 22.77 %. For females, the average unemployment rate is substantially higher than the male one and it also exhibits an increase from 13.58 % to 20.08 % and 29.75 % in the last period. We observe however, that the unemployment rise has been more prevalent for males during the crisis years. Similarly, unemployment rates differ considerably among age groups. For instance, the unemployment rate for younger individuals between 15 to 29 years old has risen substantially more than for older ones, even though they also maintain high levels of unemployment. Furthermore, single and formerly-married (separated-widowed) individuals have had a significant rise in their unemployment rate compared with the married ones and they seem to be affected the most from the current crisis. It also appears that the increased unemployment rate concerns mostly the non-EU born individuals in all three periods of examination. As concerns the breakdown of unemployment rate in educational level, it is evident that the rise in the unemployment rate decreases as the educational level of individuals increases. For example, individuals holding masters and Phds are slightly affected by increased unemployment rates compared to those with poor education. This indicates that, workers who lack skills are more likely to face higher risks of unemployment. Lastly, unemployment is also characterized by a regional dimension. It appears that individuals residing in urban areas have higher levels of unemployment compared to others, although the rise in the unemployment rate is also significant for individuals residing in rural areas.

Table 3.1. *Unemployment by demographic and socio-economic characteristics (in%)*

Group of individuals	2004Q1-2008Q2	2008Q3-2013Q4	2014Q1-2015Q4
Total	8.70	16.16	25.86
Gender			
Males	5.30	13.24	22.77
Females	13.58	20.08	29.75
Age			
15-24	23.62	38.34	51.31
25-29	13.78	25.21	40.33
30-39	8.64	16.65	27.44
40-49	5.78	12.24	21.17
50-64	4.14	9.99	17.68
Current Marital Status			
Single	14.56	24.67	36.78
Married	5.67	11.46	19.17
Separated/Widowed	9.42	17.61	27.76
Birthplace			
Native-born	8.38	15.61	24.99
EU-born	10.30	17.73	25.51
Non EU-born	9.42	21.44	35.40
Education			
Primary school	7.11	14.60	24.98
Lower secondary	9.35	18.17	28.65
Upper secondary	9.89	17.97	28.35
Post-secondary non-tertiary	12.46	20.70	31.59
University Degree	6.90	12.89	21.14
Ph.D.-M.Sc.	5.36	10.57	14.73
Urbanization			
Athens	8.29	16.12	27.62
Thessaloniki	9.56	19.35	29.45
Other urban	10.07	17.92	26.84
Semi-urban	8.25	15.60	24.93
Rural	7.44	13.03	20.77

Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT.)

Notes: Figures are weighted averages multiplied by 100 to represent percentages.

Chapter 4

Empirical Methodology

4.1 Aggregate Analysis

The starting point of the empirical analysis relies on the exploitation of the LFS data for the Greek labour market for each quarter of the period 2004-2015. Based on the ILO definitions, we classify individuals into one of the three following states: employed (E), unemployed (U) and inactive (I). Employment (E) refers to full and part-time employment, self-employment, maternity leave and government training schemes. Unemployment (U) merely includes unemployment. Inactivity (I) includes full-time study, family care, national service, retirement and anything else. The transmission mechanism is a Markov process between two time periods t and $t + 1$ which can be presented in a 3x3 matrix. Transitions between quarters are weighted in order to give various weighted flows. Flow rates are individually seasonally adjusted using the X-12 ARIMA Seasonal Adjustment Program.

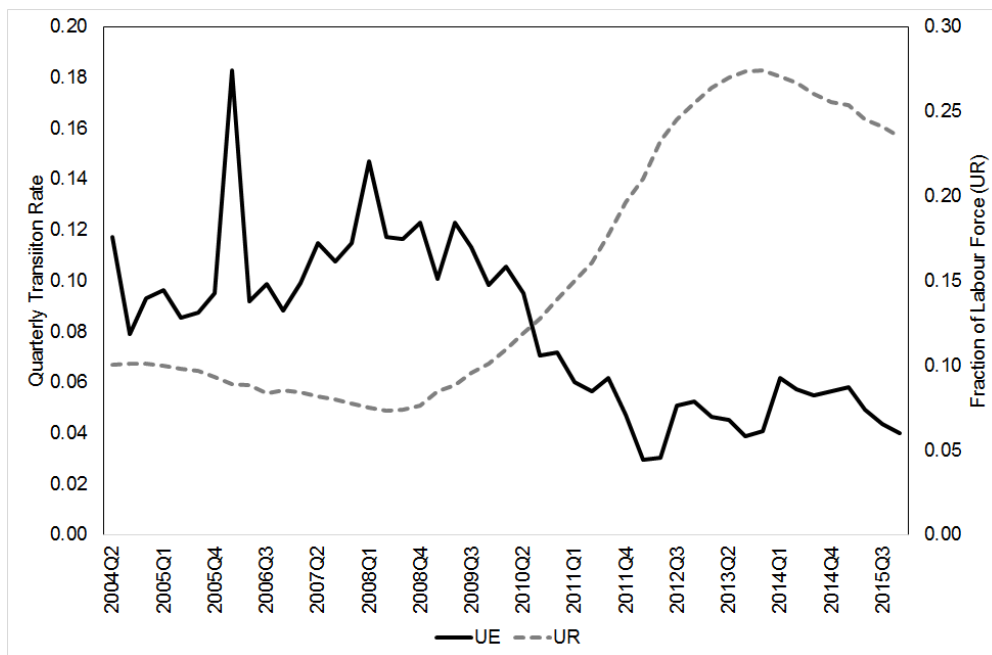
Following the work of Smith (2011), we treat the flow rates as measures of the probability of one person making the transition from one state to another. Specifically, the probability P_{ij} that an individual will move from state i to state j (where, $i = j = E, U$ and I) is calculated as the ratio of the number of individuals who move from state i at t to state j at $t + 1$, to the total number of individuals in the original state i at t . For instance, P_{UE} expresses the probability of a person moving from unemployment to employment and it is calculated as $P_{UE} = \frac{UE_{t+1}}{U_t}$.

Quarterly averages of monthly probabilities are used. Transition rates for all pair of activity statuses are then calculated, for example, the job finding rate equals to $\lambda^{UE} = -\ln(1 - UE_t/U_{t-1})$.

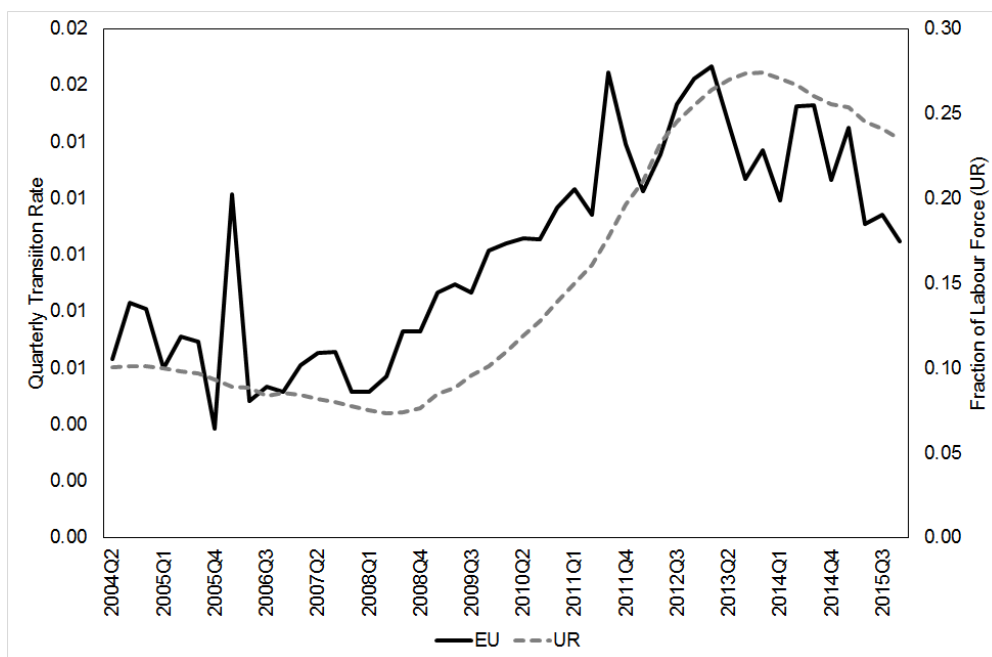
Figure 4.1 presents graphically the quarterly transition probabilities for the job finding and separation rate in Greece during the period 2004Q2-2015Q4. Panel (A) in Figure 4.1 plots the quarterly unemployment outflow rate (UE). This rate appears to be acyclical in the pre-recession period (2004Q2-2008Q3) and procyclical in the upcoming recessionary period (2008Q4-2015Q4). Specifically, in the first sub-period of declining unemployment the quarterly rate of outflow fluctuated around 12 %. In the second sub-period however, the rise in unemployment was mirrored by a gradual decline in the job finding rate, since the UE transition rate dropped to 3 % in the first quarter of 2012 and stabilized around 5 % in the third quarter of 2014.

Panel (B) of Figure 4.1 presents the quarterly unemployment inflow rate (EU) which as expected, exhibits a countercyclical behaviour. In the period 2004Q2-2008Q3 when the economy flourished, the employment to unemployment transition probability was decreasing. In the period 2008Q4-2013Q4 with the downturn of the economy and the rise of unemployment, the probability in question was increasing. Specifically, from our estimates emerges that, the separation rate rose from a very low level of 0.5 % before the 2008 recession, to a peak of 1.7 % in the first quarter of 2013, after which it slightly declined to about 1.5 % and fluctuated around that area until 2015Q4.

Figure 4.1: Quarterly Transition Probabilities and Unemployment Rate



Notes: (A): Job Finding Rate (Left Scale) vs Actual Unemployment (Right Scale)

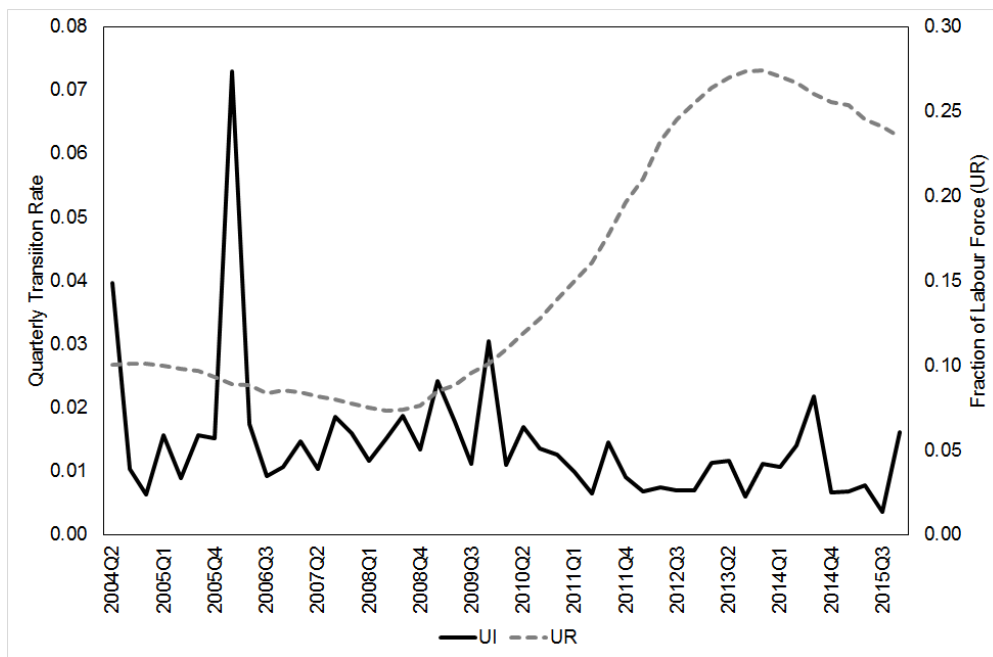


Notes: (B): Separation Rate (Left Scale) vs Actual Unemployment (Right Scale)
 Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT.)

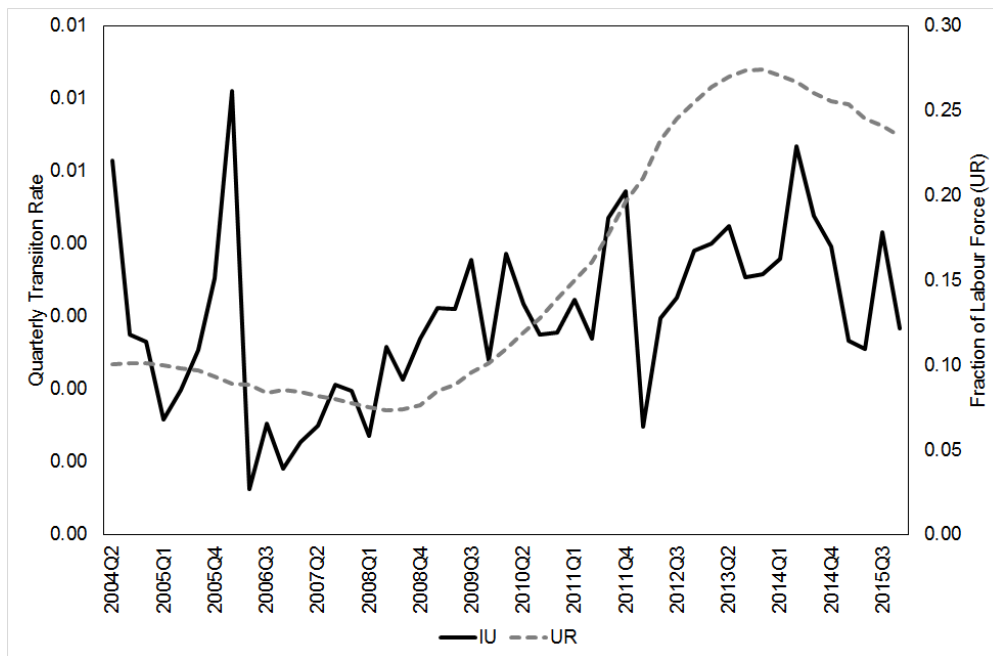
Figure 4.2 plots the quarterly transition probabilities including inactivity. Panel (C) presents the unemployment to inactivity transition rate. During the period 2004Q2-2008Q3, a period of substantial economic growth, there is a slight increase in the UI transition rate, probably because of inactivity-related benefits during that period. In the recession period though, there is a small decline from 2 % to 1 %. Yet, we could claim that in both sub-periods the UI transition rate appears to be rather acyclical. The transition rate from inactivity to unemployment is presented in panel (D) and appears to be countercyclical, as expected. We observe that in the period 2004Q2-2008Q3 when the economy grows, the IU transition probability dropped from 1 % to 0.2 % which means that inactive individuals either move directly into employment or remain inactive. In the period 2008Q4-2015Q4 as the economy shrinks, the transition rate increased from 3 % to 5 % in the second quarter of 2014. This indicates that, more inactive individuals move into the unemployment state.

Panel (E) presents the EI transition rate. This rate appears to be rather acyclical in the period 2004Q2-2008Q3 (around 0.4 %). During the recessionary years, the EI transition exhibits a mild countercyclicity: more workers exited to inactivity as well as to unemployment. Nevertheless, the increase rate is considerably low, which implies that during a time of high unemployment, the workers were not confident to leave even temporarily the labour force. Panel (F) presents the inactivity to employment transition rate (IE) which appears to be pro-cyclical in both sub periods. This implies that, during the period of low unemployment, a higher proportion of individuals joining the labour force were able to find a job, thus the IE transition rose. It subsequently fell as the Greek labour market began to tighten and prevented new entries in the employment state.

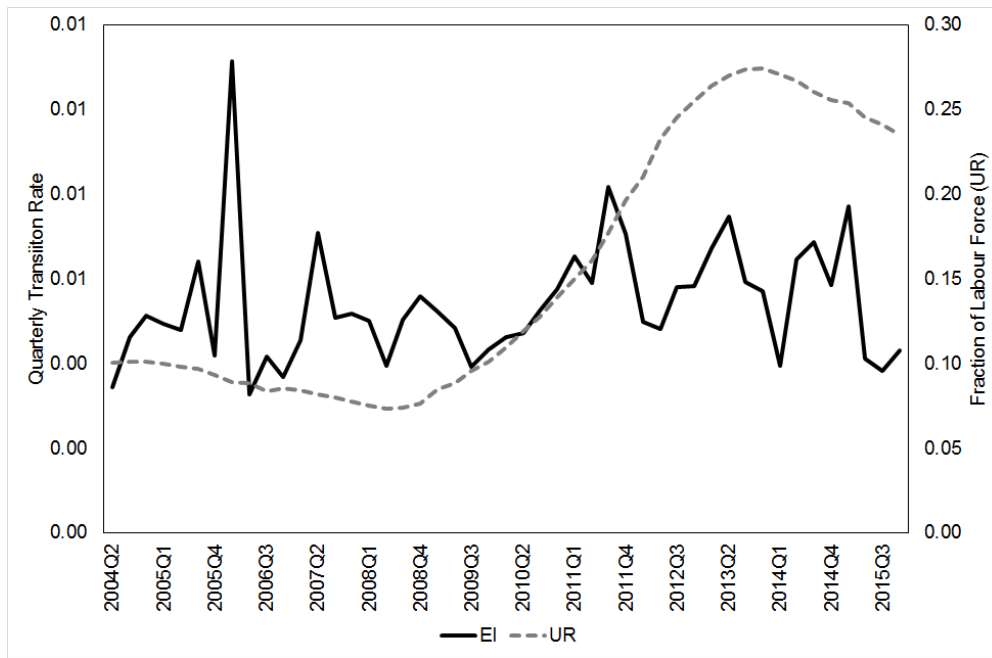
Figure 4.2: Quarterly Transition Probabilities and Unemployment Rate



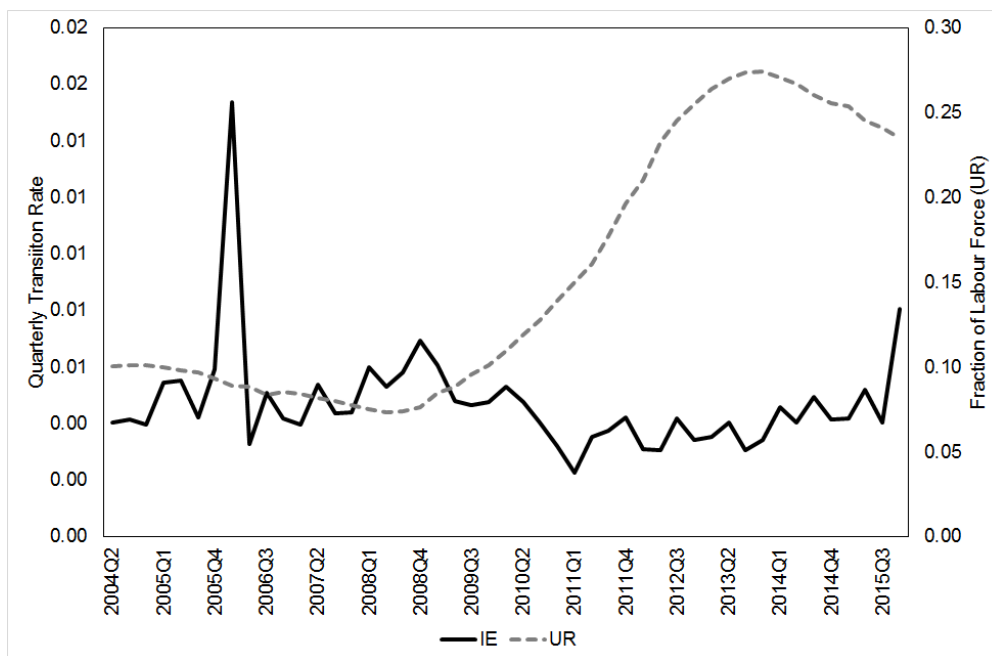
Notes: (C): Unemployment to Inactivity (Left Scale) vs Actual Unemployment (Right Scale)



Notes: (D): Inactivity to Unemployment (Left Scale) vs Actual Unemployment (Right Scale)



Notes: (E): Employment to Inactivity (Left Scale) vs Actual Unemployment (Right Scale)



Notes: (F): Inactivity to Employment (Left Scale) vs Actual Unemployment (Right Scale)
 Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT.)

We investigated the relative importance of inflow and outflow rates to changes in steady state unemployment. The dynamics of unemployment can be shown in a two-state world where workers are either employed or unemployed. Let s_t be the unemployment inflow rate and f_t be the outflow rate. Then, the unemployment rate $u_t = U_t/(U_t + E_t)$ evolves according to

$$\dot{u}_t = s_t e_t - f_t u_t \equiv s_t(1 - u_t) - f_t u_t \quad (4.1)$$

In steady state, with steady state unemployment rate \bar{u}_t , inflows equal outflows thus, we obtain that:

$$s_t(1 - \bar{u}_t) = f_t \bar{u}_t \quad (4.2)$$

After rearrangement, the steady state unemployment rate is given by

$$\bar{u}_t = \frac{s_t}{s_t + f_t} \quad (4.3)$$

In a three state world, where individuals can either be employed, unemployed or inactive the dynamics of employment, unemployment, and inactivity are

$$\dot{E}_t = \lambda_t^{UE} U_t + \lambda_t^{IE} I_t - (\lambda_t^{EU} + \lambda_t^{EI}) E_t \quad (4.4)$$

$$\dot{U}_t = \lambda_t^{EU} E_t + \lambda_t^{IU} I_t - (\lambda_t^{UE} + \lambda_t^{UI}) U_t \quad (4.5)$$

$$\dot{I}_t = \lambda_t^{UI} U_t + \lambda_t^{EI} E_t - (\lambda_t^{IU} + \lambda_t^{IE}) I_t \quad (4.6)$$

where, λ_t denotes the transition rate at time t and the subscripts denote the relevant transition.

In steady state where $\dot{U}_t = \dot{E}_t = 0$, the equations (4.4), (4.5) and (4.6) can be rearranged to express steady state unemployment rate $\bar{u}_t \equiv \bar{U}_t / (\bar{U}_t + \bar{E}_t)$ as a function of all six transition rates:

$$\bar{u}_t = \frac{\lambda_t^{EU} + \frac{\lambda_t^{EI} \lambda_t^{IU}}{\lambda_t^{IU} + \lambda_t^{IE}}}{\lambda_t^{EU} + \frac{\lambda_t^{EI} \lambda_t^{IU}}{\lambda_t^{IU} + \lambda_t^{IE}} + \lambda_t^{UE} + \frac{\lambda_t^{UI} \lambda_t^{IE}}{\lambda_t^{IU} + \lambda_t^{IE}}} \equiv \frac{s_t}{s_t + f_t} \quad (4.7)$$

The second term in the numerator multiplies λ_t^{EI} , the transition rate from employment to inactivity, by the proportion of all transitions from inactivity that go to unemployment $\lambda_t^{IU} / \lambda_t^{IU} + \lambda_t^{IE}$. It can therefore be interpreted as, the likelihood of transiting $E \rightarrow I \rightarrow U$. Thus, the numerator s_t gives the overall inflow rate from employment to unemployment, the direct $E \rightarrow U$ transition rate rate, plus the transition rate through inactivity. Similarly, f_t (the sum of the third and fourth terms in the denominator) is the transition rate from unemployment to employment directly and through inactivity. The expression for the steady state unemployment rate illustrates the advantage of working with a three-state model. It is possible to leak out the theoretically important effects of the separation rate λ_t^{EU} and job finding rate λ_t^{UE} from the overall unemployment flow rates, and to separately identify flows involving inactivity.

We also demonstrate the contribution of changes in inflow and outflow rates to unemployment dynamics. A useful summary statistic of each component's relative importance is its overall contribution to the variance of steady state unemployment. These variance contributions are mirrored through "betas". For instance, for the inflow rate the variance contribution to steady state unemployment dynamics is

$$\bar{\beta}^s = \frac{Cov(\Delta \bar{u}_{t-1}, \bar{C}_t^s)}{Var(\Delta \bar{u}_{t-1})} \quad (4.8)$$

Similar betas can be defined for all transition rates. By definition, $\bar{\beta}^s + \bar{\beta}^f = \beta^{\bar{E}U} + \beta^{\bar{E}IU} + \beta^{\bar{U}E} + \beta^{\bar{U}IE} \approx 1$, where the difference from unity is accounted for by approximation error. The estimates of betas are presented in section 5.

4.2 Micro-level Analysis

In this section we model transitions in and out of unemployment individually. Since the data provided from the LFS dataset allow us to determine the quarterly transitions at an individual level, for specific pair of statuses, we apply multinomial logit regression techniques to estimate the corresponding transition probabilities. All possible quarterly transition probabilities have been estimated, but for presentation purposes we focus on the ins and outs of unemployment, as well as the persistence of unemployment and inactivity. The analysis is carried out for three distinct periods: the pre-crisis period (2004Q1-2008Q2) the recessionary one (2008Q3-2013Q4) and the post-crisis period (2014Q1-2015Q4).

As the dependent variable of our model we consider the quarterly transition probabilities. As it is mentioned above, the probability P_{ij} of an individual moving from state i to j between quarter t and $t + 1$, equals to the ratio of the number of persons who move from state i at t to state j at $t + 1$ to the total number of persons in the original state i at t . In our analysis we consider as reference category the transition employment to employment ($E \rightarrow E$). In that case, the probability of an individual (i) leaving one labour market state, e.g. (E) for another, under the condition that he is in the state (E) is given by

$$P_{Ej} = \frac{\exp(X'_i \beta_j)}{1 + (\exp(X'_i \beta_U) + \exp(X'_i \beta_I))} \quad (4.9)$$

for the transitions $E \rightarrow U$ or $E \rightarrow I$

$$P_{EE} = \frac{1}{1 + (\exp(X'_i \beta_U) + \exp(X'_i \beta_I))} \quad (4.10)$$

for the transition of the reference category ($E \rightarrow E$)

where, j denotes the labour market state and X_i represents the vector of the independent variables which include the demographic and socio-economic characteristics of the $i - th$ individual moving from one state to the other.

We include several explanatory variables in our model in order to capture the most significant factors that affect quarterly transitions. The literature concerning movements between activity states highlights the role of gender (Theodossiou, 2002; Booth, 2009), age (Bell and Blanchflower, 2011), education (Nickel, 1979; Theodossiou and Zangelidis, 2009; Riddell and Song, 2011), marital status (Mussida and Fabrizi, 2014) and geographical differentials (Bertola and Garibaldi, 2003). Table 4.1 presents averages of these variables for selected transitions (EU, IU, UE, UI, UU and II) and time periods (2004Q1-2008Q2, 2008Q3-2013Q4 and 2014Q1-2015Q4).

Indicatively, we observe that the IU and UI transitions are more prevalent for females in all three periods (i.e., 0.69 and 0.74 in the first period, 0.64 and 0.67 in the second and 0.59 and 0.67 in the third). Furthermore, the II transition seems to hold a large amount of females indicating the persistence of inactivity for women. A different pattern however, is observed for EU and UE transitions where women are less frequently observed especially in the second period compared to the others. As regards the age component we observe that, young people (15-24) are more frequently observed in the IU and II transition and less in the EU and UE transitions. The EU and UE transitions are more pronounced for elder people (30-39), whereas individuals above fifty years old are highly observed in the II transition. These indicative findings point out the significance of individual specific characteristics in modeling the inflows and outflows of unemployment.

For interpretation purposes in our regression technique we focus on the notion of the relative risk ratio which displays how the variable of interest influences the probability of moving from a specific state compared with the probability of remaining at the same state (Wooldridge, 2010). Given that we consider our reference category to be employment to employment transition probability, the RRR coefficient is given by

$$RRR_{Ej} = \frac{P_{Ej}}{P_{EE}} = \exp(X_i' \beta_j) \quad (4.11)$$

Table 4.1. *Averages of Independent Variables*

	EU	IU	UE	UI	UU	II
Female						
2004Q1-2008Q2	0.54	0.69	0.50	0.74	0.65	0.63
2008Q3-2013Q4	0.46	0.64	0.46	0.67	0.53	0.62
2014Q1-2015Q4	0.46	0.59	0.44	0.67	0.50	0.60
Age 15-24						
2004Q1-2008Q2	0.12	0.36	0.17	0.21	0.21	0.34
2008Q3-2013Q4	0.11	0.35	0.12	0.19	0.15	0.33
2014Q1-2015Q4	0.10	0.33	0.11	0.19	0.11	0.33
Age 25-29						
2004Q1-2008Q2	0.20	0.15	0.21	0.14	0.21	0.05
2008Q3-2013Q4	0.18	0.16	0.19	0.13	0.19	0.04
2014Q1-2015Q4	0.16	0.19	0.19	0.10	0.17	0.04
Age 30-39						
2004Q1-2008Q2	0.33	0.23	0.31	0.26	0.29	0.10
2008Q3-2013Q4	0.33	0.22	0.33	0.23	0.29	0.09
2014Q1-2015Q4	0.31	0.15	0.31	0.21	0.30	0.07
Age 40-49						
2004Q1-2008Q2	0.20	0.13	0.18	0.20	0.17	0.12
2008Q3-2013Q4	0.23	0.15	0.22	0.20	0.21	0.11
2014Q1-2015Q4	0.26	0.17	0.24	0.16	0.24	0.10
Age 50-64						
2004Q1-2008Q2	0.12	0.10	0.10	0.17	0.10	0.38
2008Q3-2013Q4	0.13	0.09	0.12	0.22	0.14	0.41
2014Q1-2015Q4	0.15	0.14	0.13	0.32	0.16	0.43
Single						
2004Q1-2008Q2	0.43	0.54	0.50	0.37	0.54	0.23
2008Q3-2013Q4	0.43	0.55	0.47	0.36	0.50	0.22
2014Q1-2015Q4	0.44	0.60	0.50	0.35	0.50	0.22
Married						
2004Q1-2008Q2	0.50	0.42	0.44	0.57	0.40	0.58
2008Q3-2013Q4	0.55	0.41	0.47	0.57	0.43	0.57
2014Q1-2015Q4	0.49	0.37	0.44	0.55	0.43	0.56
Separated/Widowed						
2004Q1-2008Q2	0.06	0.03	0.05	0.05	0.05	0.18
2008Q3-2013Q4	0.05	0.03	0.05	0.06	0.05	0.20
2014Q1-2015Q4	0.06	0.02	0.05	0.09	0.06	0.21

	EU	IU	UE	UI	UU	II
Native-born						
2004Q1-2008Q2	0.68	0.70	0.69	0.74	0.66	0.72
2008Q3-2013Q4	0.79	0.85	0.81	0.88	0.86	0.95
2014Q1-2015Q4	0.88	0.91	0.88	0.89	0.86	0.95
EU-born						
2004Q1-2008Q2	0.01	0.01	0.01	0.01	0.01	0.01
2008Q3-2013Q4	0.03	0.02	0.03	0.03	0.02	0.00
2014Q1-2015Q4	0.02	0.01	0.02	0.03	0.02	0.03
Non EU-born						
2004Q1-2008Q2	0.29	0.28	0.28	0.24	0.32	0.26
2008Q3-2013Q4	0.16	0.11	0.14	0.08	0.11	0.01
2014Q1-2015Q4	0.09	0.06	0.08	0.07	0.11	0.03
Primary school						
2004Q1-2008Q2	0.25	0.18	0.21	0.25	0.17	0.52
2008Q3-2013Q4	0.20	0.15	0.19	0.23	0.16	0.50
2014Q1-2015Q4	0.15	0.13	0.14	0.20	0.14	0.47
Lower secondary						
2004Q1-2008Q2	0.13	0.11	0.12	0.13	0.12	0.14
2008Q3-2013Q4	0.15	0.12	0.14	0.14	0.12	0.13
2014Q1-2015Q4	0.13	0.11	0.12	0.11	0.12	0.13
Upper secondary						
2004Q1-2008Q2	0.33	0.40	0.33	0.39	0.37	0.24
2008Q3-2013Q4	0.34	0.41	0.34	0.40	0.37	0.25
2014Q1-2015Q4	0.34	0.42	0.36	0.44	0.38	0.26
Post-secondary						
2004Q1-2008Q2	0.08	0.10	0.10	0.09	0.13	0.02
2008Q3-2013Q4	0.09	0.10	0.09	0.06	0.12	0.02
2014Q1-2015Q4	0.10	0.08	0.12	0.07	0.11	0.02
University degree						
2004Q1-2008Q2	0.18	0.18	0.19	0.12	0.18	0.06
2008Q3-2013Q4	0.18	0.19	0.20	0.14	0.20	0.07
2014Q1-2015Q4	0.24	0.23	0.22	0.15	0.21	0.09
Ph.D.-M.Sc.						
2004Q1-2008Q2	0.01	0.01	0.00	0.01	0.01	0.00
2008Q3-2013Q4	0.01	0.01	0.01	0.01	0.01	0.00
2014Q1-2015Q4	0.01	0.01	0.02	0.00	0.01	0.01

	EU	IU	UE	UI	UU	II
Athens						
2004Q1-2008Q2	0.11	0.19	0.16	0.20	0.33	0.30
2008Q3-2013Q4	0.20	0.16	0.16	0.11	0.32	0.29
2014Q1-2015Q4	0.13	0.18	0.16	0.16	0.34	0.27
Thessaloniki						
2004Q1-2008Q2	0.07	0.13	0.09	0.17	0.09	0.08
2008Q3-2013Q4	0.07	0.12	0.07	0.13	0.10	0.08
2014Q1-2015Q4	0.05	0.11	0.07	0.07	0.09	0.09
Other urban						
2004Q1-2008Q2	0.31	0.28	0.30	0.30	0.30	0.24
2008Q3-2013Q4	0.31	0.32	0.32	0.36	0.28	0.24
2014Q1-2015Q4	0.40	0.34	0.36	0.37	0.27	0.26
Semi-urban						
2004Q1-2008Q2	0.17	0.15	0.16	0.12	0.11	0.13
2008Q3-2013Q4	0.16	0.16	0.18	0.15	0.12	0.12
2014Q1-2015Q4	0.15	0.13	0.14	0.16	0.12	0.12
Rural						
2004Q1-2008Q2	0.30	0.22	0.26	0.17	0.15	0.23
2008Q3-2013Q4	0.23	0.21	0.25	0.23	0.15	0.24
2014Q1-2015Q4	0.25	0.20	0.24	0.21	0.16	0.24

Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT).

The *RRR* coefficient for each individual characteristic, is the ratio of the probability of moving to one state (U or I) to that of remaining in the state of the base category. If the *RRR* coefficient is above (below) unity, this indicates that the individual with this specific characteristic has a greater (lesser) likelihood of being expressed in other categories than in the reference category. If the *RRR* coefficient equals unity, then there is a lack of difference between the two groups in terms of risk for an individual. All regressions are estimated by applying the Maximum Likelihood Estimation (MLE) method and the observations are weighted by a personal-based weight variable. The estimation results are presented in Table 5.3 in section 5.

Chapter 5

Empirical Results

5.1 Aggregate Analysis

Table 5.1 presents the results from decomposing steady state unemployment using the transition rate contributions. It appears that, for the entire survey period (2004Q1-2015Q4), changes in the inflow rate explain 88 % of the variation of steady state unemployment. This percentage is composed by a direct (separation rate) and an indirect effect (unemployment via inactivity). Changes in the separation rate have the dominant role. By themselves, they account for 68 % of the steady state unemployment dynamics (77 % of the total inflow rate). The contribution of the outflow rate is lower, since the changes explain only 12 % of steady state unemployment dynamics. This percentage is composed by a direct (job finding rate) and an indirect effect (employment via inactivity). Changes in the job finding rate account for most of the variation of steady state unemployment. The estimates also suggest that the role of the inflow rate via inactivity is quite high with a beta of 20 %, which is much higher than the effect of changes in outflow rate via inactivity (-4 %).

Table 5.2 presents the results of the steady state unemployment decomposition during the recession years. These results exhibit a different pattern in comparison with the above results. It appears that in the crisis years, changes in the outflow rate account for nearly 55 % of the variation in steady state unemployment. We

observe that the direct effect of the outflow rate has increased substantially relatively to that of the whole period. Specifically, changes in the job finding rate explain 50 % of the steady state unemployment dynamics, which represents 92 % of the total outflow rate. Regarding the inflow rate we observe that its changes account for 46 % of steady state unemployment changes. The direct and indirect effects decreased and changes in the separation rate have an inferior role. Changes in the separation rate account for 30 % of the variation which is clearly lower than that of the whole period. These findings indicate that the impact of the inflow rate becomes weaker and the impact of the outflow rate becomes stronger in explaining steady state unemployment dynamics. It is evident that, during the recession, the job finding rate exceeds the job separation rate indicating the the flows shift during the crisis years. These findings resemble the ones reported by Petrongolo and Pissarides (2008), Elsby et al.(2009), Fujita and Ramey (2009), and Smith (2011), as well as those reported by Kanellopoulos (2011), Demoussis et al.(2015) and Tagkalakis (2016) for Greece.

Table 5.1. *Covariance Contributions to Steady-state Unemployment Variance (2004-2015)*

β^s	inflow rate	0.88
β^f	outflow rate	0.12
β^{EU}	separation rate	0.68
β^{UE}	job finding rate	0.16
β^{EIU}	inflow rate via inactivity	0.20
β^{UIE}	outflow rate via inactivity	-0.04

Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT).
Notes: $\beta^{EU} + \beta^{EIU} = \beta^s$; $\beta^{UE} + \beta^{UIE} = \beta^f$; $\beta^s + \beta^f = 1$.

Figure 5.1 shows the results from the non steady state unemployment decomposition. We have focused on the relative contribution of inflow and outflow rates during the period 2008Q4-2015Q4, which mostly includes the crisis years. It is evident that from the beginning of the recession the outflow rate is dominant and plays an important role in changing unemployment rates. It seems however that

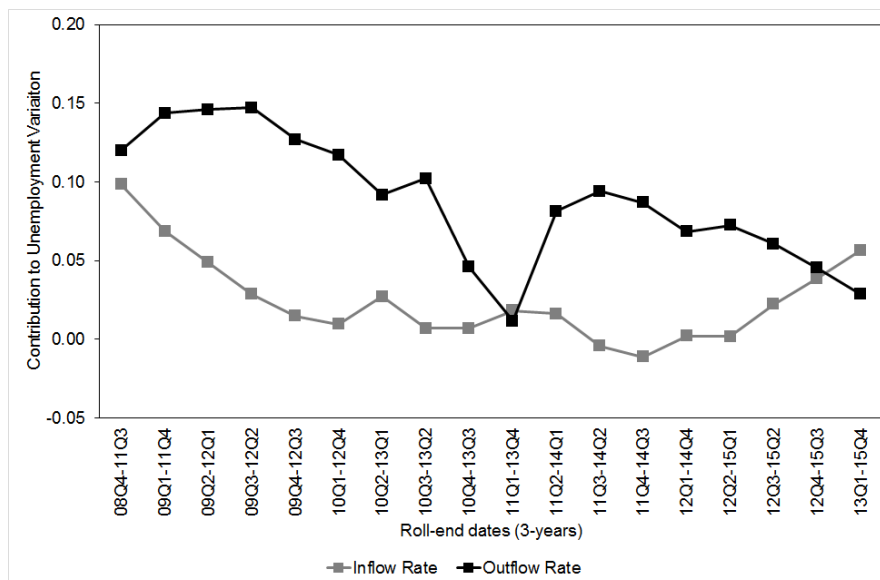
Table 5.2. *Covariance Contributions to Steady-state Unemployment Variance during the Recession*

β^s	inflow rate	0.46
β^f	outflow rate	0.54
β^{EU}	separation rate	0.30
β^{UE}	job finding rate	0.50
β^{EIU}	inflow rate via inactivity	0.16
β^{UIE}	outflow rate via inactivity	0.04

Source: Labour Force Survey (2004Q1-2015Q4). Hellenic Statistical Authority (EL.STAT).

Notes: $\beta^{EU} + \beta^{EIU} = \beta^s$; $\beta^{UE} + \beta^{UIE} = \beta^f$; $\beta^s + \beta^f = 1$.

after 2013, the inflow rate plays the main role indicating that after the recession the impact of the inflow rate is greater. These results are similar to those obtained by the steady state unemployment decomposition. Overall, our findings suggest that at times of recession and rising unemployment, the job finding rate plays the most important role in unemployment dynamics. Thus, the economic recovery could only be achieved through job creation initiatives.

Figure 5.1: Non-steady State Unemployment Decomposition

Source: Labour Force Survey (2004Q1-2015Q4). 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).

5.2 Micro-level Analysis

Unemployment inflows

In this subsection we explore the correlation between the above-mentioned individual specific characteristics and the quarterly 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 the three periods examined (2004Q1-2008Q2), (2008Q3-2014Q1) and (2014Q1-2015Q4) and are presented at the 2nd and 3rd column of Table 5.3. We employ the continuously employed (EE) as the base category for all our estimations. We have chosen not to display the estimated results for the EI transition and the IE transition since we are mostly interested in the unemployment inflows deriving from the employment pool.

According to the obtained results for the first sub-period (2004Q1-2008Q2), the EU-transition relative risk ratio for females relative to males is 2.03. That is, the relative risk of moving from the employment state to the unemployment one (EU) is higher for female workers. This finding remains valid in the second sub-period (2008Q3-2013Q4) although it is now of a lower magnitude (1.38). The reduction in the value of the estimated coefficient (from 2.03 to 1.38) suggests that in the second period the probability of making the EU transition has risen for males relative to females. Thus, unemployment inflows in Greece is an unfavorable situation that concerns mostly female workers, although in the post-2008 period the relative position of male workers has worsened. The reduction of the coefficient also continued in the third period (2014Q1-2015Q4) from 1.38 to 1.33. Concerning the inflows coming from the inactivity state (IU) we observe that females are more likely to make this transition in the first period. Relative to males, the IU-transition relative risk ratio is 4.46. This gender difference continues both in the second and third period although the estimated coefficients exhibit some decrease.

As regards the effects of age we observe that for all age groups (25-29, 30-39,

40-49, 50-64) the relative risk of moving from the employment state to the unemployment one (EU) is lower compared to the younger workers (15-24) in the first sub-period. Thus, young workers face increased risk of moving to unemployment from one quarter to another. This finding concerns and the rest sub-periods and we observe a decline of the estimated coefficient among the age groups during the second and third period. This indicates that during the crisis years and after, younger workers (15-24) are more likely to make the EU transition. Regarding the IU transition we observe that as we climb age groups, the relative risk of moving from inactivity to unemployment reduces, as expected. This implies that the younger are more likely to enter the labour force as unemployed. This finding continues to be valid during the second and the third period, as well. This might indicate that the major problem of joblessness during the recession, has negatively influenced the expected returns of job search.

As concerns the marital status, we observe that married individuals are less likely to make the EU or IU transition although this risk is higher in the recession period. Likewise, foreign individuals either born in Europe or not, face increased risks of making the transitions EU or IU compared to the native ones. Regarding the effects of education we obtain that, highly educated individuals run lower risks of making the EU transition and it seems that they are not considerably affected by the ongoing crisis. Concerning the IU transition, highly educated individuals face a lower risk of entering the labour force as unemployed rather than to continue in the inactivity state. In the crisis years however, due to the limited employment opportunities, the highly educated face even higher probability of entering the labour market as unemployed. Still, their risk is not greater than of those with low education who seem to be mainly concerned by the unemployment inflow. Finally, the EU transition concerns mostly those workers residing in semi-urban and rural areas. In contrast, the IU transition is more pronounced in urban areas.

Unemployment Outflows

We now focus on the relationship between the above-mentioned individual specific characteristics and the quarterly transition rates 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 three periods under examination and are presented at the 4th and 5th columns of Table 5.3. We also use the continuously employed (EE) as the base category, as previously.

The obtained results indicate that in the first sub-period the UE transition relative risk ratio for females, relative to males, is 1.81 suggesting that the relative likelihood of moving from the unemployment state to the employment one (UE) is higher for unemployed women. This finding continues to apply in the second sub-period although its value decreased (1.36) indicating that the probability of exiting unemployment has slightly increased for unemployed males during the crisis years. The same pattern of the reduction of the estimate coefficient continues in the third sub-period. Thus, unemployment outflows in Greece is a feature that concerns mainly female unemployed individuals although their position slightly worsened in the post-2008 period. As regards the outflows concerning the non-participation state (UI), we observe that this transition is more prevalent for females in the pre-crisis period. The same holds during the crisis period, as well. Thus, males are more likely to depart the unemployment pool and end up into employment, whereas females into unemployment.

As regards the effects of age we observe that younger unemployed individuals face greater risk of making the quarterly transition from unemployment to employment (UE). This finding is consistent throughout the three periods, although it is less visible in the crisis years. Specifically, the relative position of individuals aged 25-29 seems to slightly improve during the second and third sub-period. Turning now to the UI transition, we observe that the younger workers compared to the elder ones, are more likely to exit the labour market and become inactive, as expected. Regarding the marital status, it is evident that married unemployed

individuals are less likely to make the UE transition, although in the crisis period their possibility has increased. This implies that during the recession, the position of the single unemployed individuals worsened. Furthermore, married individuals are more likely to move from U to I. In addition, foreign-born unemployed individuals relative to the natives, are more likely to find a job (UE), or move to inactivity (UI) in the post-2008 period.

As concerns the effects of education we obtain that, highly educated unemployed individuals, relative to the those with low education, have a lower possibility of finding a job (UE) although it appears that this possibility slightly increased during the crisis. Regarding the UI flow, we observe that unemployed individuals with higher education, have a smaller chance of moving to the inactivity state. Finally, unemployed individuals residing in rural areas have a greater possibility of finding a job (UE) in all sub-periods. On the other hand, unemployed individuals residing in rather urban areas, are more likely to move towards non-participation (UI) during the crisis years.

Persistence of unemployment and inactivity

In the last part of the analysis we examine the correlation between the above-mentioned individual specific characteristics and the quarterly transition rates from unemployment to unemployment (UU) and from inactivity to inactivity (II). Again, the effects of the independent variables are represented by the relative risk ratio for the three periods under examination and are presented at the 6th and 7th columns of Table 5.3. We also use the continuously employed (EE) as the base category, as previously.

According to the obtained results, for the first sub-period the UU-transition relative risk ratio for females relative to males, is 3.59. This suggests that the likelihood of moving from unemployment to unemployment is higher for unemployed women. Thus, females exhibit higher persistence in unemployment than

males. This finding continues to be valid in the second sub-period, although now it has a smaller value, indicating that during the crisis unemployed males remained in the unemployment state for a larger period. As regards the II-transition, we observe that throughout the three sub-periods, females, compared to males, face an increased probability of remaining in the inactivity state from one quarter to another, as expected.

Regarding the effects of age, we observe that younger unemployed individuals face increased risk of making the UU-transition. This phenomenon is even more prevalent in the post-2008 period, due to the limited employment opportunities. Thus, unemployment persistence is a feature that concerns primarily the younger individuals who face a difficulty in job searching. Concerning the II flow, it appears that younger individuals are more likely to prefer to stay in the inactivity state. Furthermore, married unemployed individuals face a lower risk of becoming long-term unemployed (UU). On the other hand, they are more likely to move from inactivity to inactivity (II), relative to single inactive individuals.

Foreign-born unemployed individuals, relative to natives, have a greater probability of remaining in the unemployment state (UU) and it appears that their relative position has worsened during the crisis years. In contrast, they face a lower risk of becoming continuously inactive (II). With regards to the effects of education we observe that, unemployed individuals with high education run a lower risk of making the unemployment to unemployment transition (UU) indicating that unemployment persistence affects mostly those who lack skills. In addition, inactive individuals with lower education are more likely to remain in the non-participation state (II). Lastly, unemployed individuals residing in urban areas have an increased probability of making the UU-transition specifically in the crisis years, which implies how the recession aggravated unemployment persistence in big cities. Moreover, inactive individuals residing in urban areas have a greater chance of remaining inactive in the next quarter during the post-2008 period.

Table 5.3. Results of Multinomial Logistic Regression, ins and outs of unemployment

Independent Variables	EU	IU	UE	UI	UU	II
Female						
2004Q1-2008Q2	2.03*** (0.091)	4.46*** (0.412)	1.81*** (0.073)	5.61*** (0.574)	3.59*** (0.055)	5.18*** (0.046)
2008Q3-2013Q4	1.38*** (0.043)	3.41*** (0.200)	1.36*** (0.042)	3.76*** (0.274)	2.07*** (0.019)	4.15*** (0.027)
2014Q1-2015Q4	1.33*** (0.087)	2.60*** (0.269)	1.19*** (0.064)	3.44*** (0.274)	1.72*** (0.411)	3.23*** (0.044)
Age 25-29						
2004Q1-2008Q2	0.84** (0.077)	0.17*** (0.023)	0.63*** (0.042)	0.29*** (0.049)	0.50*** (0.013)	0.08*** (0.001)
2008Q3-2013Q4	0.79*** (0.048)	0.16*** (0.015)	0.71*** (0.040)	0.32*** (0.044)	0.61*** (0.011)	0.07*** (0.001)
2014Q1-2015Q4	0.75** (0.101)	0.21*** (0.036)	0.75*** (0.080)	0.26*** (0.065)	0.75*** (0.027)	0.06*** (0.002)
Age 30-39						
2004Q1-2008Q2	0.68*** (0.062)	0.11*** (0.016)	0.47*** (0.032)	0.21*** (0.037)	0.37*** (0.010)	0.05*** (0.001)
2008Q3-2013Q4	0.58*** (0.034)	0.09*** (0.008)	0.51*** (0.028)	0.20*** (0.027)	0.39*** (0.007)	0.49*** (0.007)
2014Q1-2015Q4	0.48** (0.062)	0.07*** (0.012)	0.47*** (0.049)	0.15*** (0.036)	0.46*** (0.015)	0.03*** (0.001)
Age 40-49						
2004Q1-2008Q2	0.46*** (0.046)	0.06*** (0.010)	0.30*** (0.023)	0.16*** (0.032)	0.27*** (0.008)	0.06*** (0.001)
2008Q3-2013Q4	0.42*** (0.027)	0.06*** (0.006)	0.36*** (0.022)	0.15*** (0.025)	0.29*** (0.005)	0.05*** (0.001)
2014Q1-2015Q4	0.37*** (0.051)	0.07*** (0.014)	0.37*** (0.041)	0.10*** (0.027)	0.38*** (0.013)	0.03*** (0.001)
Age 50-64						
2004Q1-2008Q2	0.32*** (0.036)	0.06*** (0.011)	0.20*** (0.017)	0.17*** (0.035)	0.20*** (0.007)	0.25*** (0.004)
2008Q3-2013Q4	0.28*** (0.020)	0.04*** (0.006)	0.23*** (0.016)	0.19*** (0.031)	0.23*** (0.005)	0.21*** (0.003)
2014Q1-2015Q4	0.26*** (0.040)	0.07*** (0.015)	0.23*** (0.029)	0.23*** (0.063)	0.32*** (0.012)	0.18*** (0.005)
Married						
2004Q1-2008Q2	0.59*** (0.037)	0.83* (0.098)	0.57*** (0.028)	1.00 (0.139)	0.46*** (0.009)	1.17*** (0.016)
2008Q3-2013Q4	0.72*** (0.028)	0.87* (0.070)	0.62*** (0.023)	0.96 (0.109)	0.52*** (0.006)	1.07*** (0.011)
2014Q1-2015Q4	0.65*** (0.055)	0.75** (0.111)	0.58*** (0.040)	0.90* (0.175)	0.48*** (0.010)	1.05** (0.024)

Independent Variables	EU	IU	UE	UI	UU	II
Widowed/Separated						
2004Q1-2008Q2	1.02 (0.116)	0.88 (0.199)	0.94 (0.088)	0.95 (0.022)	0.71*** (0.025)	0.86*** (0.018)
2008Q3-2013Q4	1.03 (0.075)	1.00 (0.015)	0.95 (0.068)	1.22 (0.020)	0.84*** (0.018)	0.98 (0.015)
2014Q1-2015Q4	0.99 (0.149)	0.45** (0.160)	0.97 (0.120)	1.18 (0.325)	0.74*** (0.027)	1.06* (0.035)
EU-born						
2004Q1-2008Q2	1.91*** (0.315)	1.03 (0.373)	1.61*** (0.234)	0.93 (0.334)	1.14* (0.070)	1.03 (0.042)
2008Q3-2013Q4	2.01*** (0.164)	1.31 (0.228)	1.99*** (0.162)	1.41* (0.284)	1.02 (0.033)	0.73*** (0.019)
2014Q1-2015Q4	1.58** (0.310)	1.30 (0.447)	1.65*** (0.263)	1.67 (0.544)	1.08 (0.059)	0.76*** (0.042)
Non EU-born						
2004Q1-2008Q2	1.48*** (0.138)	1.00 (0.196)	1.22*** (0.097)	0.70* (0.149)	0.93** (0.031)	0.59*** (0.012)
2008Q3-2013Q4	2.16*** (0.095)	1.49 (0.138)	2.04*** (0.092)	1.09 (0.137)	1.41*** (0.022)	0.60*** (0.008)
2014Q1-2015Q4	1.83** (0.203)	1.13 (0.240)	1.60*** (0.156)	1.20 (0.271)	1.49*** (0.043)	0.63*** (0.021)
Lower secondary						
2004Q1-2008Q2	0.73*** (0.060)	0.55*** (0.089)	0.70*** (0.046)	0.75* (0.122)	0.75*** (0.021)	1.20*** (0.014)
2008Q3-2013Q4	0.89** (0.046)	0.61*** (0.067)	0.80*** (0.041)	0.84 (0.102)	0.80*** (0.014)	1.23*** (0.012)
2014Q1-2015Q4	0.96 (0.114)	0.53*** (0.115)	0.91 (0.094)	0.66* (0.145)	0.84*** (0.025)	1.17*** (0.026)
Upper secondary						
2004Q1-2008Q2	0.73*** (0.060)	0.55*** (0.089)	0.70*** (0.046)	0.75* (0.122)	0.75*** (0.021)	1.20*** (0.014)
2008Q3-2013Q4	0.76*** (0.032)	0.87 (0.074)	0.75*** (0.031)	0.82** (0.076)	0.82*** (0.011)	0.70*** (0.006)
2014Q1-2015Q4	0.83* (0.079)	0.82 (0.131)	0.91 (0.074)	0.75* (0.116)	0.82*** (0.019)	0.73*** (0.014)
Post-secondary						
2004Q1-2008Q2	0.76*** (0.074)	0.78 (0.134)	0.88 (0.065)	0.57*** (0.105)	0.86*** (0.024)	0.21*** (0.004)
2008Q3-2013Q4	0.83*** (0.051)	0.96 (0.110)	0.88** (0.053)	0.57*** (0.088)	0.96** (0.017)	0.30*** (0.005)
2014Q1-2015Q4	1.05 (0.138)	0.78 (0.174)	1.18 (0.126)	0.63* (0.154)	0.92*** (0.029)	0.34*** (0.012)

Independent Variables	EU	IU	UE	UI	UU	II
University degree						
2004Q1-2008Q2	0.67*** (0.050)	0.71** (0.103)	0.71*** (0.047)	0.33*** (0.055)	0.56*** (0.014)	0.21*** (0.003)
2008Q3-2013Q4	0.55*** (0.027)	0.66*** (0.066)	0.61*** (0.029)	0.38*** (0.047)	0.53*** (0.008)	0.24*** (0.002)
2014Q1-2015Q4	0.72*** (0.076)	0.57*** (0.104)	0.66*** (0.061)	0.38*** (0.0755)	0.50*** (0.013)	0.30*** (0.007)
Ph.D. - M.Sc.						
2004Q1-2008Q2	0.33*** (0.128)	0.61 (0.326)	0.59** (0.130)	0.28** (0.171)	0.45*** (0.041)	0.08*** (0.080)
2008Q3-2013Q4	0.47*** (0.073)	0.61* (0.178)	0.68*** (0.092)	0.27*** (0.124)	0.39*** (0.016)	0.97*** (0.005)
2014Q1-2015Q4	0.50** (0.154)	0.55 (0.245)	0.53*** (0.126)	0.10** (0.105)	0.31*** (0.020)	0.12*** (0.010)
Thessaloniki						
2004Q1-2008Q2	2.56*** (0.294)	2.69*** (0.426)	2.17*** (0.173)	3.15*** (0.485)	1.11*** (0.028)	1.08*** (0.015)
2008Q3-2013Q4	1.49*** (0.103)	2.94*** (0.338)	1.92*** (0.139)	4.33*** (0.696)	1.25*** (0.021)	1.22*** (0.014)
2014Q1-2015Q4	1.80*** (0.325)	3.17*** (0.676)	2.16*** (0.273)	1.81** (0.492)	1.05* (0.032)	1.31*** (0.035)
Other urban						
2004Q1-2008Q2	3.55*** (0.336)	1.93*** (0.264)	2.49*** (0.161)	1.75*** (0.244)	1.22*** (0.023)	0.98 (0.010)
2008Q3-2013Q4	1.98*** (0.099)	2.29*** (0.228)	2.65*** (0.144)	3.42*** (0.488)	1.15*** (0.014)	0.99 (0.009)
2014Q1-2015Q4	3.86*** (0.504)	1.99*** (0.375)	2.83*** (0.280)	2.19*** (0.454)	0.92*** (0.020)	0.98 (0.019)

Independent Variables	EU	IU	UE	UI	UU	II
Semi-urban						
2004Q1-2008Q2	3.99*** (0.407)	2.29*** (0.344)	2.78*** (0.198)	1.40** (0.229)	0.98 (0.023)	0.79*** (0.010)
2008Q3-2013Q4	1.90*** (0.107)	2.18*** (0.241)	2.71*** (0.161)	2.68*** (0.421)	0.91*** (0.014)	0.76*** (0.008)
2014Q1-2015Q4	3.13*** (0.451)	2.02*** (0.419)	2.32*** (0.258)	2.11*** (0.480)	0.79*** (0.021)	0.76*** (0.018)
Rural						
2004Q1-2008Q2	4.83*** (0.470)	2.28*** (0.338)	3.05*** (0.205)	1.23 (0.196)	0.84*** (0.019)	0.58*** (0.007)
2008Q3-2013Q4	1.77*** (0.095)	1.93*** (0.206)	2.62*** (0.149)	2.33*** (0.354)	0.70*** (0.010)	0.55*** (0.005)
2014Q1-2015Q4	3.05*** (0.418)	1.66*** (0.329)	2.31*** (0.240)	1.39 (0.313)	0.63*** (0.015)	0.54*** (0.012)
Observations						
2004Q1-2008Q2	541,760					
2008Q3-2013Q4	698,166					
2014Q1-2015Q4	154,732					

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 15-24, single, 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. *** p<0.01, ** p<0.05, * p<0.1 denote statistical significance at 1%, 5% and 10% levels, respectively.

Chapter 6

Conclusions

Several studies have focused on the contribution of inflows and outflows to the dynamics of unemployment. In this dissertation, we analyze the ins and outs of the Greek unemployment in the presence of the ongoing economic crisis and we investigate the determinant factors that affect Greek labour market transitions. To achieve this, we use quarterly individual level data drawn from the Greek Labour Force Survey (LFS) over the period 2004-2015. We employ aggregate decomposition and micro-level methodological techniques using a three-state model of worker flows, where individuals can be employed, unemployed or inactive. The aggregate analysis includes a typical steady state decomposition technique and a non steady state one. As regards the micro level analysis, we apply multinomial logit regression techniques in order to determine the quarterly transitions across employment, unemployment and non-participation at an individual level.

The major finding of the aggregate analysis is that over the entire survey period (2004-2015) unemployment fluctuations are predominantly driven by the inflow rates. During the recession however, the outflows increase and thus they contribute more than the inflows (nearly 55 %) to the rising unemployment rates. Thus, both, job separation and job finding rates play an important role in changing unemployment rates. However, it is very important to address that, it is the decrease in the job finding rate rather than the increase in the job separation

rate that played the primary role in boosting unemployment during the Greek economic crisis. These findings are in accordance 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). Moreover, they are in agreement with the results provided for the Greek labour market (Kanellopoulos, 2011; Demoussis et al.2015; Tagkalakis, 2016). Since Greek economy is in a period of great moderation, with the unemployment rate to peak at the extraordinary level of 28 % during the crisis, and given that the "outs" win, a remarkable reduction in the unemployment rate could initially result from a rise in the job finding rate. The results suggest that economic recovery is vital but not adequate for the reduction of the very high unemployment rate. Economic recovery should be strongly associated with job creation measures to confront the unemployment persistence problem. Finally, our findings suggest that the use of a three-state model of worker flows is more appropriate for our analysis and the assumption that actual unemployment does not deviate from its steady state level is rather controversial (Smith, 2011).

Despite the aggregate analysis, we also offer additional micro-level evidence regarding how individual specific characteristics determine the ins and outs of Greek unemployment. We found in particular, that the inflows and outflows of unemployment exhibit remarkable differences according to specific characteristics such as, gender, age, marital status, country of birth, education and residence. Moreover, we found that the existing differences depend also on the sub-period examined. For instance, in the pre-crisis period, females in the Greek labour market, faced higher job separation and lower job finding rates compared to males. During the recession years, this pattern continued to exist, although now the relative position of females has improved, especially since the EU transition appears a decline. The relative risk ratio for females in the period 2008Q3-2013Q4 has also declined for the UE transition, but still unemployed females are more likely to find a job during crisis, compared to males. During this period females also face rising non-

participation rates which indicates that a "discouraged work effect" might exist for females. In the post-crisis period, they seem to have a rise in the job separation rate and a fall in the job finding rate. An additional indicative finding is that, the highly educated youth in Greece face increasing unemployment rates. This finding highlights the absence of employment opportunities in the Greek labour market and it implies that urgent policy interventions are required. Despite the enhancement of job creation, it is of utmost importance to apply efficient policy measures such as human capital investments, the adoption of structural reforms in the labour market and the improvement of the public sector efficiency.

The results that emerge of this dissertation attempt to shed light on the determinants of unemployment dynamics in Greece. Our results however, should be interpreted with some caution, given the information available. For example, we are not able to thoroughly acknowledge an individual's employment history, such as the duration of his employment. As regards future research, it is well-known that Greece holds high records of self-employment rates. Thus, an interesting investigation would be to explore unemployment dynamics in Greece in a four-state model of worker flows including paid employment, self-employment, unemployment and non-participation.

References

- Baussola, M., Mussida, C., Jenkins, J., & Penfold, M. (2015). Determinants of the gender unemployment gap in Italy and the United Kingdom: A comparative investigation, *International Labour Review*, 154(4), 537-562.
- Bell, D. N., & Blanchflower, D. G. (2011). Young people and the Great Recession, *Oxford Review of Economic Policy*, 27(2), 241-267.
- Bertola, G., & Garibaldi, P. (2003). The structure and history of Italian unemployment, Working Paper Series No. 907, CESifo, CESifo Group Munich.
- Campolieti, M. (2011). The ins and outs of unemployment in Canada, 1976–2008, *Canadian Journal of Economics/Revue canadienne d'économique*, 44(4), 1331-1349.
- Daouli, J., Demoussis, M., Giannakopoulos, N., & Lambropoulou, N. (2015). The ins and outs of Greek unemployment in the Current Economic Crisis, *South Eastern Europe Journal of Economics*, vol. 2, 177-196.
- Davis, S. J., Faberman, R. J., & Haltiwanger, J. (2006). The flow approach to labor markets: new data sources and micro–macro links, *The Journal of Economic Perspectives*, 20(3), 3-26.
- Elsby, M. W., Hobijn, B., & Sahin, A. (2010). The labor market in the Great Recession (No. w15979), National Bureau of Economic Research.
- Elsby, M. W., Michaels, R., & Solon, G. (2009). The ins and outs of cyclical unemployment, *American Economic Journal: Macroeconomics*, 1(1), 84-110.

Elsby, M. W., Smith, J. C., & Wadsworth, J. (2011). The role of worker flows in the dynamics and distribution of UK unemployment, *Oxford Review of Economic Policy*, 27(2), 338-363.

Elsby, M. W., Hobijn, B., & Şahin, A. (2013). The decline of the US labor share, *Brookings Papers on Economic Activity*, 2013(2), 1-63.

Elsby, M. W., Hobijn, B., & Şahin, A. (2015). On the importance of the participation margin for labor market fluctuations, *Journal of Monetary Economics*, 72, 64-82.

Fujita, S., & Ramey, G. (2009). The cyclicalities of separation and job finding rates, *International Economic Review*, 50(2), 415-430.

Gomes, P. (2012). Labour market flows: Facts from the United Kingdom., *Labour Economics*, 19(2), 165-175.

Hall, R. E. (2005). Employment fluctuations with equilibrium wage stickiness, *American economic review*, 50-65.

Kanellopoulos, C. (2011). Size and cyclicalities of worker flows in Greece, *Essays in Economics: Applied Studies on the Greek Economy*.

Krueger, A. B., Cramer, J., & Cho, D. (2014). Are the long-term unemployed on the margins of the labor market?, *Brookings papers on economic activity*, 2014(1), 229-299.

Lundberg, S. (1985). The added worker effect, *Journal of Labor Economics*, 3(1, Part 1), 11-37.

Mortensen, D. T., & Pissarides, C. A. (1999). New developments in models of search in the labor market, *Handbook of labor economics*, 3, 2567-2627.

Mussida, C., & Fabrizi, E. (2014). Unemployment outflows: the relevance of gender and marital status in Italy and Spain, *International Journal of Manpower*, 35(5), 594-612.

Nickel, S. (1979). Education and the lifetime pattern of employment, *Journal of Political Economy*, 87(5), 117-131.

Nordmeier, D. (2014). Worker flows in Germany: inspecting the time aggregation bias, *Labour Economics*, 28, 70-83.

Petrongolo, B., & Pissarides, C. A. (2008). The ins and outs of European unemployment, *The American Economic Review*, 98(2), 256-262.

Pissarides, C. A. (2013). Unemployment in the great recession, *Economica*, 80(319), 385-403.

Riddell, W. C., & Song, X. (2011). The impact of education on unemployment incidence and re-employment success: Evidence from the US labour market, *Labour Economics*, 18(4), 453-463.

Shimer, R. (2012). Reassessing the ins and outs of unemployment, *Review of Economic Dynamics*, 15(2), 127-148.

Smith, J. C. (2011). The ins and outs of UK unemployment, *The Economic Journal*, 121(552), 402-444.

Tagkalakis, A. O. (2016). Unemployment dynamics and the Beveridge curve in Greece, *IZA Journal of European Labor Studies*, 5(1), 1-34.

Theodossiou, I. (2002). Factors affecting the job-to-joblessness turnover and gender, *Labour*, 16(4), 729-746.

Theodossiou, I., & Zangelidis, A. (2009). Should I stay or should I go? The effect of gender, education and unemployment on labour market transitions, *Labour Economics*, 16(5), 566-577.

Tsouma, E. (2010, September). Dating business cycle turning points: The greek economy during 1970–2010 and the recent recession, *OECD Journal: Journal of Business Cycle Measurement and Analysis*, 2014, 1-24.

Venetis, I. A., & Salamaliki, P. K. (2015). Unit roots and trend breaks in the Greek labor market, *Journal of Economic Studies*, 42(4), 641-658.

Wooldridge, J. M. (2010) *Econometric analysis of cross section and panel data*, 2nd edition, MIT press.