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THE INS AND OUTS OF UNEMPLOYMENT IN THE CURRENT GREEK ECONOMIC CRISIS

JOAN DAOULI, MICHAEL DEMOUSSIS*,
NICHOLAS GIANNAKOPOULOS, NIKOLITSA LAMPROPOULOU
University of Patras, Greece

Abstract
We are investigating 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 fluctuations. In particular, early on in the recession period, inflow rates dominates, while later outflow rates take over. These findings remain unaltered when unemployment persistence and low transition rates are taken into account. Furthermore, by 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, designing an effective employment policy in Greece needs to take into consideration the exceptionally low job finding rate (10%) and employment composition in the ongoing labour market crisis.

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*Corresponding Author: Prof. Michael Demoussis, Department of Economics, University of Patras, University Campus, 26504 Rio, Patras, Greece. e-mail: micdem@upatras.gr

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 addition, the 2nd quarter of 2008 marked 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. 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, 2005). While some reforms have been adopted in Greece, under the Memorandum signed by the Greek government and the Troika, unemployment has accelerated rapidly due to the implementation of fiscal austerity measures and structural reforms (Tagkalakis, 2013; Pissarides, 2013; Venetis and Salamaliki, 2015). Undoubtedly, designing an effective employment policy requires 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; Smith, 2011; Shimer, 2012; Nordmeier, 2014). Relevant evidence regarding the Greek labour market is limited to the work of Kanellopoulos (2011) who utilized LFS data for the 2004-2009 period, during which only minor changes were observed in the unemployment rate; the author 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) slightly dominates the outflow rate (job finding) in this period. The present study covers a longer period (1998-2013) during which unemployment fluctuations drastically and rapidly increased, particularly after 2009, and provides fresh evidence on qualitative differences in the "ins and outs" that have taken place due to significant shifts in aggregate demand factors.

For analytical purposes we have employed quarterly individual-level data, drawn from the Greek Labour Force Survey (LFS) and a "worker-flow" approach (Davis *et al.* 2006)[1], while for identification purposes, we follow Elsby *et al.* (2011) in order to calculate individual annual transitions between activity statuses for the sur-

1. Usually, data on workers who move "in" or "out" of the unemployment pool are either administrative (unemployment benefit claimants/registered unemployed persons) or survey-based (e.g., US Current Population Survey, British Household Panel, European Labour Force Survey). In addition, the reference period is usually monthly (primarily because of the longitudinal dimension of datasets). Since the rotated-panel dimension of the Greek LFS does not cover the entire 1998-2013 period, but only the 2004-2009 period (Kanellopoulos, 2011), analysis of the "ins" and "outs" is performed using repeated cross-sections.
2. We acknowledge that recall data are not a good substitute for longitudinal data regarding transitory components of certain labour market outcomes. Paull (2002) analytically discusses problems 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.

vey week and for the same period one year previously.[2] At the aggregate level, we explore unemployment dynamics by using typical steady state decomposition techniques. Our results show that in the beginning of the recession the unemployment rate substantially deviates from its steady state level and the inflow rate dominates. In contrast, the outflow rate takes over in later phases of the recession. We also found that unemployment inflows are pro-cyclical in the post-2009 period. At the micro-level, data allow us 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 specific worker groups (e.g., the young, the old, women, the low-educated) face different risks of losing their jobs during severe recession. Applying multinomial logistic regression techniques (Clark and Summers, 1979; Bellman *et al.* 1995) we found that the ins and outs of unemployment vary with individual-specific heterogeneity and across time.

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 labour market flows and the results of 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 micro-econometric estimations and Section 6 concludes.

2. Data and preliminary analysis

2.1 Data sources

Data are drawn from the Greek Labour Force Survey (LFS) conducted by the Hellenic Statistical Authority (EL.STAT) on a quarterly basis since 1998 and providing 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 survey years 1998Q1-2013Q4 and 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, length 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 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

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

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 for the third quarter of 2008 (Venetis and Salamaliki, 2015), which coincides with the beginning of the recessionary period (Tsouma, 2014).

2.2. Unemployment composition

The Greek unemployment rate after the end of 2007 is characterized by continuous increase which, however, intensified in the beginning of 2010. Theoretically, unemployment may 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 unemployment rates for selected time periods and for groups of workers defined according to basic demographic and socio-economic characteristics. It can be observed that the average annual unemployment rate for the 1998Q1-2008Q3 period stands around 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 variations between groups differ substantially. For example, 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 of age) has risen substantially between the two periods substantially and more than that of younger ones. Furthermore, unemployment has increased considerably more for the married and the formerly-married (separated-widowed) than for unmarried individuals (87% vs 64%). It also appears that the increased unemployment rate mostly concerns non-EU born individuals. The breakdown of unemployment rates by educational level reveals that increase in unemployment steadily declines with increased education, indicating that joblessness concerns mostly those workers who 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.

In order to form a more complete picture of the rising unemployment rate, we present statistics regarding the decomposition of unemployment by reason of unemployment and duration of job search by the unemployed in Table 2. 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 the unemployed who are laid-off rose from 16.8% in the 1998Q1-2008Q3 period to 30.3% in the 2008Q3-2013Q4 period. The share of workers who became unemployed because their contract was terminated increased from 21.1% to 25.8% between the two periods.

Table 1.Unemployment by demographic and socio-economic characteristics (in %)

Groups of individuals	1998Q1-2008Q3	2008Q4-2013Q4
Total	9.98	16.51
Gender		
Males	6.55	14.95
Females	15.38	21.61
Age		
15-24	27.82	40.34
25-34	13.41	22.88
35-44	7.56	14.61
45-54	5.32	11.80
55-64	3.60	8.47
65-74	1.15	2.82
Current marital status		
Never married	18.13	26.33
Married	6.21	11.62
Separated/Widowed	11.02	18.03
Birthplace		
Native-born	9.81	15.84
EU-born	14.72	18.42
Non EU-born	11.95	23.19
Education		
Ph.D.-M.Sc.	6.48	11.03
University degree (AEI)	6.82	11.62
Technological Institute degree (TEI)	9.65	17.30
Post-secondary non-tertiary	13.51	20.76
Upper secondary (High school)	12.67	18.52
Lower secondary (Gymnasium)	11.51	18.31
Primary school	7.20	13.52
Never in school	6.19	21.07
Urbanization		
Urban	11.19	18.26
Semi-urban	9.41	15.78
Rural	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.

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 for the rising unemployment rates of the crisis years, i.e. 2008Q4-2013Q4. Lastly, it is noted 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 had been searching for a job more than 12 months.

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.

3. Labour market flows and unemployment decomposition

In an attempt to fully gauge 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+1* to 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 average annual transition probabilities between the three labour market states for the two sub-periods in question, as well as the entire period. In the pre-crisis period, an employed individual had a probability of 96% to classify him/

herself as employed after one year and this slightly decreased to 94% during the crisis years. Similarly, an individual who classified him/herself as unemployed had a probability of 64% to remain at this state after one year during the 1998Q1-2008Q3 period. This probability further increased 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, it is observed that unemployed workers have an almost 10% probability of moving out of the labour force in both sub-periods. Furthermore, the probability of inactive individuals to become unemployed in the next year increases over time indicating that the contribution of non-participation to unemployment is increasing. Lastly, significant reductions have been observed in the probability of transition from unemployment to employment. This probability was 26% in the first sub-period and dropped to 12% in the second.

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.

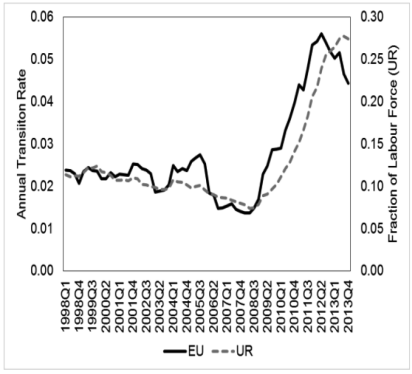
Figure 1 presents a graph of annual transition probabilities for every possible pair of E, U and I statuses. Panel A of Figure 1 presents the annual unemployment inflow rate (EU) which, as expected, exhibits countercyclical behaviour. During the 1998Q1-2008Q3 period, a period of substantial economic growth, the annual employment to unemployment transition probability decreased (from 2.4% in 1998Q1 to 1.4% in 2008Q3). In the 2008Q4-2013Q4 period, a time of unprecedented economic recession, the probability in question kept 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 1998Q1-2008Q3 period 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 was 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 lower 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). On the contrary, 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 for both periods (around 10%). This implies that even during 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 1998Q1-2008Q3 period and pro-cyclical in the 2008Q4-2013Q4 period. It is obvious that the rate of new-entry or re-entry into 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 falls, and when the economy shrinks this rate increases.

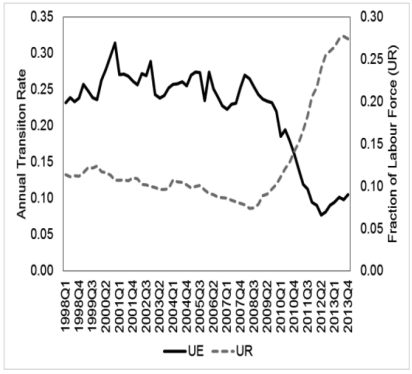
Greek unemployment grows because of sizeable inflows from employment and inactivity (non-participation). At the same time, the unemployment pool expands because of low unemployment outflows. Is the rising Greek unemployment due to sizeable inflows or insufficient outflows? To answer this question we need to conduct a decomposition analysis of aggregate unemployment dynamics. A required first step in answering this question is to examine whether the actual unemployment rate deviates from its steady state level. It is noted that the majority of available decomposition techniques assume that the actual unemployment rate is identical to that of the steady state (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 transition rates between labour market statuses are very low and, consequently, current unemployment is primarily determined by its lagged values (persistence). Actual and steady state unemployment rates for Greece using LFS quarterly data on annual flows are shown in Figure 2 (Panel A).[4]

4. Analytical derivation of the steady state unemployment decomposition can be found in Smith (2011).

Figure 1. Annual transition probabilities and unemployment rates

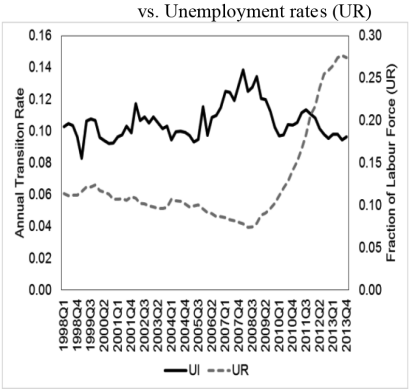


A): Employment to Unemployment (EU) vs. Unemployment rates (UR)



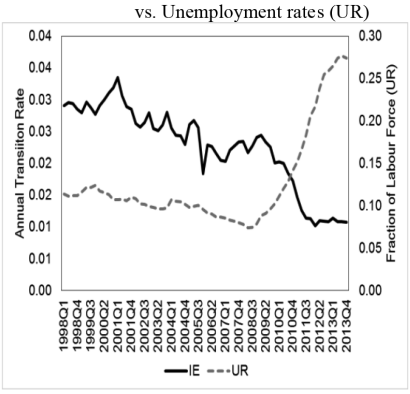
(B): Unemployment to Employment (UE) vs. Unemployment rates (UR)

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



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

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



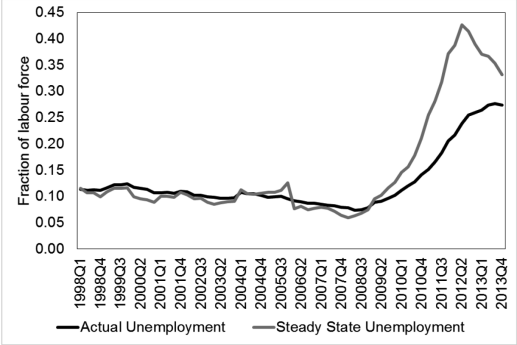
(F): Employment to Inactivity (EI) vs. Unemployment rates (UR)

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

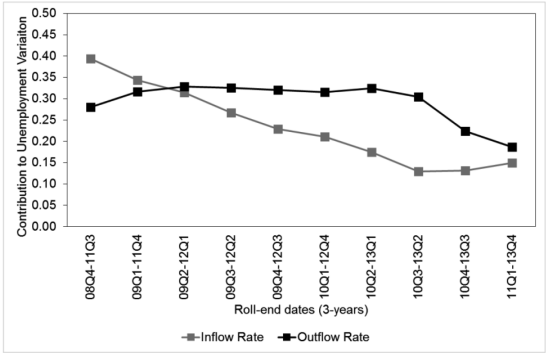
We observe that in the 1998Q1-2008Q3 period the steady state unemployment rate is very similar to the actual one. In the 2008Q3-2013Q4 period, however, significant deviations between the two unemployment rates are observed, indicating that the steady state unemployment rate does not adequately approximate the actual one. Such deviations are evident in periods of accelerating unemployment rates, while when actual unemployment rates stabilize then the two figures seem to be converging. Thus, for the 1998Q1-2008Q3 period the steady state decomposition constitutes an appropriate technique for explaining unemployment dynamics. In contrast, for the recessionary years (2008Q4-2013Q4) non-steady state decomposition is more appropriate. For comparison purposes both techniques (steady state and non-steady state) have been implemented in the context of a three-state world where individuals are employed, unemployed or inactive.

Figure 2. Unemployment rates and unemployment decomposition

Panel A: Actual and steady state unemployment rates



Panel B: Non-steady state unemployment decomposition



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). Inflow and Outflow rates are derived according to Smith (2011, p. 418) and are seasonally adjusted (X-12-ARIMA).

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). It is observed that changes in the separation rate account for 42% of steady-state unemployment dynamics (66.7% of total inflow rate). The contribution of the outflow rate is lower and explains the remaining 37%. This percentage is composed of 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 outflow rate changes 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 to the pre-crisis period we observe that the effect of the direct inflow rate has substantially increased, while the indirect effect has significantly dropped. Regarding the outflow effect we observe that both direct and 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 noted that in the crisis period, indirect effects (for both inflows and outflows) appear to be very low and, thus, do not suffice to explain unemployment variations.

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: $\beta^{EU} + \beta^{EIU} = \beta^{S}$; $\beta^{UE} + \beta^{UIE} = \beta^{F}$; $\beta^{S} + \beta^{F} = 1$.

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 on in the recession the inflow rate dominates while later in the recession the outflow rate governs 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 pre-crisis years (2004-2009).

Figure 2 (Panel B) 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 on in the recession, the inflow rate is dominant, while 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.

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

In this section we model individual transitions in and out of unemployment. More specifically, information on individual movements across different states (E, U and I) and between two discrete time periods (t, t+1) is exploited. Our interest mostly focuses on unemployment inflows (EU and IU) and unemployment outflows (UE and UI). Thus, three independent samples are defined. The first refers to those employed at time t (E), the second to those who are inactive at time t (I) and the third to those who are unemployed at time t (U). Individuals from the first sample (employed) may be observed *at t*+1 as unemployed (EU) or inactive, or they may have remained employed. Individuals from the second sample (inactive) may be observed at t+1 as unemployed (IU) or employed, or they may have remained inactive. Lastly, individuals from the third sample (unemployed) may be observed at t+1 as employed (UE) or inactive (UI), or they may have remained unemployed. Thus, in each sample, we consider outcomes j in the period t+1 (j=E, U or I), recorded in the form of a dependent categorical variable and a set of explanatory variables (including a constant term). Given that j outcomes are unordered, we utilize a multinomial logit model in order to estimate the determinants of each labour market transition (Wooldridge, 2010). Starting from the case of EU transition, the multinomial logit can be written as:

$$P_i^{EU} = \frac{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{EU} + \varepsilon_{ij}\right)}{1 + \exp\left(\mathbf{x}_i\boldsymbol{\beta}_{EU} + \varepsilon_{ij}\right) + \exp\left(\mathbf{x}_i\boldsymbol{\beta}_{EI} + \varepsilon_{ij}\right)} \tag{1}$$

where, $\boldsymbol{\beta}$ is a set of parameters to be estimated and $\boldsymbol{\varepsilon}_{ij}$ is the disturbance term. With [illegible] can be written as:

$$P_i^{IU} = \frac{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{IU} + \varepsilon_{ij}\right)}{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{IE} + \varepsilon_{ij}\right) + \exp\left(\mathbf{x}_i\boldsymbol{\beta}_{IU} + \varepsilon_{ij}\right) + 1} \tag{2}$$

Similarly, in the case of unemployment outflows (UE and UI), the multinomial logit

$$P_i^{UE} = \frac{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{UE} + \varepsilon_{ij}\right)}{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{UE} + \varepsilon_{ij}\right) + 1 + \exp\left(\mathbf{x}_i\boldsymbol{\beta}_{UI} + \varepsilon_{ij}\right)}$$
$$P_i^{UI} = \frac{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{UI} + \varepsilon_{ij}\right)}{\exp\left(\mathbf{x}_i\boldsymbol{\beta}_{UE} + \varepsilon_{ij}\right) + 1 + \exp\left(\mathbf{x}_i\boldsymbol{\beta}_{UI} + \varepsilon_{ij}\right)} \tag{3}$$

For practical purposes we present the Relative Risk Ratios (RRR) which indicate (in the first sample) how each variable influences the probability of leaving the employment state (E_t) in order to move to the unemployment state (U_{t+1}) or the inactivity state (I_{t+1}) relative to the probability of remaining in the same state (E_{t+1}). Similar interpretations apply to the other two sub-samples. As a rule, when the value of the RRR coefficient is above (under) unity, this indicates that an individual with this characteristic is more (less) likely to be observed in other categories than in the reference category. If the RRR coefficient equals unity, this indicates an absence of risk difference between the two groups. We note that, although all possible annual transition probabilities have been estimated, for presentation purposes the focus is only on the ins and outs of unemployment.[5] 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 (in vector **x**) 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 associated with significant deterioration of all labour market outcomes. In such circumstances the employment adjustment process is expected to be thorny and discriminatory for numerous demographic groups (Elsby *et al.* 2010).

5. Data for transitions from employment or unemployment to inactivity are available by the authors upon request.

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 Institute 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).

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; 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 in 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 EU and UE transitions are considered: females in the second period, as 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 inflows and outflows, it is observed 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.

5. Estimation results

5.1 Unemployment inflows

In this sub-section we explore the relationship between the aforementioned individual-specific correlates and annual transition rates from employment to unemployment (EU) and from inactivity to unemployment (IU). The effects of 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 in the 2nd and 3rd column of Table 6. In the case of EU transition we employ the continuously employed (EE) as the base category. We have chosen not to present the estimated results for EI transition, since we are mainly interested in unemployment inflows originating from the employment pool. Similarly, in the case of the IU transition the continuously inactive (II) are used as the base category and estimated results for IE transition are not reported.

According to the results obtained for the first period (1998Q1-2008Q3), the EU-transition relative risk ratio for females -as compared to that of males- is 1.62. In other words, the relative risk of moving from the employment to the unemployment state (EU) is higher for female workers. This finding remains valid in the second period (2008Q4-2013Q4), albeit now at 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 as compared to females. Thus, unemployment inflows in Greece are a phenomenon that mostly affects female workers, although in the post-2008 period the relative position of male workers has worsened. With regard to 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 exclusively attributed to separation rate (EU). Regarding the effects of age, it is observed that younger workers face increased risk of making the annual transition from employment to unemployment (EU). This finding is true for both time periods, while relative risk for the younger

(15-24) and the older (45-54) has increased in the crisis years. Concerning the IU transition, it is observed, 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 has reduced, which implies that non-participation of the younger has increased. This might indicate that the problem of increased joblessness in the post-2008 period has negatively affected the job search returns expected.

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

5.2 Unemployment outflows

Let us now turn our attention to 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 in the 4th and 5th columns of Table 6. In this case, the continuously unemployed (UU) are used as the base category.

The results obtained indicate that, in the pre-crisis period, the UE transition relative risk ratio for females -as compared to males- is 0.51, suggesting that the relative likelihood of moving from the unemployment to the employment state (UE) is lower for unemployed women. This finding remains 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 are a phenomenon that concerns primarily male unemployed individuals, although in the post-2008 period the relative position of females has slightly improved. With regard to outflows concerning the non-participation state (UI), it is observed 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 the unemployed are more likely to end up into employment for males and into non-participation for females.

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 Institute 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 coefficient estimated) from a multinomial logit model. Reference categories for 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. Estimate of the constant term is not reported. Standard errors are corrected for heteroskedasticity.

[a], [b] and [c] denote statistical significance at 1%, 5% and 10% levels, respectively.

Regarding the effects of age, it is observed 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, it is observed, as expected, that the younger (as compared to the 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 UE transition and more likely to move from U to I. In addition, foreign-born unemployed individuals (as compared to natives) have a greater chance of finding a job (UE). Unemployed individuals of a high educational level have a greater probability of finding a job (UE) and it appears that their relative position (compared to the unemployed of a low educational level) has substantially improved in the crisis years. Furthermore, unemployed individuals of a higher educational level have a smaller chance of becoming inactive (UI). Lastly, those residing in urban areas are more likely to find a job (UE), but this likelihood has vanished during the ongoing crisis. On the contrary, movement towards non-participation (UI) is more prevalent in rural areas.

6. Conclusions

The present study analyses the ins and outs of Greek unemployment against the background of the ongoing economic crisis. Our major finding is that in the beginning of the crisis (2008Q4-2011Q4) inflows dominated outflows in explaining unemployment variations. Later on in the recession, outflows contribute more than inflows to 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). At the micro-level, data allow us to define individual annual transitions and investigate the heterogeneous nature of the ins and outs of unemployment using multinomial regression techniques. It has been found that the flows in question vary with gender, age, marital status, country of birth, education and place of residence. These variations are of a different magnitude in the sub-periods examined. For example, relative risk ratio for females in the 2008Q4-2013Q4 period decreased for EU transition and increased for UE. In addition, it has been found that highly-educated youth in Greece faces rising unemployment rates primarily due to large inflows from inactivity, highlighting the scarcity of jobs in the Greek labour market.

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 rather than from longitudinal datasets. This prevents measuring monthly or quarterly transitions and implementing well-known techniques for eliminating possible biases, i.e., the time aggregation bias. However, we do not expect that these biases could substantially alter our findings given the low level of labour market transitions in Greek economy. In addition, it has not been possible to fully identify one's individual employment history (duration dependence), within an unemployment-spell approach. Furthermore, evidence cannot be provided regarding alternative measures of unemployment by including marginally unemployed individuals, whose number is expected to increase during recession periods. At the individual level, and given that Greece records the highest self-employment rates in the EU, one may wish to explore a four-state model of worker flows (paid employment, self-employment, unemployment and non-participation).

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