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LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Vassilis Monastiriotis[*] and Angello Martelli[#]

ABSTRACT

The crisis in Greece led to one of the largest economic shocks in European history, with unemployment increasing three-fold within the space of four years. Drawing on micro-data from the Greek Labour Force Survey, we utilise standard micro-econometric methods and non-linear decomposition techniques to measure the size of the shock exerted on the Greek labour market and the quantitative and price adjustments in response to this shock. We find elements of economic dynamism, with some sizeable price adjustments in the economy of the Greek capital, Athens; but overall our results show that adjustment has been partial and limited, in terms of both labour quality (sorting, selection) and labour quantity (migration). Our use of the decomposition techniques for the analysis of macro-level developments in the labour market offers a novel perspective to the application of the decomposition methodology.

Keywords:

unemployment risk, non-linear decomposition, Greek crisis, shock, adjustment

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1. Introduction

The crisis in Greece was an enormous shock which caught unprepared not only its fiscal authorities (as well as those of the Eurozone) but also its economic policy-makers and the domestic economic actors more generally. After years of fast growth and (slowly) declining unemployment, Greece entered the height of the global financial crisis with record-low unemployment and record-high labour force participation. The fiscal derailment revealed at the end of 2009 and the sovereign debt crisis that ensued in 2010 turned quickly this optimistic picture around. Unemployment started rising fast – and in 2011/2012 at an accelerating pace – moving from 7.8% in 2008 to 12.7% in 2010 and to 24.5% in 2012, before stabilising at just above 27% in 2013.[1] A series of economic and policy shocks contributed to this sudden rise in unemployment, the biggest in peace-time modern European history. The initial tax-hikes and public sector pay-cuts, which supressed demand and economic activity, were followed by a period of political instability and deep uncertainty about the country's future inside the Eurozone, leading to sizeable capital flight, disinvestment and liquidity problems, which further dampened demand conditions in the country and catapulted unemployment. A very drastic cut in minimum and bargained wages in the private sector, as part of a doubtful strategy for internal devaluation, gave perhaps the final blow to economic activity in the country, as the decline in domestic demand that resulted from this strategy far exceeded any gains in terms of external demand that came through the suppression of domestic unit labour costs.

In this context, labour market policy in the country lacked an overall strategic design and was largely driven by short-term fiscal-policy needs. Attention to the fiscal and solvency issues deprived policy-making from the ability to examine carefully and appreciate fully the ongoing developments in the labour market. Helped by a rather futile debate about the odiousness of the country's inflated debt and by a long tradition of evidence-absent policy-making (Monastiriotis and Antoniades, 2011), academic and policy research on the Greek labour market remained thin – indeed, even today the literature has to show no more than a handful of academic papers examining labour market processes in the country and the impact of the crisis on these.[2] Thus, despite living the longest recession in post-WWII Europe and experiencing a three-fold increase in unemployment in the space of four years, issues addressed in the international literature for other countries – such as (un)employment transitions (Kelly et al, 2013), the relative contribution of changes in firing and hiring flows to overall unemployment (Smith, 2011), the impact of minimum wage and unemployment benefit changes on labour demand and unemployment durations (Linde Leonard et al, 2014; Cahuc and Laroque, 2014; Addison et al, 2013; Caliendo et al, 2013), issues of wage rigidity,

[1] Unemployment started subsiding very slowly after the 2013 and at an accelerated pace more recently. Data from Eurostat (series tsdec450).

[2] Among them, Christopoulou and Monastiriotis (2014 and 2016) and Daouli et al (2013a) have examined how the various wage-cuts in the public and private sectors have affected the structure of returns in the Greek economy; Athanassouli (2012) studied the characteristics and occupational status of new labour market entrants; Daouli et al (2013b) looked at how the crisis affected the shape of the Greek wage-curve; Bakas and Papapetrou (2014) and Koutentakis (2012) examined the evolution of unemployment dynamics, within a macro-econometrics setting, before and during the crisis; Tagkalakis (2013) examined the unemployment effects of fiscal policy in the country; and Pouliakas (2014) examined the issue of skill mismatch during the crisis. A more voluminous literature exists on the changing employment relations in the country (Dedoussopoulos et al, 2013; Ioannou, 2013; Kornelakis and Voskeritsian, 2014; Koukiadaki and Kretsos, 2012), but this literature is concerned more with the regulatory aspects of the labour market than with labour market processes (functioning) as such.

cyclical adjustment and job creation (Haefke et al, 2013; Abbritti and Fahr, 2013), etc – have hardly been touched upon in the case of Greece.

This paper seeks to make a small but important contribution in this respect. We use micro-data from the Greek Labour Force Survey (LFS) and apply a set of standard micro-econometric and decomposition techniques in a novel way to examine how the Greek labour market was affected by, and responded to, the crisis. Specifically, we run a series of unemployment probits to estimate the contribution of various individual and household characteristics to individual unemployment risk before and during the crisis, examining in this way how the crisis affected the unemployment probability for different groups of the active population and how it re-shaped the marginal employment probabilities of different marketable characteristics such as education and labour market experience (as proxied by age). Further, we apply a decomposition analysis to derive a number of distinct components of the overall change in unemployment during the crisis, identifying specifically a measure of the extent of the shock to the economy and two measures showing the size of the compositional and price adjustments that took place in response to this shock.

We find that adjustment to the shock came predominantly through price adjustments, especially in the more urban areas of the country, representing mostly an intensified sorting (into / out of employment) on the basis of some individual characteristics, both marketable (education) and exogenous (ethnicity); while some more minor quantitative adjustments (towards rising overall labour quality) also took place. However, these adjustments were nowhere near sufficient to negate the extent of the shock, resulting in the tripling of unemployment in the country in the space of four years. Absence of a more intensive adjustment (especially outside the main urban agglomeration of the capital, Athens) and the overall magnitude of the shock (especially in Athens) show in a way the nature of the unemployment problem in Greece: an unprecedented collapse in demand and a structural weakness to respond sufficiently to this collapse via internal adjustments, including quantitatively, through migration.

The structure of the paper is as follows. The next section discusses our empirical approach and methodology. Section 3 presents our micro-econometric analysis of individual unemployment risk and discusses the changes in this, between the pre-crisis and crisis periods. Section 4 implements a set of aggregate decompositions which focus on the compositional adjustments that took place in the Greek labour market during the crisis; while section 5 implements instead a detailed (variable-specific) decomposition which allows us to examine more closely the extent of the shock and the price adjustments to it. The last section summarises our findings and discusses their implications with regard to the functioning of the Greek labour market and its economic resilience to external shocks.

2. Data and methodology

Our empirical methodology combines a micro-econometric analysis of individual unemployment risk along with a series of non-linear decompositions to investigate the dynamics of unemployment adjustment during the crisis in the Greek labour market and in different geographical areas within the country. We use individual-level data from the spring

waves of the Greek Labour Force Survey for the years 2008 and 2012[3], representing, respectively, the year prior to the eruption of the crisis in Greece, when unemployment reached a 20-year low; and the year signalling the height of the crisis, when unemployment reached a historical high and the country was broadly believed to be on its way out of the Eurozone. As a first step, we run a set of probit regressions which enable us to estimate for each individual the probability of observing a specific unemployment outcome (employed – unemployed) on the basis of a series of individual and household characteristics. Given that the 'choice' between employment and unemployment is conditional on an individual's participation to the labour force, we also estimate our unemployment probits using a Heckman correction for selection – with a first-stage regression explaining an individual's probability of labour force participation (activity probit) and the second-stage regression (unemployment probit) being subsequently amended to include the correction term (inverse Mills ratio) which controls for the fact that the characteristics (and thus the employability) of individuals that 'choose' to participate in the labour market are not a random draw from the set of characteristics observed in the full sample of working age population.

Formally, the econometric methodology is as follows. For each individual ***i*** we observe a status outcome $\boldsymbol{Y_i}$ (e.g., equal to 1 if the person is unemployed and 0 otherwise). This outcome will depend on the individual's underlying risk for unemployment – which is an unobserved (latent) variable ($\boldsymbol{Y_i^*}$). Our probit model assumes that the observed outcome and unobserved risk are linked via a standard normal cumulative distribution function ($\boldsymbol{\Phi}$), which translates discrete values of $\boldsymbol{Y_i^*}$ to a probability (***Pr***) for observing the event $\boldsymbol{Y_i}$=1, so that

$$Pr(Y_i = 1) = \Phi(Y_i^*) \qquad (1)$$

The underlying-risk variable is in turn a function of a set of individual characteristics ($\boldsymbol{X_i}$), as follows:

$$Y_i^* = \beta X_i + \varepsilon_i \qquad with \qquad Y_i = \begin{cases} 1 & if \;\; Y_i^* > 0 \\ 0 & otherwise \end{cases} \qquad (2)$$

where $\boldsymbol{\varepsilon_i}$ is a normally distributed error term and $\boldsymbol{\beta}$ is a vector of parameters to be estimated. Under this setting, the influence of the underlying characteristics $\boldsymbol{X_i}$ on the probability of the observed outcome $\boldsymbol{Y_i}$ can be estimated through a maximum likelihood estimate of the following model:

$$Pr(Y_i = 1|X) = \Phi(X'\beta) \qquad (3)$$

In our empirical models we specify the vector ***X*** to include a series of individual and household characteristics reported in the Greek LFS, including education, gender, age, ethnicity, marital status and household size. Gender and marital status take the value of 1 if the individual is female or married/cohabiting (respectively). Ethnicity is measured imperfectly, on the basis of self-reported location of birth (Greece versus foreign-born) and takes the value of 1 if the respondent was born abroad. Age is specified as a series of dummy variables (in five 10-year intervals) to allow for non-linearities and threshold effects in the underlying relationship. The education variable is measured as imputed years of schooling, based on the degree reported

[3] The Greek LFS contains information on about 70,000 individuals. Our working sample, after some data-cleaning and restricting to working-age economically active respondents, contains roughly 30,500 and 25,000 observations for 2008 and 2012, respectively.

by the respondent. Household size is a continuous variable which measures the number of people of all ages in the household.

The estimated coefficients (z-scores) on these variables as derived from our model give us a measure of the direction in which each characteristic $\boldsymbol{X_i}$ affects the outcome variable $\boldsymbol{Y_i}$ and, for the case of same-group variables (e.g., the age categories), of the relative size of each effect. Interpretation of the exact magnitude of any individual effect, however, is not possible on the basis of these coefficients alone, as the overall effect (change in probability) of a change in any given variable, given the non-linearity of the model, depends directly on the values of all the other regressors. To facilitate interpretation, we convert the derived coefficients into marginal effects, evaluating the impact of each variable at average sample values for all the regression predictors.

As mentioned already, this approach is extended to take into account that an individual is 'selected' into activity (i.e., the choice between employment and unemployment) in a non-random way. To account for this, we implement a first-stage Heckman correction, which includes an additional individual characteristic, ***z***, as an instrument to help identify between the selection into activity (first stage) and the subsequent selection into unemployment (second stage). In this case, the first-stage regression is specified, similarly to above, as:

$$Pr(A = 1|Z) = \Phi(Z'\gamma) \qquad (4)$$

where ***A*** is now an indicator variable taking the value of 1 if the person is economically active and 0 otherwise and ***Z*** is a vector of individual characteristics comprising all elements of vector ***X*** plus the instrument ***z***. Given this, the second-stage equation, which includes the adjustment for the probability of selection into the active labour force sample, becomes:

$$Pr(Y = 1|\, X, A = 1) = \Phi(X'b + \rho\sigma_u \lambda Z\gamma) \qquad (5)$$

where $\boldsymbol{\rho}$ is the correlation between the unobserved determinants (residuals) from the two stages; $\boldsymbol{\sigma_u}$ is the standard deviation of the second-stage residuals and $\boldsymbol{\lambda}$ is the inverse Mills ratio derived from the first-stage regression. In our empirical analysis we use various alternatives as the identifying variable ***z***, including the number of dependents in the household, the number of under-age kids, and an indicator showing whether the household has additional (non-labour) sources of income.

Following this econometric analysis, at a second step we implement a decomposition analysis, in the tradition of Blinder (1973) and Oaxaca (1973), as extended to the case of non-linear models (see Yun, 2005; Fairlie, 2005; and Bauer and Sinning, 2008). This allows us to compare the (predicted) outcomes between two samples (in our case, between the years 2008 and 2012) and decompose their difference into various components broadly grouped into two categories: an "explained" component, which captures the part of the difference which is due to compositional differences in the two samples (endowment effect); and an "unexplained" component, which captures the part of the difference which is due to differences (changes) in the obtained coefficients between the two models (price effect).

The application of non-linear decomposition techniques to the case of unemployment risk and in particular in relation to the crisis (or more generally, with regard to differences over time) is surprisingly limited in the literature. Bachmann and Sinning (2012) used this methodology to examine changes during the crisis in (un)employment transitions in the USA;

while similar analyses have been offered by Fossen (2012) for Germany and Kelly et al (2013) for Ireland. At a regional level, Lopez-Bazo and Motellon (2013) also used nonlinear decomposition techniques to examine the differences in underlying determinants of unemployment across the Spanish regions, partly in relation to the crisis; while a similar analysis, for the case of the Greek regions, has been offered by Monastiriotis and Martelli (2013). More commonly in the literature, however, the application of the non-linear decomposition analysis has been implemented statically, to examine for example differences between ethnic, gender and other groups in labour market status and employment participation (Kalb et al, 2012; Pedace and DuBois, 2012; Mizunoya and Mitra, 2013), education and health outcomes (Cook et al, 2012; Mehta et al, 2013; Échevin, 2013), entrepreneurship (Fossen, 2012; Mijid and Bernasek, 2013), and so forth. Our analysis in this paper focuses specifically on the role and impact of the crisis and uses the nonlinear decomposition technique in a novel way to examine not only changes in the underlying factors driving unemployment risk but also, as we explain below, the extent of the shock and adjustment in the Greek labour market during the crisis.

Formally, the non-linear version of the Blinder-Oaxaca decomposition is given by:

$$\overline{\Pr(U=1)}_A - \overline{\Pr(U=1)}_B = [\overline{\Phi(X_A\beta_A)} - \overline{\Phi(X_B\beta_A)}] + [\overline{\Phi(X_B\beta_A)} - \overline{\Phi(X_B\beta_B)}] \quad (6)$$

where A and B constitute the two groups that are being compared (here, the 2008 and 2012 samples, respectively); and the bars above parameters show predicted values. In this simple decomposition the first term ("explained" component) captures the difference between the samples that is due to differences in characteristics, ***X***, valuated at the estimated prices of group A (the low-unemployment year); while the second term ("unexplained" component) captures the difference that is due to differences in 'prices' (the ***β*** coefficients) expressed in terms of group-B characteristics.

Complimentary to using this simple decomposition, we also implement some additional decomposition techniques, as follows. First, we use the Oaxaca-Ransom (pooled-coefficients) decomposition, which valuates the 'endowment' effect at full-sample prices (***β*** coefficients derived from a pooled-sample estimation) and subsequently calculates the 'price' effect on the distance of the group-specific estimates from the pooled coefficients:

$$\overline{\Pr(U=1)}_A - \overline{\Pr(U=1)}_B = [\overline{\Phi(X_A\beta^*)} - \overline{\Phi(X_B\beta^*)}] + [\overline{\Phi(X_B(\beta_A-\beta^*))} - \overline{\Phi(X_B(\beta^*-\beta_B))}] \quad (7);$$

second, the Neumark (1988) decomposition, which draws on the above formula to separate the price effect into a group-A 'advantage' and a group-B 'disadvantage':

$$\overline{\Pr(U=1)}_A - \overline{\Pr(U=1)}_B = [\overline{\Phi(X_A\beta^*)} - \overline{\Phi(X_B\beta^*)}] + [\overline{\Phi(X_B(\beta_A-\beta^*))} + \overline{\Phi(X_B(\beta_B+\beta^*))}] \quad (8);$$

last, a three-way decomposition (developed by Daymont and Andrisani, 1984), which valuates the endowment effect at group-B prices, thus producing a third residual component ('interaction' effect) capturing the part of the difference in the predicted outcome (unemployment) that is due to simultaneous changes in prices and characteristics between the two samples:

$$\overline{\Pr(U=1)}_A - \overline{\Pr(U=1)}_B = [\overline{\Phi(X_A\beta_B)} - \overline{\Phi(X_B\beta_B)}] + [\overline{\Phi(X_B\beta_A)} - \overline{\Phi(X_B\beta_B)}] + [\overline{\Phi(X_A\beta_A)} - \overline{\Phi(X_B\beta_B)}] \quad (9)$$

Further, on the basis of these, we implement a variable-specific (detailed) decomposition, which produces each of the above components separately for each of the variables included in the model (for example, a separate 'price' and 'endowment' effect for the gender variable and a separate 'price' and 'endowment' effect for the education variable) (see Jann, 2008). In the context of non-linear (probit) model decompositions, this presents the additional complication that the derived components for the categorical variables included in the model (e.g., the age groups) are not independent from the choice of the omitted base category (see Oaxaca and Ransom, 1999). To address this, we implement the iterative method proposed by Yun (2005), which "normalises" these effects by running sequentially a decomposition for each alternative base category and expresses the estimated effects as deviations from the grand mean.

The variable-specific decompositions allow us to depart from the micro-econometric analysis and derive conclusions that have a wider (economy-wide) relevance. In particular, we use the detailed decompositions to derive a 'price' component associated to the change in the fixed-effect (intercept) between the two year-specific regressions. As the underlying intercepts give us the 'baseline' aggregate unemployment probability for each year, net of the individual characteristics and of their prices (coefficients), the difference in unemployment attributable to this component is a direct measure of the change in unemployment that would have occurred between the two years under analysis in the absence of any compositional and price-related changes. It is thus a measure of the shock applied to the economy, between the two years, independent of any (price or compositional) adjustments that may have taken place and may have smoothened or amplified this shock. By this, we are able to 'decompose' the rise in unemployment between the two years not only into the traditional "explained" and "unexplained" components but, much more crucially, to derive measures of (a) the extent of the shock and (b) the extent of adjustment to this shock – which, jointly, account for the overall 'effect' of the crisis (i.e., actual rise in unemployment) observed in the data. With this, we are also able to derive a measure of the overall resilience of the labour market, defined as the proportion of the original (exogenous) shock that has been absorbed through compositional and price adjustments. This is a novel and to our knowledge unique approach to the implementation of the decomposition analysis and, we believe, one that makes a highly important contribution to the understanding of how the (Greek) labour market was affected by, and responded to, the crisis.

3. The contribution of individual characteristics to unemployment risk

As noted, we start by reviewing the individual estimates derived from the econometric analysis with regard to the contribution of the various individual characteristics on the probability of unemployment in the two periods. Given that the crisis led to significant changes not only in (un)employment but also in economic activity more generally, we also look at the issue of selection into the active labour force, as a prior condition for the subsequent sorting into (un)employment. Controlling for how different individual characteristics have 'selected' people into and out of inactivity, both prior to and during the crisis, allows us to obtain a more accurate picture of the determinants of unemployment in the economy. For example, if the crisis pushed previously inactive 'unemployable' individuals into active job-search, this may artificially raise the unemployment figures observed in the

data. A similar effect will be observed if in response to the crisis a disproportionate number of highly employable individuals withdrew from the active labour force, for example by migrating abroad. The inverse effect is of course also possible: for example, the crisis may have pushed into active job-search previously inactive individuals with above-average employability (e.g., inactive spouses in professional / high-income households).

Table 1. Individual determinants of unemployment before and during the crisis

	Simple probits		With selection into activity			
	2008	2012	2008		2012	
	Unempl	Unempl	Unempl	Active	Unempl	Active
Education	-2.805***	-4.336***	-2.126***	7.813***	-4.705***	7.786***
	(0.354)	(0.312)	(0.402)	(0.284)	(0.417)	(0.323)
Female	49.87***	26.52***	38.88***	-175.9***	32.99***	-146.6***
	(2.473)	(2.172)	(3.686)	(3.236)	(5.322)	(3.324)
Foreign	-12.55**	23.92***	-13.11***	-14.03***	24.04***	-9.072**
	(4.934)	(4.373)	(4.907)	(3.772)	(4.364)	(4.526)
Household size	5.568***	8.592***	5.567***	1.036	8.488***	0.917
	(1.006)	(0.925)	(0.997)	(0.958)	(0.929)	(1.050)
Married	-33.21***	-43.24***	-36.29***	-44.22***	-41.57***	-33.94***
	(3.007)	(2.643)	(3.072)	(2.965)	(3.034)	(3.484)
Age 15-24	57.21***	61.94***	52.75***	-63.49***	64.40***	-67.24***
	(4.577)	(4.416)	(4.754)	(5.417)	(4.724)	(6.138)
Age 25-34	27.33***	21.88***	26.16***	-11.15***	22.02***	-3.485
	(3.377)	(2.964)	(3.354)	(3.143)	(2.960)	(3.881)
Age 45-54	-12.66***	-7.984***	-13.99***	-24.45***	-7.282**	-17.87***
	(3.679)	(3.020)	(3.652)	(2.999)	(3.038)	(3.563)
Age 55-64	-20.21***	-25.44***	-26.69***	-76.82***	-21.28***	-75.17***
	(5.168)	(4.176)	(5.829)	(3.486)	(5.372)	(4.110)
Dependents				-16.17***		-8.261**
				(2.736)		(3.214)
'rho'			31.62***		-17.28	
			(9.626)		(12.03)	
Constant	-143.6***	-38.47***	-149.3***	191.6***	-34.21***	159.0***
	(6.478)	(5.793)	(6.591)	(6.360)	(6.546)	(7.118)
Observations	30,563	25,057	30,563	37,486	25,057	30,142

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All coefficients have been multiplied by 100 for ease of presentation.

Our treatment of this process of selection, by means of a Heckprobit model (right-hand panel in Table 1), shows that processes of selection have in fact been stronger prior to than during the crisis. Our selection instrument[4] is significant in both years, but its magnitude is halved in

[4] The results reported in Table 1 use the number of dependents (under-15 year olds and over-65 year olds) in the household as the instrument. We obtained similar results when using alternative instruments, including the

2012 compared to 2008 and its significance drops to the 5% level. Moreover, the 'rho' coefficient changes from positive-significant in 2008 to negative and not statistically significant, even at the 10% level, in 2012. This suggests the inverse of what would normally be expected in relation to the labour market behaviour of individuals in the pre- and post-crisis periods. Prior to the crisis, the characteristics that 'selected' individuals into activity were correlated with a higher likelihood of unemployment for those individuals. This most probably reflects a 'needs-driven' behaviour, whereby the option of inactivity was taken up disproportionately by more employable than by less employable individuals. In 2012 this behaviour had ceased: selection into (in)activity was not systematically related to the incidence of unemployment; and, if anything, the selection was for more employable individuals (albeit not in a statistically significant sense), presumably as the less employable were discouraged from the labour market and pushed towards inactivity.

The relatively minor role played by selection, also prior to the crisis but especially during the crisis (in 2012), is confirmed by the second-stage regression results and how these compare to the results obtained from the simple unemployment probits (left-hand panel of Table 1). As can be seen, the obtained coefficients for most individual characteristics are broadly similar across models (probit versus heckprobit – perhaps with the exception of the female dummy). Rather, the most interesting differences are between time-periods.

Perhaps the most important of these differences, in economic and policy terms, concerns the role of education. As can be seen, in both years education was a significant factor influencing an individual's probability of unemployment. Prior to the crisis, an additional year of schooling was associated with a 0.33% lower probability of unemployment for an individual with average characteristics (see Table A.1 in the Appendix). The impact of selection in explaining this result was rather moderate, as even with the Heckman correction the probability remained highly significant (but dropped to 0.24%). The role of education, however, increased substantially with the crisis. At the height of the crisis, in 2012, the probability of unemployment associated to one additional year of schooling was by 1.30% lower for the individual possessing average characteristics – and this time this probability was not affected by selection. In both years, education has also been playing an important role in driving individuals into activity, as is shown in the first-stage Heckman regressions.

A similar effect, but in the opposite direction, is also observed for the gender variable. In 2008 an average-characteristics female had a 5.94% higher probability of unemployment compared to a male with the same characteristics, while with the crisis this disadvantage rose to 7.98%. As noted already, selection into inactivity played a more important role in this case, helping reduce in some way the implied gender unemployment differential in 2012: controlling for selection in the 2012 sample produces a much higher estimate for the female dummy and a corresponding marginal effect to the value of 10.32%.

More interesting perhaps is the crisis effect observed for the case of the foreign-born variable. Prior to the crisis, unemployment for non-natives was in ceteris paribus terms 1.5% lower than for those born in Greece – with little effect from selection. At the height of the crisis, however, non-natives became much more exposed to unemployment, with the z-score in Table 1 changing sign (+23.92, significant at the 0.01 level) and corresponding to a predicted unemployment disadvantage (marginal effect) of 7.19%. This result seems to suggest a degree

number of kids aged 12 or younger and the presence of alternative sources of household income (results available upon request).

of discrimination, whereby foreign-born individuals become increasingly excluded from (the declining number of) jobs in favour of Greek nationals.[5] Again, this result is not particularly affected by selection, despite the fact that non-natives continued during the crisis to have a higher probability of inactivity (again, in ceteris paribus terms).

The effect of the two socio-demographic variables included in the models (household size and marital status) intensified with the crisis, but was in the opposite direction. Living in a larger household was in both years associated with a higher probability of unemployment; while, controlling for this, being married (or cohabiting) was associated with a lower probability of unemployment. As is more clearly shown in Table A.1, the importance of these two variables increased substantially with the crisis – with an additional household member contributing by 2.58% to the unemployment probability of the average-characteristics individual; and with married individuals experiencing, ceteris paribus, a 13% lower probability of unemployment. These changes seem to reflect the particular type of adjustment that took place in the Greek labour market during the crisis. Quite evidently, the incidence of multiple income earners within households declined faster than the corresponding increase in overall unemployment (unemployment increased faster in these households than in the overall sample), while single people were more dearly affected by this rise in unemployment. In a way, this is consistent with standard expectations about labour supply responses to declining demand: with married people having a more inelastic labour supply and people in households with other potential wage-earners having in turn a less inelastic labour supply.

Finally, an interesting set of results is obtained for the case of the age variables. As can be seen, both prior and during the crisis Greek workers were to a large extent sorted into (un)employment on the basis of their age. Specifically, unemployment probabilities (in ceteris paribus terms) were highest for the very young (15-24 years old) and declined progressively for each age group, becoming lowest for the group of individuals aged 55-64. Compared to the base group (35-44 year-olds), in both years, all groups had a higher probability of being selected out of activity. When evaluated at mean sample values (marginal effects), these age-specific unemployment probabilities appear to have changed substantially with the crisis. Thus, in 2012 the very young had almost a three-times higher probability of unemployment, relative to the base category, than in 2008 (from 6.8% to 18.6%), when calculated at mean sample values; while the very old (55-64 years old) had a three-times lower probability of unemployment on the same terms (from -2.4% to -7.6%). It is worth noting, however, that by comparison to the estimated marginal effects (Table A.1), the changes in the estimated coefficients reported in Table 1 are much smaller and not always significant in a statistical sense (compare the z-scores in columns 4 and 6 of Table 1). This seems to suggest that the apparent change in fortunes, with regard to each age group's exposure to unemployment risk, has to do more with changes in the average characteristics of the workforce (i.e., a change in the mean values at which the marginal effects are calculated) than in the actual age elasticities of unemployment risk (z-scores, as reported in Table 1). This highlights the importance that compositional changes may have played in the Greek labour market with the advance of the crisis. In turn, this motivates the analysis that follows, which applies the non-linear decomposition methodology to disentangle the overall change in unemployment (and

[5] It should also be acknowledged, however, that a large part of this effect may be due to the sectoral composition of job losses, for example in the construction sector where non-Greek nationals were significantly over-represented prior to the crisis. Unfortunately, the Greek LFS does not contain sufficient information on individual employment histories to allow a further exploration of this.

unemployment risk) between the two periods and identify between different components driving this change.

4. Changes in unemployment risk during the crisis – aggregate decompositions

As mentioned in section 2, we implement our decomposition analysis using four alternative methods: the simple Blinder-Oaxaca decomposition; the Oaxaca-Ransom decomposition which uses the pooled model to derive the underlying base coefficients; the Neumark decomposition which uses a similar technique to split the 'price effect' into an 'advantage' and a 'disadvantage' component; and the Daymont-Andrisani decomposition, which identifies a separate 'interaction' effect. This is done both for robustness and in order to obtain as complete as possible a picture with regard to the nature of the change in unemployment risk in Greece during the crisis. Given our earlier exploration of the issue of selection (into / out of inactivity), we implement these decompositions both on the simple probit models and on the models controlling for selection. We also implement these decompositions for two additional sub-samples: the metropolitan region of Athens and the rest of Greece. This is because previous evidence in the scant literature (Monastiriotis and Martelli, 2013) as well as our own more detailed analysis of the unemployment probits (from results not shown here) revealed some important differences in terms of obtained coefficients between the capital city of Athens, the single most important and perhaps the only major urban agglomeration in Greece, and the rest of the country. We present a first set of decomposition results in Table 2.

As can be seen in the first panel of Table 2, the rise in unemployment in Greece between 2008 and 2012 was of a magnitude just over 16.6 percentage points, with some visible, but overall not too major, difference between Athens and the rest of the country (17.9 versus 16.0 percentage points). In percentage terms, however, the rise of unemployment in Athens was over twice as fast than in the rest of Greece (301% versus 190%), reflecting the much more favourable labour market conditions characterising Athens in the start of the period and, as we shall see, the bigger shock experienced in Athens with the crisis. Nationally, the role of selection has been limited, but in the direction towards dampening the pressure from unemployment: controlling for selection in the national sample produces a predicted change that is 12.2% higher than that actually observed in the data (18.65 versus 16.62 percentage points).[6]

Table 2. Aggregate decomposition of the change in unemployment during the crisis

		Greece		*Athens*	*Rest of Greece*
		No selection	With selection	No selection	

[6] As is shown later in Table 3, the effect of selection in the two sub-samples is much smaller and especially in Athens it changes direction. We discuss this later in the text.

Differential	Abs change	0.16624	0.18649	0.17920	0.16012
	% change	218.3%		301.0%	190.3%
	Selection effect		12.21%		
Decomposition	Component				
Blinder-Oaxaca	Explained	-0.00552***	-0.00651***	-0.01568***	-0.00200***
		-3.32%	*-3.49%*	*-8.75%*	*-1.25%*
	Unexplained	0.17176***	0.19299***	0.19488***	0.16212***
		103.35%	*103.49%*	*108.75%*	*101.26%*
Pooled	Explained	-0.00241***	-0.00241***	-0.00505***	-0.00095***
		-1.45%	*-1.29%*	*-2.82%*	*-0.59%*
	Unexplained	0.16864***	0.18889***	0.18425***	0.16107***
		101.47%	*101.29%*	*102.82%*	*100.61%*
Neumark	Explained	-0.00258***	-0.00258***	-0.00732***	-0.00031***
		-1.55%	*-1.38%*	*-4.08%*	*-0.19%*
	Advantage	0.08501***	0.08024***	0.09505***	0.08029***
		51.15%	*43.03%*	*53.04%*	*50.15%*
	Disadvantage	0.08381***	0.10882***	0.09147***	0.08014***
		50.42%	*58.36%*	*51.04%*	*50.06%*
D-A	Endowments	-0.00552***	-0.00651***	-0.01568***	-0.00200***
		-3.32%	*-3.49%*	*-8.75%*	*-1.25%*
	Coefficients	0.16794***	0.18840***	0.18247***	0.16044***
		101.05%	*101.03%*	*101.82%*	*100.21%*
	Interaction	0.00382***	0.00459***	0.01242***	0.00168***
		2.30%	*2.46%*	*6.93%*	*1.05%*

Notes: Coefficients show the contribution of each component to the total between-samples difference ("absolute change"). Figures in Italics give the corresponding percentage to the total difference.

Turning to the actual decomposition results, these show universally that the change in individual unemployment risk between the two periods is almost exclusively accounted for by the 'price effect' (the "unexplained" component). In the national sample, this takes the value of 0.1718 in the simple Blinder-Oaxaca decomposition and 0.1686 in the Oaxaca-Ransom decomposition. It is moreover very similar in the Neumark decomposition (the sum of the estimated 'advantage' and 'disadvantage' components is 0.1688) and in the Daymont-Andrisani decomposition (where the 'interaction' component, at 0.0038, is a mere 2.3% of the total change). Inversely, the 'endowment' effect ("explained" component) ranges between -0.0024 and -0.0055 or -1.45% and -3.32% of the total change in unemployment and thus it is of a very minor influence. This is of course not too surprising: as is well known, the crisis in the Greek labour market came exogenously through a fiscal policy shock, which affected hugely liquidity and demand conditions in the economy (including demand for labour) but had little to do with any prior shifts in the supply or quality of labour in the country (Monastiriotis, 2011).

Despite, however, the small magnitude of the 'endowment effect', its sign presents an interesting conclusion for the adjustment that took place in the Greek labour market during the crisis. As is shown in the 'unexplained component', in the absence of any compositional adjustments in the workforce, overall unemployment would have in fact increased even further than what is actually observed. This suggests that the overall labour quality improved during the crisis, thus playing a (minor but non-negligible) role in containing the increase in unemployment in the country. There are three major channels via which this may have happened. First, an outflow of less employable individuals out of Greece via international migration; second, an inflow into the active labour force of previously inactive individuals with above-average employability; and third, a natural attrition effect, with potentially less employable individuals reaching retirement age and being replaced by better 'endowed' cohorts. As the last two of these possibilities seem rather unlikely explanations for the observed 'endowment effect'[7], it appears that the first channel may have played a role in mediating the rise in unemployment in the country – possibly driven in part by the repatriation of a relatively large number of non-Greek migrants in that period (Cavounidis, 2013; Maroukis and Gemi,2013). In any case, the finding of a negative 'endowment' effect (i.e., an effect associated with *less* unemployment) seems to go against common perceptions in Greece about a generalised 'brain-drain' caused by a presumed large wave of emigration of talented individuals in search of better employment opportunities abroad (Cavounidis, 2013; Labrianidis, 2014).

We can extent this line of thought to the results obtained for the two geographical sub-samples of Athens and the rest of Greece (last two columns of Table 2). As can be seen, the compositional adjustment is much larger in the case of Athens, ranging between 2.8% and 8.8% (depending on decomposition method); while in the rest of the country this effect ranges between 0.6% and 1.2% - it is in other words between 5 and 7 times smaller. This implies that labour adjustment in the metropolitan region of Athens has been much stronger. Consistent with our above discussion, this in turn suggests that labour migration (whether international or inter-regional) has been more favourable, in terms of labour quality, in Athens than in the rest of Greece – again, in contrast to common perceptions that the crisis has instigated an outflow of qualified individuals to the Greek periphery.[8]

Irrespective of these differences, however, the fact remains that the bulk of the rise in unemployment in Greece during the crisis is not accounted for by compositional changes in the labour force, either in relation to migration or in relation to selection (changes in the characteristics of those flowing into and out of inactivity). Instead, the 'price effect', what is commonly referred to as the "unexplained component", appears to capture most, if not all, of the action with regard to the change in unemployment in the country. To shed more light in this regard, we proceed to a detailed decomposition analysis, which allows us to identify the explained and unexplained components individually for each of the right-hand side

[7]The inactivity flows explanation is not supported by the evidence derived from the models that implement the Heckman correction for sample selection, which produce results very similar to those obtained when not controlling for selection; the sample attrition explanation also seems unlikely given the much reduced employability of the youth compared to the older cohorts, as shown in the results of the unemployment and (in)activity probits reported in Table 1.

[8] See, for example, Donadio (2012). In fact, as is shown in Figures A.1 and A.2 in the Appendix, Athens maintained (if not improved on) its education advantage over the rest of the country during the crisis. Specifically, Athens received increasingly younger and more educated (in terms of average years of schooling) workers from the rest of Greece and lost significantly older (by some 10 years) and less educated (by 3 years) individuals.

variables included in our underlying models (those reported in Table 1). This is presented in the next section.

5. Price effects and labour market shocks – detailed decompositions

As was explained in section 2, by implementing the detailed (variable-specific) decomposition we are able to derive the endowment/explained and price/unexplained components for each of the individual characteristics included in the underlying regressions. Importantly, we are able to derive a 'price effect' also for the intercepts from these regressions. This is important as, in this context of a two-period comparison, the estimated intercepts constitute effectively a set of time-specific fixed effects, which are net of the impact on unemployment of the various individual characteristics and their prices. Thus, the change in the intercepts between the two periods shows the (potential) rise in unemployment that is specific to the crisis (specific to 2012) irrespective of changes in the composition of the labour force (the 'endowment' component) and in the valuation of the various labour force characteristics (the remainder of the 'price' component) that may have taken place in this period. On this basis, we can interpret the 'fixed effect' component as a measure of the overall shock to the labour market (i.e., the maximum potential impact of the crisis) and, consequently, all other 'explained' and 'unexplained' components as the (compositional and price-related) adjustments that took place in response to the shock. To put it differently, the 'fixed effect' component from the detailed decomposition shows what would have happened to unemployment if there was no price or compositional adjustment in the labour market; in turn, the other components give us a measure of the adjustment that took place in response to this shock – and thus a measure of the resilience of the labour market to that exogenous shock.

Our interpretation of the fixed effect in those terms is supported by the empirical evidence (Table 3). As can be seen, in all cases the fixed effect component is greater than 100%, i.e., it is larger than the actual increase in unemployment observed in the data. Interestingly, the measure of the shock varies little between models that control or not for selection. Instead, the size of the shock appears very different between the metropolitan region of Athens and the rest of the country. Nationally, the shock is calculated at around 132% of the actual rise in unemployment, corresponding to an increase by near 22 percentage points (e.g., from 8% to 30%). In Athens, however, the shock was much bigger, both in absolute size and in percentage terms: it was about 185% of the actual rise in unemployment observed in the capital, or equivalent to 33 percentage points of additional unemployment (e.g., from 6% to 39%). Instead, the shock in the rest of the country was only 20% higher than the actual rise in unemployment, equivalent to about 19 percentage points of additional unemployment.

Table 3. Detailed decomposition of the change in unemployment during the crisis

	Greece		***Athens***		***Rest of Greece***	
	No selection	With selection	No selection	With selection	No selection	With selection
Abs change	0.16624	0.18649	0.17920	0.17582	0.16012	0.17291

% change	218.3%		301.0%		190.3%	
Selection effect (%)		12.18%		-1.89%		7.98%
Endowments	-1.45%	-1.29%	-2.82%	-2.87%	-0.59%	-0.55%
Education	-1.55%	-1.38%	-2.02%	-2.06%	-1.82%	-1.69%
Age (all groups)	-0.94%	-0.84%	-0.72%	-0.73%	-1.41%	-1.30%
Gender	0.61%	0.54%	0.19%	0.20%	1.33%	1.23%
Ethnicity	0.07%	0.07%	-0.01%	-0.01%	0.09%	0.09%
Marital status	0.47%	0.42%	0.22%	0.22%	0.90%	0.83%
Household size	-0.11%	-0.10%	-0.48%	-0.49%	0.31%	0.29%
Prices	-30.61%	-37.14%	-81.51%	-84.26%	-19.69%	-19.72%
Education	-24.25%	-28.10%	-82.77%	-84.69%	-16.37%	-16.54%
Age (all groups)	-0.54%	-3.13%	1.69%	0.45%	-1.21%	-1.78%
Gender	2.40%	2.04%	1.33%	1.03%	2.83%	3.24%
Ethnicity	-18.90%	-17.27%	-8.88%	-8.05%	-20.49%	-20.41%
Marital status	-1.35%	-1.20%	0.22%	0.26%	-2.11%	-2.18%
Household size	12.03%	10.52%	6.89%	6.73%	17.65%	17.95%
Fixed effect	132.05%	138.44%	184.33%	187.13%	120.28%	120.27%

Notes: Percentage contributions to the total between-samples difference ("absolute change"). All decompositions have been made using the Blinder-Oaxaca method with pooled-sample coefficients.

At the same time, however, adjustment to the shock was also much greater in Athens than in the rest of Greece – in fact, our prior separation between 'explained' and 'unexplained' components (see Table 2) masks much of this adjustment. As can be seen in Table 3, Athens saw a very sizeable adjustment through the price component of education, which reduced the potential rise in unemployment by some 14.8 percentage points (82.77%). This is evidence of a very high degree of resilience: it shows that in response to the crisis, employers in Athens started sorting individuals much more intensively on the basis of their education – both in comparison to 2008 and in relation to the rest of Greece – thus pricing out of employment individuals with lower educational qualifications and (apparently) maintaining a disproportionate number of jobs relative to the size of the shock in the economy. Adjustment through the price of education was significant also in the rest of Greece, but much smaller in magnitude (2.6 percentage points or 16.37%). As a result, the combined effect of the shock ('fixed effect') and the price adjustment of education was a rise of unemployment by 18 percentage points in Athens and by 16.5 percentage points in the rest of Greece – despite the fact that the original shock to the Athens economy was over 1.5 times higher than in the rest of the country.

Two other variables seem to have played an important role in determining the extent of adjustment in the Greek economy during the crisis: ethnicity and household size. Nationally, the price effect of ethnicity – which, as in the case of education, shows intensified sorting based on an individual's characteristics – contributed by about 19% to containing the rise in unemployment. This time, however, the adjustment was greater (over twice as high, proportionally) in the periphery than in the capital. As foreign-born individuals were 'priced

out' from jobs, the concentration of job losses to this group of workers eased the reduction of total employment levels in the labour market – and especially so in the more agricultural periphery. The effect of household size is different. Here, the change (rise) in the unemployment risk associated to individuals living in bigger households resulted in an overall push towards higher unemployment, again with the periphery having the most accentuated effect (almost three times larger than in Athens).

For most of the other variables, the contribution of the price and endowment components is rather minor in magnitude. The differences between areas, however, remain noticeable – although, given the overall magnitude, they are not always significant statistically. For example, the price effect of age and of marital status is positive (signalling more unemployment) in Athens but negative (signalling less unemployment) in the rest of the country. Similarly, the price component of the gender variable is over twice as high in the periphery than in Athens; while noticeably higher in the periphery are also the endowment components related to these variables (gender, age and marital status). Overall, however, the main differences between Athens and the rest of the country, as well as the main components of the rise in unemployment nationally, are related to three factors: (a) the size of the shock, which was much greater in Athens; (b) the pricing-out of foreign-born individuals, which was the main source of price adjustment in the Greek periphery; and (c) the pricing-out of less educated individuals, which was a much stronger source of adjustment in Athens and of an unusually high magnitude overall.

Table 4. Summary measures of crisis and adjustment in the Greek labour market

	Greece	***Athens***	***Rest of Greece***
Shock	0.220	0.330	0.193
Adjustment	-0.053	-0.151	-0.032
Crisis	0.166	0.179	0.160
Resilience	24.3%	45.7%	16.9%

Notes: Results based on the Oaxaca-Ransom decomposition of the simple probit model (without correction for selection). For definitions see text.

To summarise these effects, in Table 4 we present a summary measure of the extent of shock, adjustment, crisis and resilience in Greece and the two geographical sub-groups. The shock to the Greek labour market (in terms of unemployment), as captured by the 'fixed effect' component, was of a magnitude of about 22 percentage points, ranging from 33 percentage points in Athens to 19.3 percentage points in the rest of the country. Adjustment to the shock was much stronger in Athens (15.1 percentage points) than in the rest of Greece (3.2 percentage points), resulting in an overall adjustment nationally of only around 5 percentage points. Interestingly, had the price adjustment in the rest of Greece been of an equal proportion to that of Athens, unemployment nationally would have increased by some 3.8 percentage points less.[9] In the absence of such an adjustment in the Greek periphery, the unemployment effect of the crisis (i.e., the observed rise in unemployment) was 16.6 percentage points nationally and, as discussed previously, with only small differences

[9] From Table 4 we can calculate the predicted adjustment for the rest of Greece, using the Athens coefficient of resilience and the estimated size of the shock for the rest of Greece, at 8.82 percentage points. Weighting by the unemployment share of the two areas gives a national-level extra reduction of unemployment of 3.77 percentage points.

between areas. Given the differences in the extent of the shock and of the adjustment to it, however, this relatively uniform increase in unemployment was underpinned by extremely large differences with regard to labour market resilience: ranging from near 50% in Athens (meaning that nearly half of the shock was negated via the internal adjustment of the labour market) to 17% in the rest of the country. We pick up on this point and discuss the range and overall implications of our findings in the concluding section.

5. Conclusions

The fiscal crisis in Greece came as a shock not only to the economy and labour market but also to domestic and European policy-making at large. Given the urgency of the efforts to keep the country solvent and maintain its Eurozone membership, attention to the ways in which the labour market was affected by, and responded to, the crisis and to the emergency measures that were taken to support the fiscal consolidation efforts became somewhat second-stage. In consequence, academic research and evidence-based knowledge on the processes of shock and adjustment in the Greek labour market remains to date limited.

Our analysis in this paper sought to partly fill this gap. By relying on individual-level micro-data and utilising recently advanced decomposition techniques for non-linear models, we were able to identify not only how the crisis affected the individual unemployment probabilities of various groups and for different labour force characteristics, but also – and more crucially – how the crisis played out mode generally in the Greek labour market at the macro-level. Our detailed decomposition showed that the overall extent of the shock was notably bigger than the actual rise in unemployment – suggesting that some partial adjustment did in fact take place. A small part of this adjustment had to do with changes in the composition of the workforce (labour endowment / quality): in 2012, those in employment had better-quality marketable characteristics (e.g., education) and exogenous characteristics typically associated with less unemployment (e.g., being male). As only a part of this was accounted for by selection/flows into and out of inactivity, there is an implication that an important part of this 'labour-quality' adjustment happened through migration – both international and, in the case of Athens, inter-regional.

By far, however, the main adjustment happened through the price effect, in other words, through an intensified sorting of individuals on the basis of their characteristics. Driven mainly by developments in the Athens economy, nationally this sorting-based adjustment was mostly related to the education variable. In response to the crisis, employers started valuing education more and thus more educated individuals became more successful in maintaining/obtaining jobs at the expense of individuals with lower educational qualifications. In the periphery, however, this rather welcome market mechanism operated much less strongly. Instead, the main vehicle of price adjustment there was a change in the 'valuation' of ethnicity, with foreign-born individuals being 'priced-out' from jobs and a sub-set of them exiting the Greek labour market via return migration.

Overall, however, the price and labour-quality adjustments were not sufficient to alleviate the unemployment pressures exerted on the labour market. Thus, the greatest part of the shock, both nationally and - especially - outside the Greek capital, manifested itself in the form of unemployment. Nationally, our estimate is that only a quarter of the overall shock was mediated through internal adjustment. In the periphery this adjustment was significantly weaker, with only a sixth of the shock being absorbed through price (sorting) and labour-

quality adjustments. Instead, in the case of Athens resilience has been much greater: despite experiencing a much more sizeable shock (estimated at 33 percentage points of unemployment), the Athens economy managed to absorb nearly half of it, mainly through a price adjustment for the education variable.

What do these developments tell us about the nature of the crisis in Greece and about the prospects of its labour market post-recovery? Evidently, the unemployment problems seen in the Greek labour market still today are most predominantly related to the legacy of the crisis, which created conditions of depressed demand and illiquidity in the economy. Thus, despite some adjustment, unemployment still remains at very high levels - and it is expected to remain so in the medium term. On the other hand, the overall response and adjustment to the unemployment pressures, at least in the pre-recovery phase of the crisis as examined here, has been unquestionably subdued. Functional (price) adjustments have been rather strong in the Greek capital; but in the areas outside the main agglomeration of Athens, and thus also nationally, they have been limited. Some adjustment appears also to have come from migration (although this is not directly observed in our data), and to a lesser extent from changes in labour supply (via selected flows from inactivity), but again this has not been of an apposite magnitude – especially given the extent of the depression of the Greek economy (with the country losing a quarter of its GDP in the four years covered in our analysis).

The differences in terms of the size and type of adjustment observed between the capital and the rest of the country sketch out a rather worrisome picture about the longer-term dynamics and the prospects of continuing recovery in the Greek labour market. Despite the much bigger shock there, the Athens economy exhibited during the crisis much more dynamism and overall a much more robust functioning and resilience – including a more sizeable improvement in the overall employability of its workforce and more market-based responses with regard to the valuation of workforce characteristics. In this regard, the post-crisis period find the Athens economy perhaps at a stronger position with regard to future declines in unemployment. But for the other areas in the country, the lack of dynamism and adjustment during the crisis may be read as suggesting that the post-crisis recovery will also be slow and cumbersome. This imbalance is problematic not only in terms of spatial equity, and of the subsequent demands this may have on (regional and other) policy, but also with regard to the overall efficiency of the Greek labour market. This is a point that will require more and more attention as the country moves away from its decade-long crisis and the devastating fiscal austerity that it was forced to implement to address its sovereign debt problems.

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Appendix

TABLE A.1. Individual determinants of unemployment – marginal effects

	Simple probits		Heckman selection	
	2008	2012	2008	2012
	Unempl	Unempl	Unempl	Unempl
Education	-0.334***	-1.304***	-0.238***	-1.472***
	(0.0414)	(0.0923)	(0.0483)	(0.155)
Female	5.943***	7.976***	4.356***	10.32***
	(0.282)	(0.647)	(0.503)	(1.890)
Foreign	-1.496**	7.194***	-1.469***	7.520***
	(0.585)	(1.322)	(0.547)	(1.374)
Hhold size	0.664***	2.584***	0.624***	2.655***
	(0.120)	(0.277)	(0.113)	(0.290)
Married	-3.958***	-13.00***	-4.066***	-13.01***
	(0.362)	(0.799)	(0.333)	(0.840)
Age 15-24	6.818***	18.63***	5.910***	20.15***
	(0.549)	(1.327)	(0.602)	(1.709)
Age 25-34	3.257***	6.581***	2.931***	6.888***
	(0.404)	(0.891)	(0.393)	(0.937)
Age 45-54	-1.508***	-2.401***	-1.567***	-2.278**
	(0.438)	(0.908)	(0.407)	(0.944)
Age 55-64	-2.408***	-7.651***	-2.991***	-6.659***
	(0.611)	(1.253)	(0.608)	(1.580)
Net unempl	7.550	35.023	6.772	36.614
Actual unempl	7.617	24.262	7.617	24.262

Notes: Marginal effects have been calculated at sample mean values for all variables based on the z-scores reported in Table 1 using the –margins, dydx atmeans– command in Stata. 'Net unemployment' is the cumulative standard-normal probability of the estimated intercept, i.e., the predicted unemployment rate for a single prime-age (35-44 years old) Greek male with zero education. 'Actual unemployment' is the actual (unconditional) unemployment rate calculated in the sample). All probabilities (marginal effects) have been multiplied by 100 for ease of presentation.

Table A.2. Detailed decomposition – coefficients

	Greece		***Athens***		***Rest of Greece***	
	No selection	With selection	No selection	With selection	No selection	With selection
Abs change	0.16624	0.18649	0.17920	0.17582	0.16012	0.17291
% change	218.3%		301.0%		190.3%	
Selection effect (%)		0.02025		-0.003387		0.01279
Endowments	-0.002407	-0.002407	-0.005046	-0.005046	-0.000949	-0.000949
Education	-0.00258	-0.00258	-0.003623	-0.003623	-0.002917	-0.002917
Age	-0.001563	-0.001563	-0.001284	-0.001284	-0.002254	-0.002254
Gender	0.00102	0.00102	0.00034	0.00034	0.00213	0.00213
Ethnicity	0.00012	0.00012	-1.68E-05	-1.68E-05	0.00015	0.00015
Marital status	0.00078	0.00078	0.00039	0.00039	0.00143	0.00143
Household size	-0.00018	-0.00018	-0.000854	-0.000854	0.0005	0.0005
Prices	0.16864	0.18889	0.18425	0.18086	0.16107	0.17386
Education	-0.040319	-0.052409	-0.148325	-0.148892	-0.026207	-0.028595
Age	-0.000891	-0.005845	0.00304	0.00079	-0.001938	-0.003079
Gender	0.004	0.00381	0.00239	0.00182	0.00454	0.0056
Ethnicity	-0.031422	-0.032205	-0.015908	-0.014155	-0.03281	-0.035285
Marital status	-0.002245	-0.002232	0.00039	0.00045	-0.003383	-0.003775
Household size	0.02	0.01961	0.01234	0.01184	0.02827	0.03103
Fixed effect	0.21952	0.25816	0.33032	0.32901	0.1926	0.20796

Figure A.1. Age profile of labour force by affiliation to geographical area

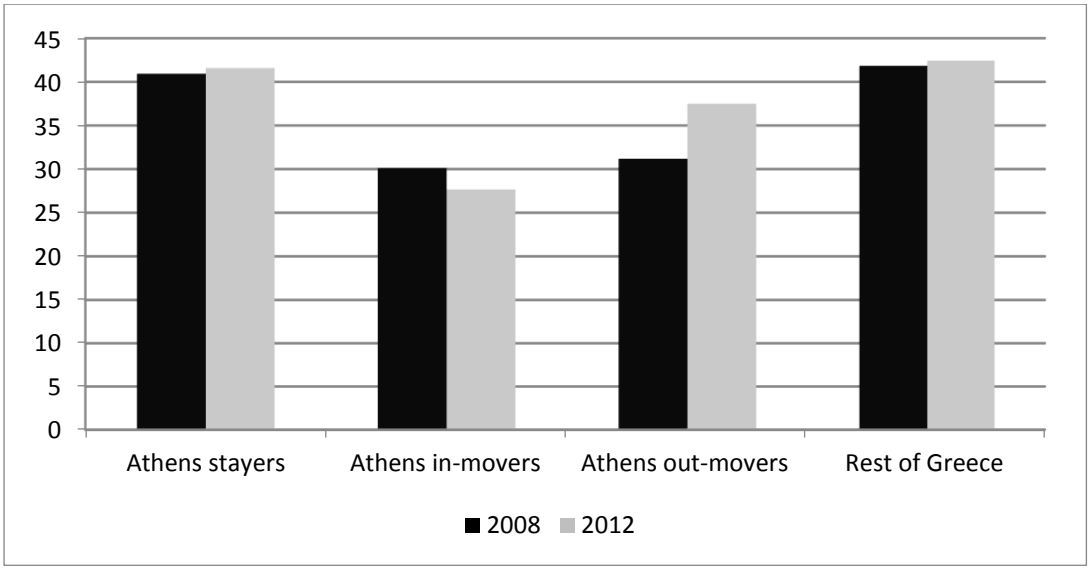
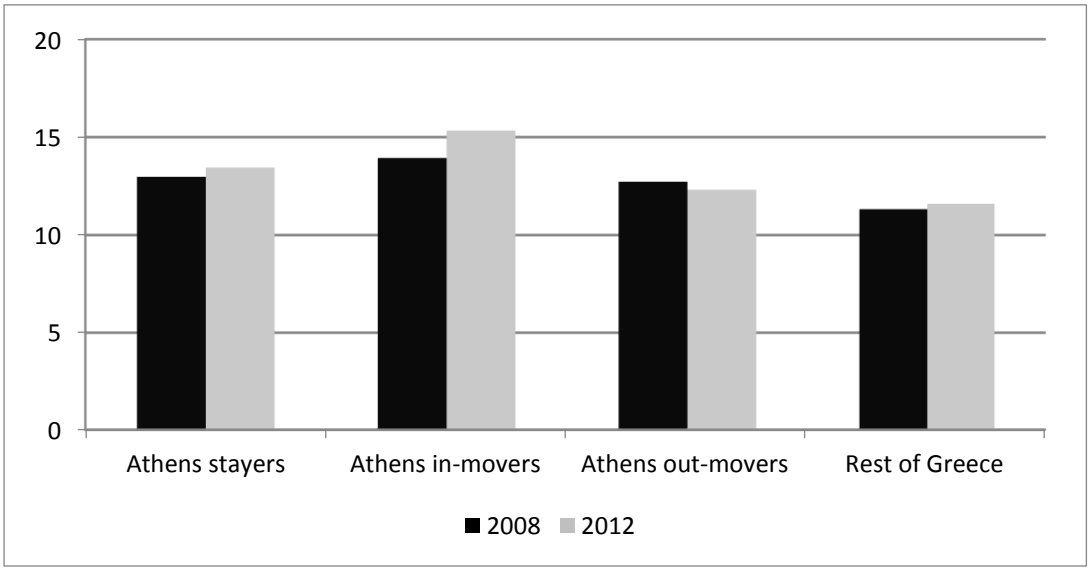


Figure A.2. Education profile (years of schooling) of labour force by affiliation to geographical area



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