



BANK OF GREECE
EUROSYSTEM

Working Paper

Housing credit and female labour supply:
Assessing the evidence from Greece

Sarantis E.G. Lolos
Evangelia Papapetrou

141

NOVEMBER 2011 PER WORKING PAPER WORKING PAPER WORKING PAPER WO

BANK OF GREECE
Economic Research Department – Special Studies Division
21, E. Venizelos Avenue
GR-102 50 Athens
Tel: +30210-320 3610
Fax: +30210-320 2432

www.bankofgreece.gr

*Printed in Athens, Greece
at the Bank of Greece Printing Works.
All rights reserved. Reproduction for educational and non-commercial purposes is permitted provided that
the source is acknowledged.*

ISSN 1109-6691

HOUSING CREDIT AND FEMALE LABOUR SUPPLY: ASSESSING THE EVIDENCE FROM GREECE

Sarantis E. G. Lolos
Panteion University, Athens

Evangelia Papapetrou
Bank of Greece and University of Athens

Abstract

This paper brings new evidence on the relationship between housing credit and female labour participation decisions by investigating the possible interdependence between the two variables in the case of Greece. This relationship is analysed through the estimation of a probit model with endogenous regressors using household data of the Income and Living Conditions (EU-SILC) survey for 2008. The empirical results show that mortgage and female labour participation decisions are interrelated. In a broader perspective, the evidence provided in our analysis supports the existence of a finance (housing credit) and real economy activity (female labour supply) nexus.

Key words: J2, D91, J21

JEL classification: Mortgage market, female labour market participation, endogeneity

Acknowledgements: The authors wish to thank Steven Hall, Eugenie Gargana and Heather Gibson for useful comments and suggestions. The authors would like to thank the Hellenic Statistical Authority (EL. STAT.) and especially the Population and Labour Market Statistics Division for providing the data. The views expressed in this paper are those of the authors and not necessarily those of their respective institutions.

Correspondence:

Evangelia Papapetrou
Bank of Greece
Economic Research Department
21 El. Venizelou, 102 50
Athens, Greece
Tel: +30 210 320.2377
Fax: +30 210 323.3025
E-mail: epapapetrou@bankofgreece.gr

1. Introduction

The relationship between the financial and the real sectors of the economy has been documented by various theoretical and empirical studies (Levine, 1997). An important stream of literature has analysed the association of credit market imperfections with labour market outcomes, such as unemployment (Acemoglu, 2001; Wasmer and Weil, 2004) and labour force participation (Fortin, 1995; Del Boca and Lusardi, 2003).

The purpose of this paper is to analyse the relationship between housing credit and female labour supply decisions and to investigate the possible interdependence between the two variables. This interdependence arises since the wife's decision to enter the labour market relaxes the household's credit constraints and increases the probability for the household to acquire a mortgage. At the same time, if a family has a mortgage, the wife may be induced to work more. The case of Greece serves as an example in our empirical study as it is in many ways ideal to study this interrelationship, because of the functioning of the fairly recently introduced liberalisation of the mortgage market. We believe that our empirical investigation offers an explanatory framework for the interdependence between female labour supply and housing credit decisions and has important policy and welfare implications. Our findings also shed light on the existence of finance (housing credit) and real economy activity (female labour supply) nexus.

The real estate market has traditionally been very important in Greece. Residential property represents more than 80 percent of total household wealth, a share far greater than in other comparable countries. Regarding housing credit, it recorded a rapid growth rate of about 25 percent annually for over a decade, a development strongly related to the liberalisation of the banking system and the country joining the Eurozone. At the same time, female labour supply has increased substantially. Women's employment rate in Greece rose to almost 50 percent at the end of the 2000s from just over 40 percent at the beginning of the decade. This may be attributed to the labour and social policies, co-financed by EU Structural Funds. However, female labour participation rate in Greece still falls short of the optimistic target of 60 percent set for the EU countries for 2010 at the European Council of Lisbon.

The empirical investigation of the potential relationship between mortgage debt and female labour supply was carried out through the estimation of probit regression models with endogenous regressors. Hence, in the mortgage loans equation, female labour participation is treated as an endogenous variable, while, in the wife's labour participation equation, mortgage debt is considered endogenous. The empirical analysis is based on data from the EU Survey on Income and Living Conditions (EU-SILC), enriched with additional household data from the 'Over-indebtedness and financial exclusion' survey of 2008. A distinct feature of our study is the use of unpublished data on housing credit collected by the Hellenic Statistical Authority (EL. STAT.) that has been combined with the EU-SILC survey data.

The paper proceeds as follows. Section 2 provides a presentation of the main features of the Greek mortgage and labour markets. Section 3 reviews the previous research on the issue. Section 4 discusses the methodological issues and the estimated model. In Section 5 the data used and the empirical results are presented. In Section 6 the main conclusions and the policy recommendations are summarized.

2. The mortgage and labour markets in Greece

2.1 The mortgage market

The real estate market has traditionally been very important in Greece. Investment in real estate was the only outlet for household savings due to the thinness of the capital market and the existence of high inflation for long periods, together with existence of foreign exchange controls. This behaviour is reflected in an ownership rate that is remarkably high by international standards. Note that at the beginning of the 2000s, the recorded home ownership rate in Greece was about 80 percent (97 percent in rural areas) compared to 60 percent in the Euro zone.¹ Also, real estate property appears to be the

¹ See Brissimis and Vlassopoulos (2009); also Hardouvelis (2009). For an overview of real estate developments and prospects in Greece, see the special edition of the *Bank of Greece* (2009).

most important asset for Greek households reaching 80 to 90 percent of their total wealth.²

Until the end of the 1980s the mortgage market in Greece remained underdeveloped mainly due to institutional factors. The banking system was characterised by the pervasive presence of the state and was regulated through a complex system of credit rules and administratively fixed interest rates. Credit and interest rate policies aimed at facilitating the government's economic policy priorities (export promotion, support for Small and Medium Enterprises (SMEs), financing of state-owned firms, etc).³ Commercial banks did not provide consumer credit and they were not permitted to supply housing credit; mortgage lending been restricted to a few specialised credit institutions.⁴ As a result of this strict institutional setting, households were, to a large extent, credit constrained. Housing purchases were made mostly in cash, accumulated through savings or obtained through transfers from relatives or friends. Financing facilities were also provided by property developers and constructors (Brissimis and Vlassopoulos, 2009).

However, since the early 1990s, the Greek financial landscape was transformed at an accelerating pace as a result of liberalisation and deregulation of the banking system and especially with the enactment of the Second Banking Directive (1992).⁵ These institutional changes together with the prospects for Greece to join the Euro zone created the environment for an impressive growth of private sector credit and of the mortgage market in particular.⁶

² According to a study by *Eurobank* for the year 2008, real estate amounts to 81.8 percent of the Greek households assets as against 17 percent of deposits and only 1.2 percent of company shares (Hardouvelis, 2009).

³ For the regulatory framework of the Greek banking system and actual policies pursued see, *inter alia*, Halikias (1978), Courakis (1981).

⁴ In Greece five special credit institutions were in operation: the Deposits and Loans Fund, the Postal Savings Bank, the National Mortgage Bank, the National Housing Bank (the last two merged in 1997 and were acquired by the commercial National Bank of Greece in 1998) and the Aspis Bank (renamed to T-Bank in 2010 after the Postal Savings Bank becoming the main shareholder).

⁵ For a concise presentation of the deregulation measures of the Greek banking system see *Central Banking* (1995/6), Voridis *et al.* (2003).

⁶ For a discussion of recent credit developments in Greece, see *IMF* (2007).

More specifically, commercial banks increased their lending to the private sector since they found themselves with increased liquidity after the substantial reduction of reserve requirements (from 12 to 3 percent of banks' deposits), the abolition of the obligation to hold government bonds (40 percent of banks' deposits), the abolition of requirements for the financing of large investment projects, SMEs, public enterprises and firms with liquidity constraints (Lolos, 1988).

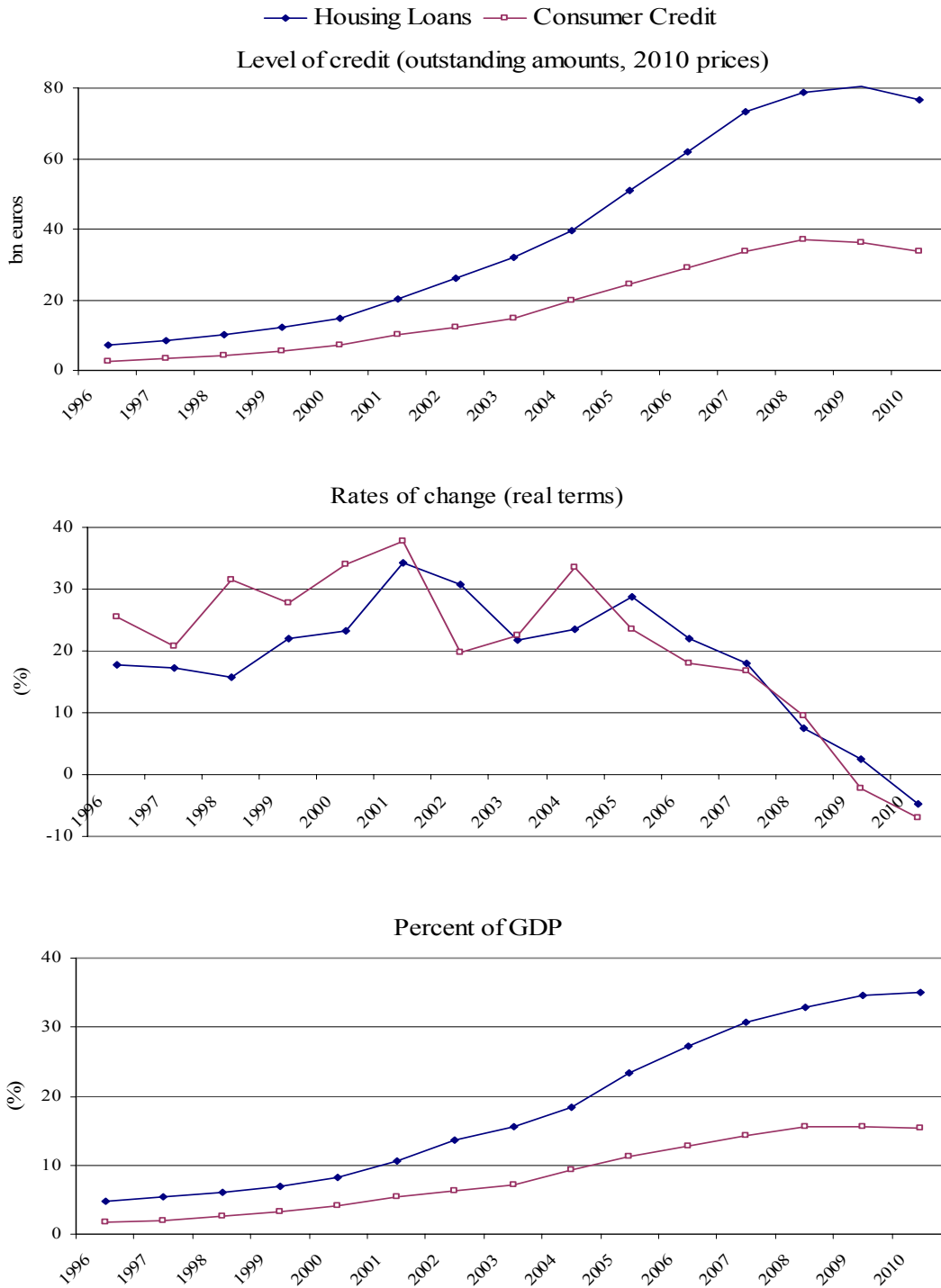
Furthermore, commercial banks were permitted to enter the mortgage market (1991) and consumer loans were allowed (1993) including credit cards (1994) and personal loans, i.e. loans without documents (from 1994 but with certain restrictions until 2003). Also, foreign exchange controls were removed in 1993-4. At present, all deposit and lending rates are freely determined and banks are allowed to extend credit on their own terms and provide new financial products and services. In addition, increased competition among credit institutions put pressure on banks to proceed to financial innovation in terms of new products to address more flexibly the requirements of potential customers. Banks also exploited the relationships with their customers (e.g. credit cards) to lessen the problem of asymmetric information.⁷

Finally, there has been a considerable drop in interest rates in view of the country joining the Euro zone which exerted significant downward pressures on mortgage interest rates. Note that nominal interest rate on housing loans declined from around 20 percent in the mid 1990s to less than 4 percent in the mid 2000s.

Developments in credit to households over the period of financial liberalisation are shown in Figure 1. Since the mid-1990s as a result of the aforementioned structural changes, household lending in Greece experienced a real boom.

⁷ For a broader discussion, see Brissimis and Vlassopoulos (2009) and Brissimis *et al.* (2011).

Figure 1: Household loans in Greece



Source: Bank of Greece and EL.STAT

In particular, from the mid-1990s until the mid-2000s mortgage credit in real terms increased at an average annual rate of 25 percent in line with the considerable increase in demand for second-homes and holiday houses especially in the islands. Over the same period consumer credit registered similar annual growth rates to that of mortgages.⁸ Along with the increase in mortgage credit there has been an upward movement of real estate prices affecting household wealth, private consumption and economic activity in general (Simigiannis and Hondroyiannis, 2009).⁹ The substantial rise in mortgages decelerated rapidly after the unexpected economic recession and Greece's fiscal crisis and was brought to a halt by end-2000s. This development created an oversupply of houses but the drop in real estate prices has been limited. Despite the drop in completions of new dwellings, it seems that a large number of housing units remain unsold.

The supply of mortgages and particularly the low interest rate on credit has increased the indebtedness of households and has affected their ability to meet their obligations. In fact non-performing mortgage loans rose from 6 percent in 2008 to about 9 percent of outstanding loans in 2010.¹⁰ At present all banks are in a process of limiting the excessive behaviour of the period before the economic crisis and they have become more cautious in lending. Stricter regulation and terms of borrowing are being followed by all credit institutions.¹¹

The fast growth of household credit pushed the ratio of total household debt to GDP from 6 percent of GDP in mid-1990s to 50 percent in 2010; and for mortgage loans from 4 to 35 percent respectively. The increase in household debt since the mid-1990s has been driven by both mortgage and consumer credit, but because of its low starting

⁸ At present consumer credit consists by about $\frac{2}{3}$ of loans against supporting documents (hire purchase) and personal loans and the remaining $\frac{1}{3}$ consists of credit cards.

⁹ Note that the additional costs and fees associated with the purchasing of property in Greece amount to 13-15 percent of the purchase-market price (valuation cost around €300, legal fees around 1-2 percent, purchase tax between 9-11 percent of the property value). There is a property tax of around 0.25 percent of the total value of the property, while some local municipalities charge around 3 percent of the property value for public services.

¹⁰ This rise is not much of a problem compared to increase of the non-performing loans to SMEs from 12 to 18 percent of the outstanding amounts over the period 2009-10.

¹¹ Banks generally allow borrowing up to 35 percent of earned income. There are limits based normally on 70 percent of the value of the property. Unlike some other European countries, banks allow mortgages for 25 years or more, also allowing those up to the age of 73 to borrow.

level, mortgage debt in Greece is one of the lowest in the euro area. By contrast, consumer credit has been one of the highest compared to the euro zone, owing to the unprecedented growth rates of personal loans and loans against documents.¹²

2.2 The labour market

The Greek labour market is characterized by low employment and low participation rates. However, the female employment rate in Greece has increased from 42.9 percent in 2002 to 48.7 percent in 2009. Also, the rate of women's employment rate in Greece is considerably lower than in the EU as a whole (59.1 percent in 2008 for EU-27) and even lower than the target (60 percent) set at the European Council of Lisbon for 2010. The gap in employment rates between women and men is narrowing, and fell from 29.3 percentage points in 2000 to 26.3 points in 2008, but it remains the second highest in Europe.

Women's integration into the labour market is low as evidenced by the full-time equivalent employment rate. This rate is particularly low (41.3 percent) in 2002, the third lowest in the EU and well below the corresponding EU average (46.8 percent).

Part-time employment in Greece is lower (5.6 percent) than that of the EU average (approximately 18 percent). However, it is more than three times higher for women than for men (9.9 percent compared to 2.3 percent, respectively in 2008). On the other hand, part-time employment offers employees, particularly women, the opportunity to reconcile work with attending to the needs of their family, especially when the available child-care solutions are insufficient or costly. On the other hand, part-time jobs are typically associated with limited opportunities for career advancement and with lower remuneration (*OECD*, 1999). It should be noted that although part-time and other flexible working arrangements may reflect personal preferences, in Greece, men and women report that they were forced to choose this form of employment because they could not find a full-time job.

¹² According to the EU-SILC survey for 2008, the proportion of individuals in the total population that are in a critical situation (owing an amount larger than the household monthly disposable income) was above 5 percent in Greece (as well as in UK, Germany, Cyprus, Austria) as against less than 5 percent for the EU average

In addition, Greece has high unemployment rates, affecting especially women and young people. The unemployment rate of women (11.4 percent on 2008) is considerably higher than that of men (5.1 percent) and also considerably higher than the EU average for women (7.5 percent). The gap in unemployment rates between women and men is narrowing, and fell from 8.9 percentage points in 2000 to 6.3 points in 2008, but it remains the highest in Europe. Also, Greece shows high levels of gender segregation, both sectoral and occupational (*OECD*, 2002). In particular, women have a strong presence in 14 occupations (out of a total of 115) that are female dominated.

Regarding the institutional framework of the labour market, until very recently Greece had strict employment protection legislation, such as restrictive lay-off procedures, which tend to shift employment into the informal sector and intensify labour market segmentation (*OECD*, 1999). Hours and conditions of employment are subject to extensive government legislation. The unemployment compensation system is rather poor and assistance to those seeking entrance to the labour market is limited.

Greece's labour market institutions have undergone broad changes in recent years.¹³ At the beginning of the 1990s, a new institutional framework for collective bargaining was introduced and the collective bargaining system was decentralized and broadened and was freed from direct government control by abolishing compulsory arbitration. In 2010 there have been further changes in relation to the institutional features of collective bargaining and labour costs in Greece with the aim of increasing labour market flexibility and productivity.

3. Review of previous research

The relationship between the financial and the real sectors of the economy has been documented by various theoretical and empirical works (Levine, 1997; Eschenbach, 2004). An important stream of literature has dealt with the association of credit market imperfections with labour market outcomes, such as unemployment (Acemoglu, 2001; Wasmer and Weil, 2004) and labour force participation (Fortin, 1995; Del Boca and Lusardi, 2003; Belkar *et al.*, 2007).

Labour decisions of households are affected by imperfections in the mortgage market which is one of the most important markets for household credit. House purchases are often restricted by the existence of borrowing constraints in the mortgage market. These constraints can be relaxed by intergenerational transfers such as gifts, inheritances or parental support (Engelhardt and Mayer, 1998; Guiso and Jappelli, 2002). An alternative way to relax borrowing constraints seems to be both male and female participation in the labour market (Fortin, 1995; Bottazzi, 2004).

In certain studies labour market performance is related to the residential status, as reviewed by Havet and Penot (2010) and the rate of unemployment in particular is associated with homeownership. Joesch (1994) studied the effect of residential status on labour supply through the indebtedness constraint for the case of US and found that financial constraints associated with ownership play an important role in the decisions of women to have a job just after childbirth. Houdré (2008) investigates the case of France and finds that a household raises its labour supply when the debt payment exceeds a certain proportion of income. As a result, the combination of a weaker labour market and credit requirements can inhibit home ownership.

A number of studies focus on the relationship between housing debt and partnered female labour participation. The general framework for the analysis of the association of credit markets imperfections with female labour participation is the intertemporal life-cycle model. The underlying hypothesis is that binding credit constraints, that prevent access to borrowing funds from financial institutions or impose an upper bound on the amount of credit available, are expected to alter labour supply decisions within the family context. Increasing labour supply can be considered as a means of relaxing these credit constraints in the majority of empirical studies.

Fortin (1995) studied the effects of mortgage constraints on labour market decisions for the case of Canada. She employed the traditional life-cycle model that incorporated a housing assets accumulation constraint into it and found that mortgage commitments influence the labour market decisions of married women. Her results show that the

¹³ For an extensive discussion on various features of the Greek labour market, see *inter alia*, Papapetrou (2006).

households' mortgage decisions depend significantly on the existing levels of the wife's labour earnings. Thus, the existence of mortgage debt and its servicing obligations have a positive and significant effect on female labour market decisions.

Del Boca and Lusardi (2003) study the case of Italy and they model labour force and credit decisions simultaneously. They come to the conclusion that there is a significant impact of mortgages on women participation in the labour market. Also, Belkar *et al.* (2007) explore the role of household debt in the labour force participation of prime-age Australian women and men. They assess the potential endogeneity of debt in the labour force participation decisions and they find that indebtedness has a significant effect on current labour force participation but not the other way round. In addition, Bottazzi (2004) analysed the relationship between female labour force participation and mortgage commitments in a life-cycle setting for the case of UK. She finds that mortgage commitments have a positive effect on female labour participation.

Worswick (1999) investigates whether credit constraints on the family's ability to borrow act as an obstacle to labour market adjustment of immigrant family members in Canada. He finds that that immigrant families are more likely to be credit constrained than are non-immigrant families. Aldershof *et al.* (1997) in their study for Netherlands incorporate a quite general borrowing constraint and they find that mortgage commitments have a significant positive effect on the labour supply of women. Dauschmidt (1997) investigates the US case and finds a significant effect of debt commitments on labour participation. Yoshikawa and Ohtake (1989) estimated saving and labour supply functions for Japan and found a significant effect of the price of owning a house on female labour supply. Moriizumi and Naoi (2006) estimated jointly female labour force participation with a housing purchase plan equation using micro data for Japan and they found that housing purchase plans have a significantly positive effect on female labour supply.

The empirical evidence for Greece is limited. There are three empirical studies investigating the socioeconomic determinants of indebtedness and financial stress of Greek households (Mitrakos and Simigiannis, 2009; Simigiannis and Tzamourani, 2007;

Mitrakos *et al.*, 2005).¹⁴ The empirical results show that the probability of household indebtedness increases mainly due to factors relating to the level of income and wealth, to social and regional characteristics, to the number of working members. However, the relationship between housing credit and labour participation has not yet been addressed for Greece. The present study bridges this gap.

4. Methodological issues and model

The theoretical and empirical evidence presented in the previous section suggests that household mortgage decisions and wives' labour supply decisions are most likely interrelated. The endogenous determination of debt might arise as households simultaneously choose a future path of work and debt, in relation to plans to acquire a mortgage. In the case, the use of logit or probit estimation methods to model a system of equations in which there are two or more endogenous variables may yield biased estimates of the parameters and make the standard errors unreliable. To address this problem we use instrumental variable techniques to control for the endogeneity associated with the wives' labour participation variable in the mortgage equation. Similarly, we use instrumental variable methods to control for the endogeneity associated with the mortgage debt variable in the wives' labour force participation equation.

Thus in the present paper we estimate the wives' labour force participation and mortgage decision using a model with dichotomous dependent variables and endogenous regressors to account for the endogeneity between these two variables. Therefore in the empirical specification the propensity of the wife of the household to participate in the labour market and the propensity in the household to have a mortgage debt are treated as latent variables. The implication is that unobservable shocks affecting the wife's labour force participation also affect the household's decision to acquire mortgage debt; also unobservable shocks affecting credit constraints, such as mortgage debt, also affect the wife's labour force participation decision.

The estimation of limited-dependent variable models with endogenous regressors has received considerable attention in the econometrics literature. Based on the seminal

¹⁴ These studies are based on three waves of the Bank of Greece commissioned surveys to

works of Amemiya (1978, 1979), Newey (1987) developed an efficient estimation method that incorporates the simultaneous-equation tobit models of Rivers-Vuong (1988) and Smith-Blundell (1986)¹⁵

Therefore in the model we control for endogeneity and use an instrumental variable regression method based on a recursive bivariate probit model. The estimated model is as follows:

$$y_{1i}^* = y_{2i}\beta + x_{1i}\gamma + u_i$$

$$y_{2i} = x_{2i}\Pi_1 + x_{21}\Pi_2 + v_i$$

where $I = 1, \dots, N$, y_{2i} is a $1 \times p$ vector of endogenous variables, x_{1i} is a $1 \times k_1$ vector of exogenous variables, x_{2i} is a $1 \times k_2$ vector of additional instruments, and the equation of y_{2i} is written in reduced form. In particular y_{1i} takes the value 1 if the wife in the household participates in the labour market and 0 otherwise, and y_{2i} takes the value of 1 if the household i currently has mortgage obligation. The vectors x_{1i} and x_{21i} are exogenous variables in the wife's participation and mortgage equations, respectively. We assume that $(u_i, v_i) \sim N(0, \Sigma)$ where σ_{11} is normalized to one to identify the model. The vectors β and γ are structural parameters, and Π_1 and Π_2 are matrices of reduced form parameters. This formulation represents a recursive model: y_{2i} is in the equation for y_{1i}^* , but y_{1i}^* does not appear in the equation for y_{2i} and y_{1i}^* is not observed but instead

$$y_{1i} = \begin{cases} 0 & y_{1i}^* < 0 \\ 1 & y_{1i}^* \geq 0 \end{cases}$$

The order condition for identification of the structural parameters requires that $k_2 \geq p$. Presumably, Σ is not block diagonal between u_i and v_i ; otherwise, y_{2i} would not be endogenous. The model is estimated under the assumption that (u_i, v_i) is independent and identically distributed multivariate normal for all i . The above equation system is also described as reversed causality because the dependent variable y_{1i}^* has a feedback effect

investigate the level of household indebtedness for the years 2000, 2005 and 2007.

¹⁵ The estimation procedure is set out by Harkness and Newman (2003).

on y_{2t} . The estimation of the model is achieved through maximum likelihood estimation techniques.

As described above, the appropriate method for the estimation of equations in which each function contains endogenous binary explanatory variable among the dependent variables is a binary dependent variable model with endogenous regressors. This model is applicable to both structural equations, i.e. the wife's labour participation decision and the decision to obtain a mortgage. Each dependent variable, in this case mortgage debt and the wife's labour participation rate, is assumed to be endogenous to the system, and as a result, treated as correlated with the error terms. Unless otherwise specified, all other explanatory variables in the system are considered exogenous and uncorrelated with the error terms.

The specification of our two models follows recent theoretical considerations and empirical findings (e.g. Fortin, 1995; Del Boca and Lusardi, 2003). Hence, the specification of the mortgage equation (*Mortgage*)¹⁶ includes two categories of exogenous variables. The first one is a number of personal, family, income and regional characteristics that the credit institutions take into account in the evaluation of the provision of loans to their customers. The second includes characteristics referring to the relation of the household with the credit system. In addition, the specification of the mortgage equation includes the wife's labour force participation (*FemParticip*) as an endogenous variable. We treated the wife's decision to enter the labour market as an endogenous variable as we expect that unobservable shocks affecting the decision of the household to obtain a mortgage also affects the wife's decision to participate in the labour market. In this case the coefficient of the wife's labour participation should be positive.

Thus, the following mortgage equation is estimated:

$$\begin{aligned}
 Mortgage = & a_0 + a_1 FemParticip + a_2 WifeAge + a_3 WifeAge^2 + a_4 Child\ 0-4 \\
 & + a_5 HusbSecEdu + a_6 HusbTerEdu + a_7 HusbIncome + a_8 NoBorrow \\
 & + a_9 CreditCard + a_{10} CheqAcc + a_{11} Region + \varepsilon
 \end{aligned} \tag{1}$$

where, *WifeAge* is the wife's age, *WifeAge*² is the wife's age squared, *Child 0-4* is the number of children in the family under the age of four, *HusbSecEdu* is the husband's secondary education, *HusbTerEdu* is the husband's tertiary education, *HusbIncome* is the husband's income, *NoBorrow* signifies that the household is not in need of borrowing; also *CreditCard* and *CheqAcc* signify that the household has credit cards and cheque accounts respectively and *Region* determines the region of residence.

A rationale similar to the determination of the mortgage equation is followed for the specification of the wife's labour force participation equation (*FemParticip*). As in the case of the mortgage equation, the exogenous determinants include variables that describe personal, family, educational, economic and regional characteristics of the household. Also, in the wife's labour force participation equation the mortgage debt (*Mortgage*) is included as an endogenous variable in the system since we expect that unobservable shocks affecting the decision of the wife to participate in the labour market also affect the decision of the household to obtain a mortgage. The coefficient of the mortgage variable is expected to be positive in the case that the decision to obtain a mortgage induces the wife to work more in order to alleviate the credit constraint.

Therefore, the following wife's labour force participation equation is estimated:

$$\begin{aligned}
 FemParticip = & a_0 + a_1 Mortgage + a_2 WifeAge + a_3 WifeAge^2 + a_4 Child\ 0-4 \\
 & + a_5 WifeSecEdu + a_6 WifeTerEdu + a_7 HusbIncome \\
 & + a_8 NoBorrow + a_9 CreditCard + a_{10} Region + \varepsilon
 \end{aligned} \tag{2}$$

where, *WifeSecEdu* is the wife's secondary education and *WifeTerEdu* is the wife's tertiary education; the rest of the variables are explained above.

For the mortgage equation the instrumented variable is the wife's labour force participation and the subset of instrumental variables consists of the exogenous regressors along with variables affecting the female labour force participation decision but not the decision to acquire a mortgage. On the grounds of existing evidence we included

¹⁶ The mortgage debt variable is specified as a dummy variable (0, 1) indicating whether the household has a mortgage debt or not. For a detailed definition of all variables, see Table A in the Appendix.

variables such as the wife's level of education as it might affect positively her work decision, her health condition as it might complicate her effort to enter the labour market, as well as the presence of elderly persons that might influence negatively the female's decision to find a job.

For the wife's labour force participation equation, the instrumented variable is the mortgage debt and the subset of instruments consists of the exogenous regressors along with variables indicating whether the household has transactions with the credit system or not. These instruments are expected to affect the banks' lending decision to grant a mortgage or not.

5. Data and empirical results

5.1 The data

The data used for the estimation of the model is drawn from the 2008 EL.STAT Survey on Income and Living Conditions (EU-SILC). The EU-SILC database is compiled by the Statistical Survey of the EU member states for Eurostat.¹⁷ This survey provides information both about the household as a whole and about each household member separately, regarding demographic characteristics, economic and housing conditions etc, such as age, family status, education, income, type of employment, health etc.

The statistical analysis uses data for 2008 (referring to the year 2007). Additional data pertaining to the household were extracted from a special module on 'Over-indebtedness and financial exclusion' of the EU-SILC survey which was carried out in 2008. All variables in the 2008 module were collected at household level. A feature that makes our study distinct is the fact that we have used unpublished data on housing credit collected by EL.STAT (Hellenic Statistical Authority) and then we combined them with those included in the EU-SILC Survey.¹⁸

¹⁷ The EU-SILC survey replaced the European Community Household Panel (ECHP) sampling survey that covered all EU countries and was conducted by Eurostat from 1994 to 2001.

¹⁸ The use of longitudinal data would be ideal to empirically investigate the interrelation between housing credit and labour market effects. However, as presented, data limitation does not permit to perform such an analysis.

The sample is restricted to married couples with wives between the age of bracket 21-60 and husbands aged 21-65. We excluded families with self-employed members and only employees were included in the analysis. The sample used in the analysis includes families that either rent or own their accommodation. After deleting missing observations the sample used in the empirical analysis was restricted to 982 observations.

Table 1 presents the descriptive statistics of the sample variables used in the empirical analysis. It can be seen that the average participation rate of wives is about 62 percent, which is higher than the country's female labour force participation. The participation rate of husbands is equal to one.

Table 1: Descriptive statistics of the sample variables

Variable	Household		Wife		Husband	
	mean	st.err.	mean	st.err.	mean	st.err.
Labour participation			62%	0,02	1	
Age (years)			42	0,27	46	0,28
Number of children aged 0-4	23%	0,02				
Primary education			17%	0,01	17%	0,01
Secondary education			47%	0,02	48%	0,02
Tertiary education			36%	0,02	34%	0,02
Semi rural residence	54%	0,02				
Urban residence	46%	0,02				
Monthly income (euros)			1264	26,6	1689	28,6
Not in need of borrowing	74%	0,01				
Mortgage			2%	0,00	20%	0,01
Credit card	46%	0,02				
Cheque account	32%	0,01				
Number of observations	982					

Source: EU-SILC 2008

Regarding the demographic and socioeconomic characteristics, it can be seen that, on average, the sample consists of relatively young couples in their mid-forties and few of them have children under the age of four. Our sample consists of households living in

urban areas (46 percent) and the remaining 54 percent are semi rural residents.¹⁹ Also, the couples in our sample belong to those with relatively high educational attainment since about $\frac{1}{2}$ of them have secondary education and another $\frac{1}{3}$ have tertiary education.

The average monthly income of the wives is 1,264 euros while that of their husbands is 1,687 euros both being higher than the country's average. In addition, $\frac{3}{4}$ of the households have declared that they do not need to borrow. As for the variables in the sample relating to the credit system, almost half of the households use credit cards and about one third keep cheque accounts, while the average proportion of households with mortgage is 20-22 percent (20 percent of husbands and 2 percent of wives).

Thus, on average, our sample consists mainly of couples that are relatively wealthy, fairly well-educated and normally not in need of borrowing to make ends meet. Also, they are in their mid-forties, few of them have small children and they are on good terms with the credit institutions. This profile of the representative household shows that the Greek banks have been fairly conservative in their lending policy and quite cautious in granting mortgage loans.²⁰ This may explain the fact that at present, the proportion of non-performing mortgage loans is relatively low (around than 10 percent) and the mortgage indebtedness of Greek households is low compared to other EU countries.

5.2 Empirical Results

Our empirical results are presented in Table 2. Columns 1 and 2 of the Table show the univariate probit estimates for the mortgage and the wives' labour force participation equations. Both models fit significantly better than an empty model since the likelihood ratio tests (91.14 and 180.70 respectively) are statistically significant at the 1 percent level.

The results of the *mortgage model* show that the wife's participation in the labour force increases the probability of the household acquiring a mortgage, since it helps alleviate credit constraints. The wife's age and the presence of small children increase the probability of getting a mortgage. Also, factors such as the husband's income, his

¹⁹ In our sample, the number of households belonging to the rural category was small and was added up to the semi rural category.

²⁰ Similar findings are reported by Mitrakos and Simigiannis (2009).

educational level and the fact that the household is familiar with banking transactions (e.g. use of credit cards) affect a mortgage decision positively. Similar results are shown in the studies of Mitrakos and Simigiannis (2009) and Mitrakos *et al.* (2005).

Cheque accounts do not affect significantly the mortgage decision because this credit facility is rarely used by the owners.²¹ The region of residence does not seem to be a significant factor for a mortgage decision, contrary to the evidence provided by Del Boca and Lusardi (2003).²²

The results of the *wife's participation model* show that the existence of a mortgage increases the probability of a wife entering the labour market, since this will provide her with extra income to meet the mortgage burden. The wife's age and her education level together with the good relations of the household with the banking system facilitate her entering the labour market. As expected, the income of her husband affects her decision to work negatively.

The probit models with *endogenous regressors* were estimated by the instrumental variables technique and the results are shown in Table 2 (columns 3 and 4). The instruments used are discussed in Section 4, above. The estimates are obtained using maximum likelihood techniques.

The results of the *mortgage equation* show that female labour participation affects positively the decision of a household to acquire a mortgage, even after controlling for other characteristics that influence this decision. Our results show that households with wives participating in the labour market are 90 percent more likely to obtain a mortgage compared to those with wives that are not in the labour force.

²¹ All couples in our sample are wage earners, thus being eligible for a cheque account but they rarely use it as means of borrowing.

²² Alternative variables were used to capture the regional aspect but they did not render statistically significant results.

Table 2: Empirical results

	Univariate Probit model		Instrumental variable Probit model	
	Average marginal probability (1)	standard error (2)	Average marginal probability (3)	standard error (4)
Mortgage equation				
Wife's labour participation	0.093***	(0.027)	0.914***	(0.325)
Wife's Age (years)	0.053***	(0.014)	0.163***	(0.066)
Wife's age-squared	-0.0006***	(0.0001)	-0.002***	(0.0007)
Number of children aged 0-4	0.054**	(0.026)	0.241**	(0.105)
Husband's secondary education	0.142***	(0.040)	0.499***	(0.167)
Husband's tertiary education	0.117***	(0.043)	0.326*	(0.190)
Husband's monthly income/1000	0.036***	(0.013)	0.177***	(0.055)
Not in need of borrowing	-0.037	(0.029)	-0.175	(0.115)
Credit card	0.095***	(0.024)	0.297***	(0.111)
Cheque account	0.047*	(0.025)	0.147	(0.103)
Semi rural	-0.007	(0.024)	-0.010	(0.096)
constant			-5.676***	(1.323)
Instr. variable: wife's particip.	no		yes	
Wife's labour participation equation				
Mortgage	0.199***	(0.038)	1.609***	(0.505)
Wife's age (years)	0.066***	(0.013)	0.117*	(0.065)
Wife's age-squared	-0.0008***	(0.0001)	-0.001**	(0.0007)
Number of children aged 0-4	-0.069**	(0.032)	-0.251***	(0.094)
Wife's secondary education	0.033	(0.040)	0.009	(0.123)
Wife's tertiary education	0.327***	(0.041)	0.748***	(0.219)
Husband's monthly income/1000	-0.078***	(0.017)	-0.257***	(0.053)
Not in need of borrowing	0.065**	(0.032)	0.209**	(0.095)
Credit card	0.092***	(0.029)	0.123	(0.127)
Semi rural	-0.033	(0.029)	-0.085	(0.087)
constant			-2.076*	(1.284)
Instr. variable: mortgage	no		yes	

Notes: The values in parenthesis are standard errors.

The symbols (*), (**) and (***) denote statistical significance at 10, 5 and 1 percentage level respectively.

Also, the predicted probability of acquiring a mortgage increases along with the wife's age, though at a diminishing rate. The average marginal effect of the female's age on the probability of having a mortgage is 8 percent. Similarly, the existence of small children increases by 24 percent the probability of the family obtaining a mortgage. The educational level of the husband in the household has a positive and significant influence on the probability of having a mortgage. Judging from the marginal effects of the education dummy variables, families with husbands having secondary and tertiary education are more likely by 50 and 33 percent respectively to obtain a mortgage compared to husbands with primary education.

The husband's income level has an 18 percent probability to affect positively the decision for a mortgage. Also, households that are customers of the banking system, as reflected in the use of credit cards, are 30 percent more likely to obtain a mortgage than those that do not have credit cards.

The results of the *wife's labour participation equation* of the probit model with endogenous regressors show that the existence of a mortgage is much more likely to affect positively the decision of the wife to participate in the labour market (the average marginal probability is 1.61). This applies even after we control for other factors that influence this decision.

The presence of small children in the family makes it 25 percent less likely for a mother to seek a job. The same applies to the husband's income, as a higher level of income affects the wife's labour supply negatively. On the other hand, older and especially educated wives with mortgage loans have a higher probability (8 and 75 percent respectively) of participating in the labour market than those who are younger and have lower educational skills. Factors such as the use of credit cards and the location of the household do not seem to affect in a statistically significant way the probability that a woman participates in the labour market.

Subsequently we performed a number of tests to evaluate the statistical significance of our empirical results in the two models.²³

²³ Detailed test results are not reported here. They are available from the authors upon request.

First, we evaluated the robustness of the models' results with respect to the selected endogenous variables. We conducted Wald tests to reject or accept the null hypothesis that the coefficients of the endogenous regressors are zero. The tests showed that the female labour participation has a significant positive impact on a mortgage decision (chi-squared value = 7.87), while a decision to obtain a mortgage has a significant positive impact on the wife's decision to enter the labour market (chi-squared value= 10.12). We also performed Wald tests on all regressors that confirmed the relevance of the selected variables.

Second, we tested the hypothesis that all slope coefficients are jointly zero. The empirical evidence rejected the null hypothesis since the estimated Wald test statistics were 87.80 and 244.19 for the mortgage and the female labour participation models respectively.

Third, both instrumental variables models we also performed a Wald test of exogeneity. The estimated statistics provide evidence that there is no sufficient information to reject the null hypothesis of no endogeneity. Thus, our findings suggest the presence of endogeneity in the estimated models at 10% and 5% level of significance in the mortgage and the female labour participation models respectively.

Fourth, we tested for the correlation between the errors in the probit and the reduced-form equations for the endogenous regressors in the two models. The significant values of the estimated *rho* statistics (-0.269 and -0.500 for the two models) indicate that we can reject the null that there is of no endogeneity of the instrumental variable models. Thus, the estimation of the probit model with endogenous regressors is judged as more appropriate than the independent univariate probit regressions.

Fifth, we employed the Newey's (1987) minimum chi-squared efficient two-step technique for the estimation of the two models. The results obtained through this estimator are not directly comparable to those obtained through the maximum likelihood technique or through probit analysis. However, these findings are used to evaluate the validity of our model results. They are qualitatively similar since all estimated coefficients have the same sign as those obtained from the maximum likelihood

estimation model. Also, the Wald exogeneity test performed confirms the earlier findings of endogeneity of the instrumented variable in both models.

Finally, we evaluated the robustness of the main findings of the instrumental variable method employing a seemingly unrelated bivariate probit model to jointly estimate the factors that influence both the mortgage decisions of the household and the female labour force participation choice. The Wald test and the likelihood-ratio test support the evidence of endogeneity of the two variables. In the first model the effect of wife's labour participation choice on mortgage decision is positive and statistically significant, while in the second model the effect of the mortgage decision on the wife's participation choice is also positive and statistically significant.

Our results are in line with the findings of Del Boca and Lusardi (2003) where mortgage decisions and female labour participation decision are taken simultaneously. However, our results are contrary to the findings of Fortin (1995) and Bottazzi (2004). Fortin (1995) finds evidence that mortgage payments are exogenous to the labour force decision using Canadian data. Bottazzi (2004) tests for the endogeneity of the mortgage constraint on labour force participation in the UK using house prices as an instrumental variable and finds that mortgage payments are exogenous to the labour force decision.

6. Conclusions and policy recommendations

The present study investigates the possible interrelationship between housing credit and female labour supply decisions in the case of Greece. The analysis is based on data from the EU Survey on Income and Living Conditions (EU-SILC) that includes additional household data from the 'Over-indebtedness and financial exclusion' survey of 2008 that was further enriched with unpublished data on housing credit collected by EL.STAT.

Following recent advances in econometric modelling mortgage debt and female labour supply, we estimated probit models to get a better insight into the main socioeconomic determinants of the two variables. The empirical results suggested that the mortgage debt and the wife's participation decisions are not statistically independent.

Subsequently, to investigate the potential relationship between the two variables we estimated probit models with endogenous regressors. In the mortgage loans equation the partner's female labour force participation is an endogenous variable, while in the wife's labour force participation equation, mortgages are endogenous.

The empirical results showed that mortgage decisions and female labour supply decisions are interrelated. In other words, the wife's decision to enter the labour market relaxes the household credit constraints and increases the probability for the household to acquire a mortgage. At the same time, if a family has a mortgage debt the wife is encouraged to join the labour market.

Furthermore, as expected, both decisions, for a household to get a mortgage and for the wife to seek for a job are affected by financial and socioeconomic factors. Thus, the probability of obtaining a mortgage is positively influenced by factors such as the wife's age, the husband's income and education level, the couple's familiarity with banking transactions and the presence of small children. On the other hand, the probability for a wife to participate in the labour market is positively affected by her education level and her age and negatively by her husband's income and the presence of small children in the family.

In the economic literature, the relationship between credit developments and economic activity is well founded. The evidence we have provided on the interdependence of housing credit and female labour participation has significant implications for economic growth. Since borrowing constraints induce women to enter the labour market and vice versa, housing credit policies could have a significant positive impact on employment and real economic activity. This is particularly important for countries sharing similar characteristics to Greece, which has one of the lowest female employment and participation rates among the EU countries. Labour and social policies aiming at boosting female employment would alleviate the burden on social security and the public debt. At the same time, the increase in female labour supply relaxes household financial constraints and may make a positive contribution to financial intermediation and development.

References

- Acemoglu, D. (2001), "Credit Market Imperfections and Persistent Unemployment", *European Economic Review*, 45, 665–679.
- Aldershof, T., Alessie, R. and A. Kapteyn (1999), *Female Labour Supply and the Demand for Housing*, Centre for Economic Research, Tilburg University, No. 9746.
- Amemiya, T. (1979), "The Estimation of a Simultaneous-Equation Tobit Model", *International Economic Review*, 20, 169–181.
- Amemiya, T. (1978), "The Estimation of a Simultaneous Equation Generalized Probit Model", *Econometrica*, 46, 1193-1205.
- Bank of Greece (2009), *Mortgage Markets: Developments and Prospects*, Bank of Greece, Proceedings of Bank of Greece Workshop, 29 April 2009 (in Greek).
- Belkar, R., Cockerell, L. and R. Edwards (2007), *Labour Force Participation and Household Debt*, Reserve Bank of Australia, RDP 2007-05.
- Bottazzi, R. (2004), Labour Market Participation and Mortgage Related Borrowing Constraints, *The Institute for Fiscal Studies Working Paper* 04/09.
- Brissimis, S. N., E. N. Garganas and S. G. Hall (2011), *Consumer Credit in an Era of Financial Liberalisation: An Overreaction to Depressed Demand?*, Mimeo, Bank of Greece.
- Brissimis, S. N. and T. Vlassopoulos (2009), "The Interaction between Mortgage Financing and Housing Prices in Greece", *The Journal of Real Estate, Finance and Economics*, 39, 2, 146-164.
- Central Banking* (1995/6), "Special Feature: The Bank of Greece", *Central Banking*, 6, 3, Winter, 55-85.
- Courakis, A. (1981), "Financial Structure and Policy in Greece: Retrospect and Prospect", *Greek Economic Review*, 205-244.
- Dau-Schmidt, K. (1997), "An Empirical Study of the Effect of Liquidity and Consumption Commitment Constraints on Intertemporal Labour Supply", *Journal of Economics*, 23, 89–105.
- Del Boca, D. and A. Lusardi (2003), "Credit Market Constraints and Labour Market Decisions", *Labour Economics*, 10, 6, 681-703.
- Engelhardt, G. and C. Mayer (1998), "Intergenerational Transfers, Borrowing Constraints, and Saving Behaviour: Evidence from the Housing Market", *Journal of Urban Economics* 44, 135-157.
- Eschenbach, F. (2004), *Finance and Growth: A Survey of the Theoretical and Empirical Literature*, Tinbergen Institute Discussion Paper.
- Fortin, N., J. (1995), "Allocation Inflexibilities, Female Labour Supply, and Housing Assets Accumulation: Are Women Working to Pay the Mortgage?" *Journal of Labour Economics*, 13, 3, 524-557.

- Guiso, L. and T. Jappelli (2002), "Private Transfers, Borrowing Constraints and the Timing of Home-ownership", *Journal of Money, Credit, and Banking*, 34, 2, 315-339.
- Halikias, D. (1978), *Money and Credit in a Developing Economy: The Case of Greece*, New York University Press, New York.
- Hardouvelis, G. (2009), "The Importance of the Housing Market in the Economy", *Bank of Greece (2009) op. cit.*
- Harkness, J. and Newman, S. (2003), "Differential Effects of Homeownership on Children from Higher and Lower Income Families", *Journal of Housing Research*, 14, 1-20.
- Havet, N. and A. Penot (2010), *Does Homeownership Harm Labour Market Performances? A Survey*, GATE Groupe d'Analyse et de Théorie Economique Lyon St-Etienne, WP 1012, May.
- Houdré, C. (2008), "Offre de Travail et Accession à la Propriété : L'impact des Contraintes d'Emprunt sur l'Activité des Femmes en France", *Economie et Statistique*, N° 417-418, 153-172.
- IMF (2007), *IMF Country Report, Selected Issues: Greece*, International Monetary Fund, No. 07/27, January.
- Joesch, J. (1994), "Children and the Timing of Women's Paid Work After Childbirth: A Further Specification of the Relationship", *Journal of Marriage and the Family*, 56, 2, 429-440.
- Levine, R. (1997), "Financial Development and Economic Growth: Views and Agenda", *Journal of Economic Literature*, Vol. 35, 2, 688-726.
- Lolos, S. (1988), "The Development of Reserve Requirements in Greece", *Hellenic Bank Association Bulletin*, 20, September, 3-14 (in Greek).
- Mitrakos, T. and G. Simigiannis (2009), "The Determinants of Credit and of Financial Stress of Households in Greece", *Economic Bulletin*, Bank of Greece, 32, 7-29 (in Greek)
- Mitrakos, T, G. Simigiannis and P. Tzamourani (2005), "The Indebtedness of Greek Households: Evidence from a Survey", *Economic Bulletin*, Bank of Greece, 25, 15-40 (in Greek).
- Moriizumiy, Y. and M. Naoi, (2006), *Housing Tenure Transition and Female Labour Supply in Japan*, 10th Asian Real Estate Society (AsRES) International Conference.
- Newey, W. K. (1987), "Efficient Estimation of Limited Dependent Variable Models with Endogenous Explanatory Variables", *Journal of Econometrics*, 36, 231-250.
- OECD (1999), *Employment Outlook*, Organisation for Economic Coordination and Development, Paris.
- OECD (2002), "Women at Work: Who Are They and How Are They Faring", *Employment Outlook*, Chapter 2, Paris.

- Papapetrou, E. (2006), “The Public-Private Sector Pay Differential in Greece”, *Public Finance Review*, 35, 4, 450-473.
- Rivers, D., and Q. H. Vuong (1988), “Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models”, *Journal of Econometrics*, 39, 347–366.
- Simigiannis, G. and G. Hondroyiannis (2009), “Housing Prices: The Recent Greek Experience”, *Bank of Greece (2009) op. cit.*
- Simigiannis, G. and P. Tzamourani (2007), “Indebtedness and Socioeconomic Characteristics of Households: Results from Bank of Greece Surveys”, *Economic Bulletin*, Bank of Greece, 28, 35-56 (in Greek).
- Smith, R. J., and R. Blundell (1986), “An Exogeneity Test for the Simultaneous Equation Tobit Model with an Application to Labour Supply”, *Econometrica*, 54, 679-685.
- Voridis, H., Agelopoulou, H. and I. Skotida (2003), “The Greek Monetary Policy in the Publications of the Bank of Greece, 1990-2000”, *Economic Bulletin*, 20, January.
- Yoshikawa, H. and F. Ohtake (1989), “An Analysis of Female Labour Supply, Housing Demand, and the Saving Rate in Japan”, *European Economic Review*, 33, 5, 997-1023.
- Worswick, C. (1999), “Credit Constraints and the Labour Supply of Immigrant Families in Canada”, *The Canadian Journal of Economics*, 32, 1, 152-170.
- Wasmer, E., and P. Weil (2000), *The Macroeconomics of Credit and Labor Market Imperfections*, UBL Working Paper.

Appendix

Table A: Definition of variables used in the empirical analysis

Variable	Description
Mortgage	Dummy variable. Takes the value of one when the respondent has a mortgage debt and zero otherwise
Wives' participation rate	Dummy variable. Takes the value of one if the wife participates in the labour market and zero otherwise
Wife's Age (years)	Wife's age
Wife's age-squared	Wife's age squared
Number of children aged 0-4	Number of children below the age of four
Husband's secondary education	Dummy variable. Takes the value of one if the husband has secondary education and zero otherwise
Husband's tertiary education	Dummy variable. Takes the value of one if the husband has high education and zero otherwise
Wife's secondary education	Dummy variable. Takes the value of one if the wife has secondary education and zero otherwise
Wife's tertiary education	Dummy variable. Takes the value of one if the wife has high education and zero otherwise
Husband's monthly income	Husband's monthly income from work
Not in need of borrowing	Dummy variable. Takes the value of one if the household is not in need of borrowing and zero otherwise
Credit card	Dummy variable. Takes the value of one if the household has credit cards and zero otherwise
Cheque account	Dummy variable. Takes the value of one if the household keeps a cheque account and zero otherwise
Semi rural	Dummy variable. Takes the value of one for semi rural regions and zero for urban regions

Source: EU-SILC 2008

BANK OF GREECE WORKING PAPERS

116. Tagkalakis, A., “Fiscal Policy and Financial Market Movements”, July 2010.
117. Brissimis, N. S., G. Hondroyiannis, C. Papazoglou, N. T Tsaveas and M. A. Vasardani, “Current Account Determinants and External Sustainability in Periods of Structural Change”, September 2010.
118. Louzis P. D., A. T. Vouldis, and V. L. Metaxas, “Macroeconomic and Bank-Specific Determinants of Non-Performing Loans in Greece: a Comparative Study of Mortgage, Business and Consumer Loan Portfolios”, September 2010.
119. Angelopoulos, K., G. Economides, and A. Philippopoulos, “What Is The Best Environmental Policy? Taxes, Permits and Rules Under Economic and Environmental Uncertainty”, October 2010.
120. Angelopoulos, K., S. Dimeli, A. Philippopoulos, and V. Vassilatos, “Rent-Seeking Competition From State Coffers In Greece: a Calibrated DSGE Model”, November 2010.
121. Du Caju, P.,G. Kátay, A. Lamo, D. Nicolitsas, and S. Poelhekke, “Inter-Industry Wage Differentials in EU Countries: What Do Cross-Country Time Varying Data Add to the Picture?”, December 2010.
122. Dellas H. and G. S. Tavlas, “The Fatal Flaw: The Revived Bretton-Woods system, Liquidity Creation, and Commodity-Price Bubbles”, January 2011.
123. Christopoulou R., and T. Kosma, “Skills and wage Inequality in Greece: Evidence from Matched Employer-Employee Data, 1995-2002”, February 2011.
124. Gibson, D. H., S. G. Hall, and G. S. Tavlas, “The Greek Financial Crisis: Growing Imbalances and Sovereign Spreads”, March 2011.
125. Louri, H. and G. Fotopoulos, “On the Geography of International Banking: the Role of Third-Country Effects”, March 2011.
126. Michaelides, P. G., A. T. Vouldis, E. G. Tsionas, “Returns to Scale, Productivity and Efficiency in Us Banking (1989-2000): The Neural Distance Function Revisited”, March 2011.
127. Gazopoulou, E. “Assessing the Impact of Terrorism on Travel Activity in Greece”, April 2011.
128. Athanasoglou, P. “The Role of Product Variety and Quality and of Domestic Supply in Foreign Trade”, April 2011.

129. Galuščák, K., M. Keeney, D. Nicolitsas, F. Smets, P. Strzelecki and Matija Vodopivec, “The Determination of Wages of Newly Hired Employees: Survey Evidence on Internal Versus External Factors”, April 2011.
130. Kazanas, T., and E. Tzavalis, “Unveiling the Monetary Policy Rule In Euro-Area”, May 2011.
131. Milionis, A. E., and D. Patsouri, “A Conditional CAPM; Implications for the Estimation of Systematic Risk”, May 2011
132. Christodoulakis, N., and V. Sarantides, “External Asymmetries in the Euro Area and The Role Of Foreign Direct Investment”, June 2011.
133. Tagkalakis, A., “Asset Price Volatility and Government Revenue”, June 2011.
134. Milionis, E. A., and E. Papanagiotou, “Decomposing the Predictive Performance of The Moving Average Trading Rule of Technical Analysis: The Contribution of Linear and Non Linear Dependencies in Stock Returns”, July 2011.
135. Lothian, J. R., and J. Devereux, “Exchange Rates and Prices in the Netherlands and Britain over the Past Four Centuries, July 2011.
136. Kelejian, J., G. S. Tavlas, and P. Petroulas, “In the Neighbourhood: the Trade Effects of the Euro in a Spatial Framework”, August 2011.
137. Athanasoglou, P.P., “Bank Capital and Risk in the South Eastern European Region”, August 2011.
138. Balfoussia, H., S. N. Brissimis, and M. D. Delis, “The Theoretical Framework of Monetary Policy Revisited”, September 2011.
139. Athanasoglou, P. P., and I. Daniilidis, “Procyclicality in the Banking Industry: Causes, Consequences and Response”, October 2011.
140. Lazaretou, S., “Financial Crises and Financial Market Regulation: The Long Record of an ‘Emerger’”, October 2011.