

DETERMINANTS OF DEBT: AN ECONOMETRIC ANALYSIS BASED ON THE CYPRUS SURVEY OF CONSUMER FINANCES

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Abstract

This work is based on the Cyprus Survey of Consumer Finances (CySCF) and focuses on the investigation of home secured loans and consumer credit card outstanding balances among Cypriot families. The CySCF runs on a triennial basis with the first database created in 1999 (CySCF1999). According to CySCF1999 and CySCF2002, the overall participation in home secured debt among all families declined from 29.95% in 1999 and 29.77% in 2002 to 25.77% in 2005 (CySCF2005). Credit cards were introduced in the early 1980s and grew significantly during the 1990s. The overall percentage of Cypriot households holding credit cards is estimated at 41.7% for 1999, 50% for 2002, and 48% for 2005.

This work deals with the econometric analysis of home secured loans and consumer credit card outstanding balances and it provides results based on logit models. The main variables selected for home secured loans are the age, family status, specific attitude toward credit, employment status, and income. The resulting model exhibits a polynomial behaviour of degree two with respect to age. The main variables for consumer credit card balances are the age, education, general attitude, income code, home secu-

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red loans and riskiness. Worth noting is the high probability of having credit card balances for those households where the economically dominant unit is of low age with a positive attitude towards credit.

Keywords: debt distribution, family finances, home secured loan, credit card use, logit model.

1 Introduction

The surveys of consumer finances (SCF) are designed to gather detailed and comprehensive information on assets, liabilities, income and other financial characteristics of households. At the same time, such surveys combine portfolio data with information on demographic characteristics of each household, and on its attitudes towards borrowing, lending, risk taking and other related matters. In Cyprus, the survey runs on a triennial basis with the first survey completed in 1999. For details about the surveys of consumer finances, the reader may refer to Guiso et al. (2001) and Aizcorbe et al. (2003).

The period under investigation in Cyprus exhibits two very interesting features, the first feature being the fact that Cyprus experienced financial liberalization during the period of concern, and in particular interest rates were liberalized as of January 1st, 2001, which was seemingly to reduce the borrowing constraints of households by facilitating mortgage securitization and also by providing access to non-bank resources as substitutes for bank lending. Secondly, the Cyprus Stock Exchange (CSE), which started operating on March 29, 1996, was undergoing a remarkable increase in stock prices due to a prevalent euphoria about its prospects. The general price index of the CSE experienced a radical increase of 688% during 1999, with an average daily volume of approximately 17.5 million Cyprus pounds², followed by a subsequent fall of 65% during 2000. In addition, the burst of the bubble combined with low interest rates, initiated a flow of funds into land and real estate almost creating a second bubble in this market. On the other hand, the credit card use grew substantially during the 1990s and until 2002, due to its strong promotion by commercial banks, reaching the rate of 50%. Credit cards certainly are widely used and accepted by the public. Consumers use credit cards for two reasons: as a substitute for cash when making purchases and as a source of revolving debt.

The purpose of this work is to use the Cyprus Survey of Consumer Finances for the analysis of household portfolios in Cyprus. The interest in Cyprus is further enhanced by Cyprus being the only country outside the financially developed core that runs such a survey. Surveys of this nature can be used for studying numerous aspects of financial behaviour. The paper focuses first on the determinants of mortgages on primary residences in order to explore the debt burden of households. Secondly, we focus on the determinants of outstanding balances on consumer credit cards in order to investigate a number of concerns raised by the extended use of credit cards, the most significant of which is associa-

² The Cyprus pound has been replaced by the Euro as the official currency of the Republic of Cyprus since January 1st, 2008 at an irrevocable fixed exchange rate of 1 Euro to 0.585274 Cyprus pounds.

ted with the possibility that credit cards have encouraged widespread overindebtedness, especially among those who are least able to pay.

There is extensive work done on the analysis of the determinants of debt. Boheim and Taylor (2000), Banks et al. (2002), Cox et al. (2002) and May and Tudela (2005) make use of the British Household Panel Survey while the papers by Cox and Jappelli (1993), Zhu and Meeks (1994) and Crook (2001) use the USA Survey of Consumer Finances. The composition of liabilities as well as the changes in debt distribution of Cyprus household portfolios has been the subject of analysis of a recent paper by Antoniou et al (2004). Furthermore, the composition of household assets in Cyprus based on the first Cyprus Survey of Consumer Finances (CySCF1999) was the subject of a recent work by Kourouyiannis (2005). This paper deals with the determinants of home secured loans and credit card balances, comparing the periods before and after the financial liberalization, in the midst of a stock market bubble which lasted up to the end of 2000, with real estate prices rising rapidly. The paper is organized as follows. Section 2 offers a brief description of the Cyprus survey of consumer finances and Section 3 provides a preliminary analysis of various types of debts. Section 4 provides the results of a detailed econometric analysis, examining the determinants of mortgages on the primary residences (home secured loans) and consumer credit card balances, and comments and compares the results from the CySCFs. Section 5 provides concluding remarks.

2 The Cyprus Survey of Consumer Finances

The first Cyprus Survey of Consumer Finances took place in 1999 (CySCF1999), the second in 2002 (CySCF2002) and the third in 2005 (CySCF2005). The sampling design is based on standard area-probability multi-stage sampling techniques and provides two samples, the main and the wealthy samples. The main sample is a representative sample of the entire population included in the survey to ensure adequate representation of broadly distributed characteristics, while the wealthy sample is an overrepresented sample of wealthy households (oversampling). It is a common practice to use oversampling for the wealthy population since the wealthy population, while holding greater amount of assets, is proportionally smaller in terms of the total population. The CySCFs address the issue of statistical efficiency through the use of this dual-frame sample design. Appropriate weights were applied in the database to deal with the overrepresentation of wealthy households. For the CySCF1999, and after the application of the appropriate weights, the final sample comprised 1361 households. For CySCF2002 and CySCF2005 the corresponding sample sizes were 1197 and 1290 households respectively. The response rates for all surveys were between 70% and 80%.

The CySCF questionnaire follows mainly the format of the United States Survey of Consumer Finances and the interviewers used the paper and pencil (PAPI) data collection method. The interviews were conducted in person, averaged about 90 minutes and were completed by the economically dominant units of households. The questionnaire goes through a detailed list of items in order to, on the one hand, minimize the risk of forgetting to report specific items and, on the other, reduce the tendency to underreporting. The survey is organized in 16 sections ranging from demographic information and

household tendencies towards financial matters and financial institutions to detailed portfolio characteristics³.

The project has been financed by the Central Bank of Cyprus since its initiation in 1997 and it is conducted exclusively by a research group at the Research Unit of Banking and Finance at the University of Cyprus. Furthermore, the first two databases, namely CySCF1999 and CySCF2002, have been recently incorporated into an international database of SCF, known as Luxembourg Wealth Study (LWS).

3 Preliminary analysis

This section makes brief references to family liabilities. The types of household debts include credit card balances, mortgage and home equity, loans for investment in real estate and loans for businesses. Finally, the definition of “other debt” covers all other types of loans, namely home improvement loans, student loans, consumer loans (overdraft facilities, household item loans, medical debts, loans from friends or relatives and generally other consumer loans), personal debts from business and loans against life insurance policies.

Table 1 provides the participation rates of households for the principal types of debts. The portion of households with any type of debt decreased from 63.14% in 1999 and 62.29% in 2002 to 50.12% in 2005. The results are mixed for the share of households with loans backed by real estate other than their primary residence. More specifically, the share of families with such loans increased from 4.96% in 1999 to 6.37% in 2002 and then dropped to 2.5% in 2005. This comes as a natural consequence of an unclear picture of the economic activity in both the Cyprus Stock and the Land Market. Indeed, the dramatic fall of the Cyprus Stock Market in 2000 spurred the inflow of funds into the real estate market which in turn created yet another bubble there. In recent days, households have been hesitant to invest in land, not only because of a (possibly dramatic) collapse of this market, but also because the Euro, which came into circulation in Cyprus on January 1st, 2008, may affect the national economy including the real estate market. It is true that the Cyprus Government, in order to minimize the widespread speculation over rising consumer prices, launched a *Fair Pricing Code* which has been signed so far by more than 5000 private businesses including all private banking institutions and many construction companies and real estate agencies. It is realistic to expect that a transition period lies ahead which may last for at least a few months until the Cypriot households understand and realize the consequences of entering the Eurozone before resuming investment activities.

The highest debt participation of families was in home secured debt, which refers to mortgage loans raised by households for the purchase of primary residences. Between 1999 and 2002, home secured debt as a share of total family debt declined slightly from 56.38% to 54.8%, but then increased to 71.48% in 2005. Moreover, the overall participation of families in mortgages declined from 29.95% in 1999 and 29.77% in 2002 to 25.77% in 2005, a decrease though which is not statistically significant.

³ The codebook for the CySCF2002 is available on the project website at http://www.ucy.ac.cy/~alex/Alex_Karagrigoriou_Files/Codebook_CySCF2002.pdf.

Table 1 Household Participation in Various Debts: CySCF1999 vs. CySCF2002

	1999	2002	2005
Type of Debt	63.14	62.29	50.12
mortgage and home equity	29.95	29.77	25.77
loans for investment in real estate	4.96	6.37	2.5
credit card balances	20.11	20.37	17.41
business loans	11.0	9.7	2.2
other debt	25.94	24.99	17.81

Source: Figures based on the CySCF1999, CySCF2002 and CySCF2005

Credit cards were introduced in the early 1980s and grew significantly during the 1990s. According to unpublished Central Bank of Cyprus data the number of credit cards reached 350,000 by the end of 2001.⁴ The overall percentage of Cypriot households holding credit cards is estimated at 41.7% for 1999. This percentage increased to 50% in 2002 and to 48% in 2005, reflecting a stronger promotion of credit cards by commercial banks. As a matter of fact, nowadays banks tend to offer credit cards together with checking accounts. Close to a half of credit card holders (48%) in 1999 had outstanding balances on their credit cards, bringing the percentage of debt revolvers in the population to slightly above 20% (Haliassos et al., 2003). Conditional on having a credit card, the percentage of Cypriot households with unsettled credit card balances was 38% in 2002 and 34% in 2005, while the percentage of debt revolvers in the population was 20% and 17.5% respectively. The percentage of households with unsettled credit card balances decreased after 2001 compared with 1999, due to the fact that prior to 2001, interest rates on credit cards and other loans were about the same, as there was no interest rate ceiling. After the liberalization of interest rates in 2001, however, interest rates on checking accounts trended downwards, whereas interest rates on credit cards increased. As a result, borrowing on credit cards became relatively more expensive than taking on loans, and hence people switched from credit card borrowing to other means of borrowing. However, due to increased participation in credit cards, the percentage of debt revolvers in the population remained the same in the two comparison years. Revolving debt credit card participation increases with income indicating (a) a greater probability of having credit cards and (b) a tendency for wealthier people to use them.

Table 2 provides the participation rates for home secured loans according to the age of the economically dominant individual in the household as well as the percentage of households according to the amount owed in Cyprus pounds (CY£). Table 3 provides the corresponding values for consumer credit use. Table 2 shows that the participation rate in home secured debt is as expected, lower in the younger and older age groups. On the other hand, according to Table 3, younger groups have a high participation rate in consumer credit cards. Table 3 also shows that the percentages of households with zero or high credit card balances (over 1001 CY£) increased between 1999 and 2002 and remained high in 2005.

⁴ The population of Cyprus according to the 2001 Census is 686,000.

Table 2 Household Participation in Home Secured Debt (%)

	1999	2002	2005
Participation Rate by Age			
< 29	28.6	31.3	14.5
30-39	41.7	47.6	36.0
40-49	52.2	49.0	36.8
50-59	43.1	39.9	39.0
60-69	32.5	22.9	26.1
> 70	11.5	9.2	14.1
Percentage of Households with Mortgages by Amount Owed (in Cyprus pounds)			
0-1000	0.7	0.4	0.9
1001-5000	3.7	2.0	3.2
5001-10000	4.3	5.7	3.3
10001-20000	7.3	7.4	5.8
Over 20000	10.2	13.5	12.6

Source: Figures based on the CySCF1999, CySCF2002 and CySCF2005

Table 3 Household Participation in Consumer Credit Cards (%)

	1999	2002	2005
Participation Rate by Age			
< 29	45.2	67.9	58.9
30-39	48.1	63.6	74.8
40-49	52.4	58.4	47.8
50-59	32.6	49.8	35.5
60 – 69	27.4	31.8	18.6
> 70	19.6	16.9	11.6
Total	41.7	50.8	47.9
Percentage of Households with credit cards by Amount Owed (in Cyprus pounds)			
< 0	52.2	62	64.5
1-250			5.2
251-500			7.4
501-750	34.3	23.5	4.3
751-1000			3.4
Over 1001	13.7	14.4	15.2

Source: Figures based on the CySCF1999, CySCF2002 and CySCF2005

4 Econometric analysis of debts

The econometric model used in the analysis is a binary dependent variable model in which the dependent variable may take on only two values (i.e. having a specific type of debt = 1 or not having a specific type of debt=0). In the present work we are interested in modelling (a) the home secured loan status and (b) the consumer credit card balance status for each household (whether the household has a debt, or not). The households differ in income size, employment status, marital status, educational level, family size, age, etc., which will play the role of explanatory variables in the logit model, whose purpose is to quantify the relationship between those characteristics and the probability of one having a loan. The analysis also employs the concepts of ability and willingness for household classification. A household's ability is measured by a number of qualitative and quantitative factors that convince the lender that the borrower is able to repay the debt. Employment status, education, family status, family size, age, liquidity, riskiness and income are the ability variables used in the present analysis. A household's willingness to borrow is the perpetual and behavioural acceptance of the choice to borrow and is measured by two variables / indicators, namely the general attitude and specific attitude. The econometric analysis provides the necessary tools to examine the significance of different characteristics and determine how a change in any characteristic affects the probability of one having a loan. For econometric analyses similar to the one adopted in the present paper the reader is referred to the works of McFadden et al. (1985), Zhu and Meeks (1994) Kraay and Nehru (2006) and Karagrigoriou and Vonta (2006).

4.1 Ability Variables

Two sets of ability variables have been used in the econometric analysis of both home secured loans and credit card balances, namely economic variables and demographic variables. The economic variables are: 'income code', 'risky' and 'liquid'. Family gross income was obtained by summing up all sources of income of all family members before taxes and other deductions and then classified into eight groups according to income size. The "risky" variable is a binary variable that measures the family's willingness to take risks by checking whether or not (1 or 0) the household has invested in stocks, warrants or rights. Finally, the "liquid" variable is also a binary variable that shows the household's ability to secure a loan by checking if an application for loan has been turned down in the past (1 = "yes" and 0 = "no").

The demographic variables used are: 'education', 'employment', 'family status', 'family size' and 'age'. The *education* variable refers to the educational level of a household's head which is classified into six groups: no primary school, primary school not completed, primary school education, gymnasium and lyceum, and, finally college/university education. The *employment* variable refers to the current work status of the household's head which has been split into three dummy variables: 'employment1' (being or not a public employee), 'employment2' (being or not a private employee or self-employed) and 'employment3' (being or not being retired, student or other not included in any other category). The *family status* of the household's head was classified as single (0), married (1), living as partners (2), widow/widower (3) and separated/divorced (4). The *family size*

covers the grandparents living in the household and all dependent children, even those who are abroad for studies, and, for the CySCF databases, it ranges from 0 to 9. The *age* and *age#2* variables refer to the age and Age square (Age^2) of the household's head. The *age#2* variable is examined in order to capture the expected polynomial relation between income and *age*, which, in previous analyses for home secured loans, was found to have the general shape of $-x^2$. The controlling of all these variables eliminates systematic or confounding influences which might be exerted on the depended variable.

4.2 Willingness Variables

The attitude towards credit was measured by two indicators: the *general attitude toward credit* variable and *specific attitude toward the appropriateness of credit use* variable. In both cases the higher the scores, the more favourable the family's attitudes toward credit. The *general attitude* measures a respondent's feeling about credit in general by asking "Do you think it is a good or a bad idea for people to buy things on the instalment plan?" There were three choices for response: "good idea" as the most supportive choice, "bad idea" as the least favourable choice, and "good in some ways, bad in others" as an in-between choice.

The *specific attitude* was constructed from a five-item index of different reasons for borrowing money. Respondents were asked: "Tell me if it is all right for someone like you to borrow money to: (1) cover the expenses of a vacation trip; (2) cover living expenses when income is cut; (3) finance the purchase of a fur coat or jewellery; (4) finance the purchase of a car; (5) cover educational expenses?" Each of the 'yes' responses was given one point and the points were summed up to give a specific attitude index from zero to five. A zero score indicates that none of the items were viewed as appropriate choices for credit usage.

The two willingness variables are presented in Table 4. Observe that almost half of Cypriot households (from 43.5% in 2002 to 49.7% in 2005) think that it is a good idea in some cases and bad in others to buy on credit. On the other hand, a proportion of households around 60% (from 53% in 2005 to 69% in 1999) feel comfortable in purchasing on credit 1-2 items from the five-item list given to them (see above).

4.3 Preliminary Variable Analysis

In order to access the significance of the variables involved in the analysis we focus briefly on the information theory which is important because it can provide for interdependency analysis. Information theory techniques are useful in revealing the association between variables or the information contained in a variable. Shannon's entropy is frequently used in creating a balanced data set by identifying variables with no useful information. If a variable X takes n values X_1, \dots, X_n with probabilities p_1, \dots, p_n , then the entropy or information presented by the variable is given by

$$H(X) = \sum_{i=1}^n p_i \ln p_i \quad (1)$$

Table 4 Households' Attitude towards Credit (%)

	1999	2002	2005
General Attitude			
Good idea	35.8	36.1	19.8
Good or bad idea	46.0	43.5	49.7
Bad idea	18.2	20.4	19.4
No answer			11.1
Specific Attitude			
0 Least favorable	4.2	9.1	26.5
1	18.6	20.7	21.9
2	50.5	47.2	30.9
3	23.4	19.4	6.7
4	2.6	2.8	4.5
5 Most supportive	0.6	0.8	9.5

Source: Figures based on the CySCF1999, CySCF2002 and CySCF2005

Obviously, if X takes only one value, then $H(X)=0$ and the variable contains no useful information for the modeling task. This is equivalent to eliminating a variable from the analysis because of a very narrow or no range. The information in X is maximized when there is an equal probability of occurrence of each of the n possible outcomes of X , namely when $H(X) = \ln(n)$. The higher the entropy value the larger the amount of information contained in the variable. Note that the probabilities p_i , $i=1, \dots, n$ can be estimated using the frequency of the occurrence of the value x_i . If, for instance, N_i is the number of occurrences of x_i and N the total number of cases in the data set, then the estimator of p_i is given by $\sqrt{\hat{p}_i} N_i / N$.

For the CySCF1999, 2002, and 2005 databases, the only variable with almost no information is the variable *liquid* with entropy values between 0.07 and 0.09 (CySCF1999: 0.09, CySCF2002: 0.08 and CySCF2005: 0.07). Note that this is the only variable that does not appear in any of the models selected in the following subsections. The variables of interest, namely the home secured loans and the credit card balances have relatively high values of entropy that range between 0.5712 and 0.601 and 0.47 and 0.502 respectively. Recall that the maximum entropy value for bivariate variables is $\ln 2=0.69$. The entropy values of the variables of interest indicate that the structures of the 3 databases, as far as these variables are concerned, are quite similar. This observation is also confirmed by the entries in Table 1 relating to the participation rates of "mortgage and home equity" and "credit card balances".

Very strong entropy values have been observed for the variables *age code* and *income code* (entropy between 1.7 and 1.9 with a max value of 2.2), *general attitude* (entropy between 1.00 and 1.05 with a max value of 1.1) and *education* (entropy between 1.4 and 1.6 with a max value of 1.79). The only two variables with some variability in significance for the three periods in question are: *family status* (entropy between 0.47 and 0.80 with a max value of 1.61) and *specific attitude* (entropy between 1.2 and 1.6 with a max value of 1.79).

We close this section with a correlation analysis using Pearson, Spearman and Kendall's correlation coefficients, which has been carried out for all variables involved in the econometric analysis. The main conclusions are: (I) The strongest correlations were observed between *age and education* (between 0.23 and 0.56 for the 3 periods and the 3 coefficients) and *age and 'employment2* (between 0.23 and 0.33). The correlations are significant at the 0.01 level. (II) The home secured loans are correlated with: 'age', 'education', 'family status', 'family size', 'employment1', 'general attitude', 'specific attitude' and 'income'. The correlations are significant at the 5% level. (III) The credit card balances are correlated with: 'age', 'family size', 'education', 'income', 'employment1', 'general attitude', 'specific attitude', 'risky' and 'home secured loans'. The correlations are significant at the 5% level.

4.4 Econometric Analysis Results

Let Y be a random variable following a binomial (n, p) distribution where p is the probability of a household having a loan (either a home secured loan or a credit card balance). The binary logistic model used for the analysis requires the standard transformation

$$\text{logit}(p) = \ln(p/(1-p)) = b_0 + b_1 X_1 + \dots + b_k X_k, \quad (2)$$

where X_1, \dots, X_k are the covariates and $b_i, i = 1, \dots, k$ the corresponding binary logistic coefficients. The interpretation of the coefficient b is that a one-unit increase in the predictor leads to an increase in the logit score by b units. Then, the probability of one having a debt is given by

$$\hat{p} = \hat{P}(Y=1) = \frac{\exp[\hat{b}_0 + \hat{b}_1 X_1 + \dots + \hat{b}_k X_k]}{1 + \exp[\hat{b}_0 + \hat{b}_1 X_1 + \dots + \hat{b}_k X_k]} \quad (3)$$

where $\hat{b}_i, i = 1, \dots, k$ is the estimator of b_i . The results for the binary logistic model are presented for the years 1999, 2002 and 2005 and based on the stepwise model selection procedure according to which at each stage of the process the variable with the smallest Z -value is removed.

4.4.1 Results for Home Secured Loans

The regression analysis for home secured debt suggests that a polynomial relation of degree 2 holds with respect to the variable *age*. The resulting models appear in Table 5. The resulting significant variables are: *income code, family status (family size for 2005), specific attitude, employment status, age and age#2*.

From the signs of coefficients of the variables *age* and *age#2*, one can deduce that there is a maximum with respect to the *age* (i.e. a maximum age that maximizes the probability of one having a mortgage if all the other variables remain constant). Specifically, as age increases the probability of one having a mortgage increases up to a certain point, and then it starts to decrease as age keeps increasing. The age that maximizes the probability of one having a mortgage on their primary residence *ceteris paribus* (if all the other variables remain constant), can be obtained by taking the partial derivative of the dependent variable with respect to the relevant explanatory variable, in this case the variable *age*.

Table 5 The Logit Analysis Results

	Coefficient Estimate			Standard Error			Significance Level		
	1999	2002	2005	1999	2002	2005	1999	2002	2005
Age	0.216	0.157	-0.024	0.051	0.048	0.009	0.000	0.001	0.008
Age2	-0.003	-0.002		0.001	0.001		0.000	0.000	
Family Status							0.009	0.071	
Family Status(1)	-1.301	-1.100		0.664	0.763		0.050	0.149	
Family Status(2)	-0.216	0.456		0.543	0.451		0.691	0.312	
Family Status(3)	-1.583	1.804		1.233	1.305		0.199	0.167	
Family Status(4)	-1.883	0.079		0.926	0.719		0.042	0.912	
Income Code	-0.042	0.089	0.024	0.027	0.035	0.054	0.125	0.012	0.653
Specific Attitude	0.183	0.159	0.055	0.086	0.090	0.073	0.033	0.079	0.45
Family Size			0.417			0.063			0.000
Employment (1)		-0.487	-0.350		0.189	0.242		0.010	0.147
Employment (2)	0.262		-0.690	0.149		0.295	0.078		0.019
Intercept	-4.576	-5.356	-1.311	1.231	1.415	0.492	0.000	0.000	0.031

These maximum age values, along with predicted probabilities, are provided in Figures 1 – 4, according to employment status and for all the 3 databases. Observe that in all cases a maximum is attained in the age group 31-40 (age code=2) and that the probability of one having debt is always higher for public (government) employees. Observe also that for the year 2005, the probabilities are lower than in the other 2 cases due to the special features of the 2005 database in which a high proportion of retired households has been reported. In fact, the differences observed in Table 5 between the CySCF2005 and the other two databases may be attributed to this special characteristic of the 2005 database.

Observe that the maximum age observed in all Figures is expected, since most people around their thirties reach their peaks and feel the need of purchasing houses. This is the age when they have families and children and at the same time they have the economic capability to go through the process of purchasing homes. The chances of one having a debt after their forties are reduced and finally eliminated, since the probability that one will experience a change in their family status or financial status diminishes quite considerably.

Consider a *typical Cypriot household* with a 30-year old government employee as the household's head with an income ranging between 10000 – 15000 (10 - 15K) CY pounds who considers good reasons for taking on credit for the purchase of a car and a loan for educational purposes. For married couples, the results suggest a positive impact on one having a debt. This result is in line with the consideration that married couples with children have a stronger need for having a house than single or divorced individuals. *For a typical single Cypriot household* whose head has a university degree, there is 0.2065 less probability of having an outstanding home secured loan than for a *typical married Cypri-*

Figure 1 Predicted Probabilities in 1999 by Employment and Age

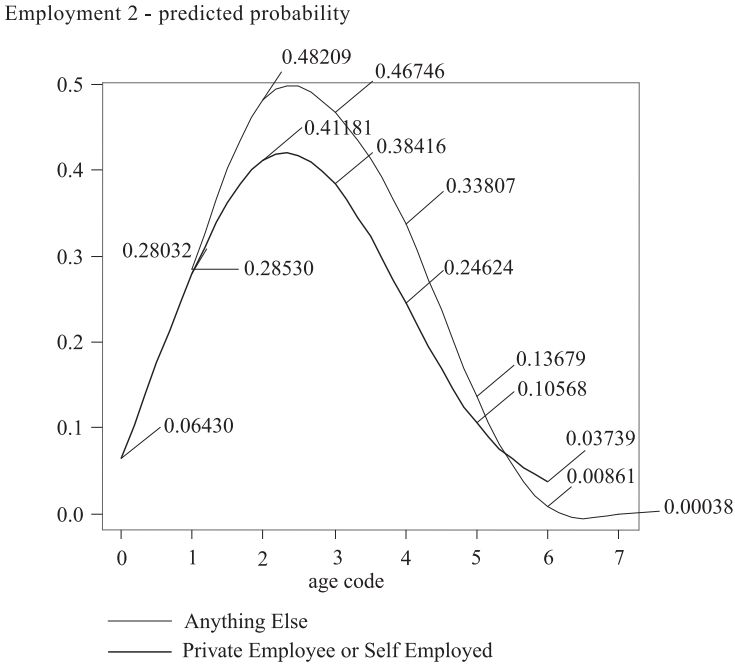


Figure 2 Predicted Probabilities in 2002 by Employment and Age

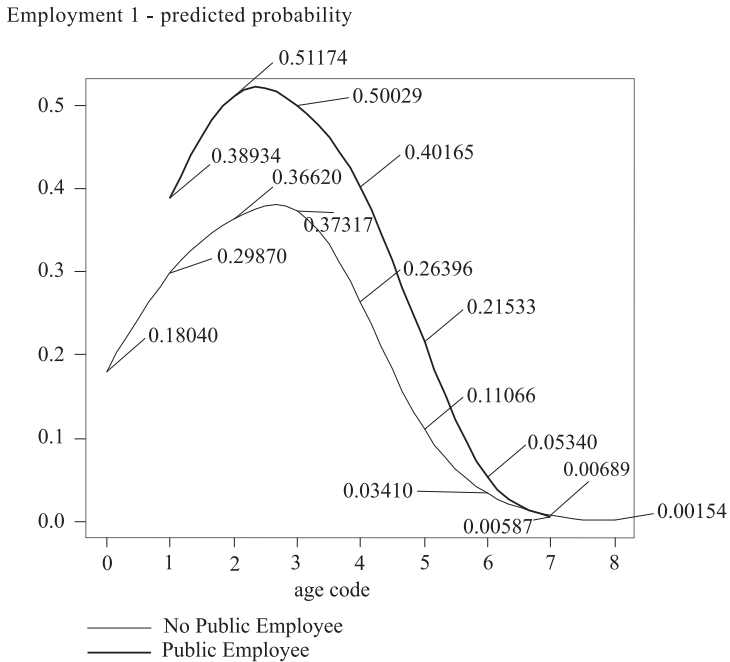


Figure 3 Predicted Probabilities in 2005 by Employment and Age

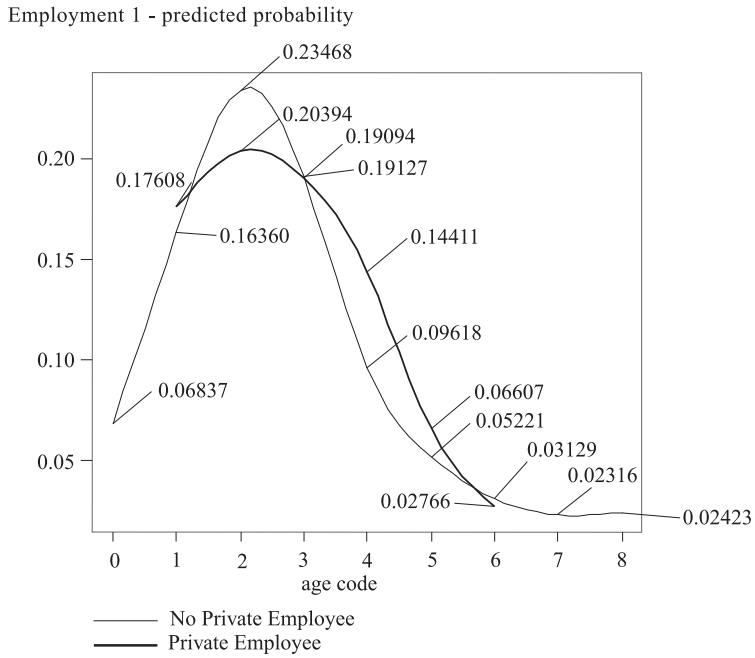
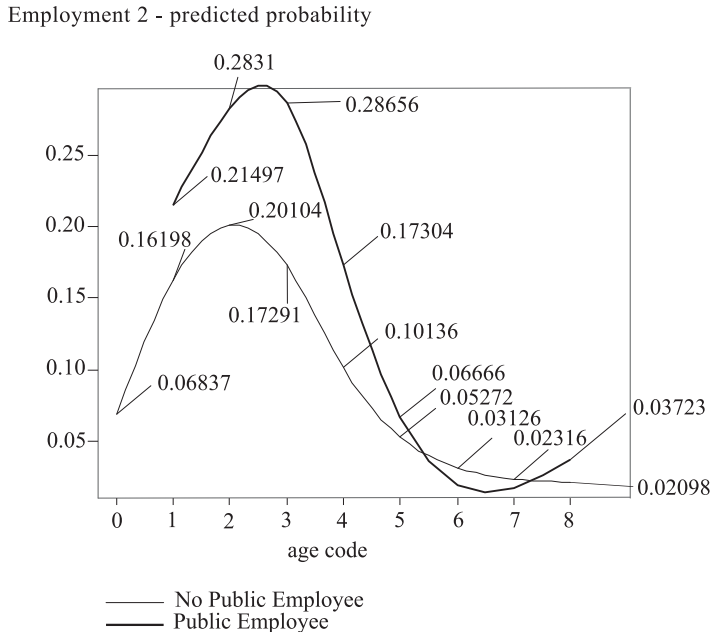


Figure 4 Predicted Probabilities in 2005 by Employment and Age



of household. Higher-income households are more likely to have or have had debts. This again stems from the fact that income is an important criterion applied by lending institutions for granting loans/mortgages. The *typical married Cypriot household* whose application for a loan has been turned down in the past has 0.02 less probability of having a home secured loan than a *typical married Cypriot household* with 2 units of increase in the income code (from 10 -15K to 20 - 25K).

The negative influence of 'employment status' indicates that households having most trouble with getting loans are non-public employees. In the case of students and unemployed persons there is an obvious explanation for this, but for private employees and self-employed individuals there is no clear explanation except the fact that they do not feel as secured as public employees in their working environments.

Finally, the positive influence of 'specific attitude' indicates that the chance of one having a loan is affected by his/her attitude towards credit. More specifically, those who are more willing to use credit are also more willing to attempt to secure the mortgages.

In order to investigate possible bias in coefficients or inefficiency in coefficient estimates, a detailed correlation analysis was carried out. The results show no sign of problematic effects associated with either colinearity or biased coefficients, or reduced efficiency of the coefficient estimates.

Finally, as it is very well known, a number of statistical tests can be performed for the quality assessment of the selected model. The Kolmogorov Smirnov (KS) test is one of the standard ways of measuring the predictive power of the selected model. In our setting, the KS test measures the maximum separation between those having the specific type of debt and those who do not. Furthermore, the Gini index measures the area between these two categories. A KS over 25% and a Gini index over 35% are standard measures of good fit for models. In the present case, the KS ranges from 30% to 38% for the 3 periods under investigation and the Gini index from 37% to 45%, which are considered quite good values for power separation.

4.4.2 Results for Consumer Credit Cards

Regarding the credit card balances, the resulting models for the first two databases appear in Table 6. The resulting significant variables are: *age code, education, general attitude, riskiness, agecode*incomecode, home secured loans and income code (only for 1999 and 2002)*.

Observe the negative effect of the 'home secured loans' which indicates that a household with a home secured loan has a higher chance of having outstanding balances on the family credit cards. Indeed, households with a home secured loan may experience economic difficulties and may in turn rely on credit cards to ease the burden of their economic obligations. The same conclusion applies to households that take risks by acquiring stocks, warrants or rights, as well as to low-income households. Furthermore, the higher the education level the stronger the probability of having outstanding balances.

Furthermore, observe the positive effect of the variables *agecode*incomecode* and *general attitude*. The result for the 'general attitude' is natural since it indicates that someone who shows positive attitude towards buying on credit has a higher chance of having

Table 6 The Logit Analysis Results

	Coefficient Estimate			Standard Error			Significant Level		
	1999	2002	2005	1999	2002	2005	1999	2002	2005
Age Code	-0.198	-0.283	-0.518	0.139	0.178	0.106	0.155	0.112	0.000
Risky	-0.510	-0.239	-0.298	0.164	0.192	0.261	0.002	0.214	0.255
Education							0.000	0.059	0.146
Education (1)	-18.43	-19.29	-18.95	28165.2	12745.3	10005.8	0.999	0.999	0.998
Education (2)	-1.437	-0.546	-18.60	0.765	0.605	6159.7	0.060	0.367	0.998
Education (3)	-1.607	-0.758	-0.994	0.364	0.389	0.404	0.000	0.051	0.014
Education (4)	-0.740	0.221	-1.000	0.311	0.322	0.421	0.017	0.493	0.017
Education (5)	-0.155	-0.097	-0.620	0.172	0.250	0.269	0.370	0.697	0.021
Education (6)		0.486	-0.427		0.288	0.337		0.091	0.204
Income Code	-0.148	0.534		0.076	0.165		0.052	0.001	
General Attitude							0.000	0.013	0.001
General Attitude (1)	1.799	0.485	1.431	0.446	0.622	0.635	0.000	0.435	0.024
General Attitude (2)	0.479	1.433	0.618	0.432	0.588	0.625	0.267	0.015	0.323
Home Secured Loans	-0.354	-0.477	-0.165	0.161	0.188	0.265	0.028	0.011	0.535
AgeCode*IncomeCode	0.049	-0.048	0.031	0.024	0.035	0.015	0.045	0.168	0.044
Intercept	0.209	-1.857	-0.421	0.569	0.748	0.767	0.713	0.013	0.583

outstanding balances on their credit card than someone with a negative attitude towards credit. The result for the combination *agecode*incomecode* indicates that the higher the value of the combination the stronger the probability of a revolving debt on the credit card. This result holds only for 1999 and 2005, but it is reversed for 2002. Note though that this is due to the effect of the *income code* which is negative for 1999 and positive for 2002.

For the quality assessment of selected models a KS test was performed and found to be between 40% and 42% for the 3 periods under investigation while the Gini index was found to be between 48% and 54%.

We close this section with predicted probabilities by calculating the marginal effects of changing particular characteristics with all others remaining constant. Such probabilities make the quantitative interpretation of the estimates much easier. Figure 5 shows the predicted probabilities of one having outstanding balance on their consumer credit card by age group and according to the *general attitude* variable for 2005. Observe the extremely high probability (over 50%) for those with low age and positive attitude towards credit. Figure 6 presents the same probabilities by educational level for 1999. The probabilities increase significantly for those with high educational levels. Figures 7 and 8 refer to the same predicted probabilities by age group and educational level according to the 'risky' variable which measures the amount of risk taken by households. The behaviour of the two graphs is identical to the behaviour observed in the previous graphs, but the differences are not as strong as before.

Figure 5 Predicted Probabilities in 2005 by General Attitude and Age

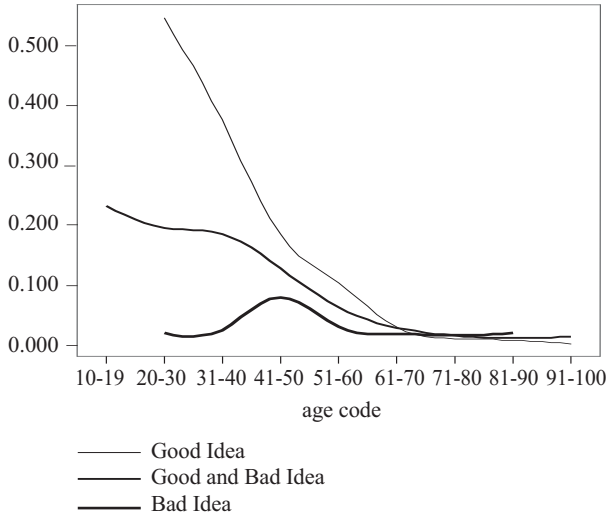


Figure 6 Predicted Probabilities in 1999 by General Attitude and Education

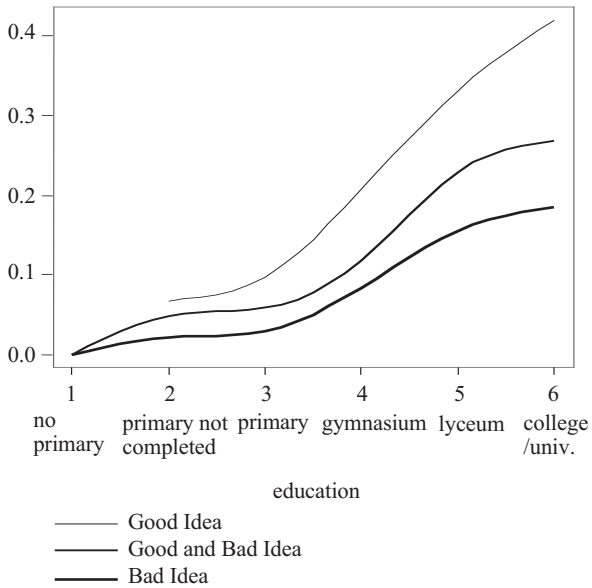


Figure 7 Predicted Probabilities in 2005 by Riskiness and Age

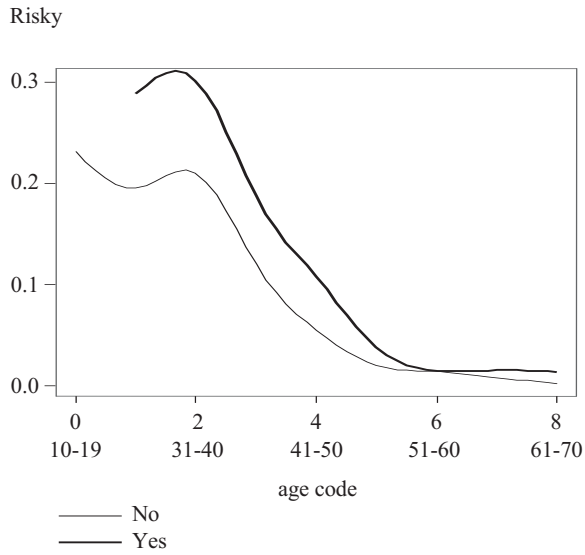
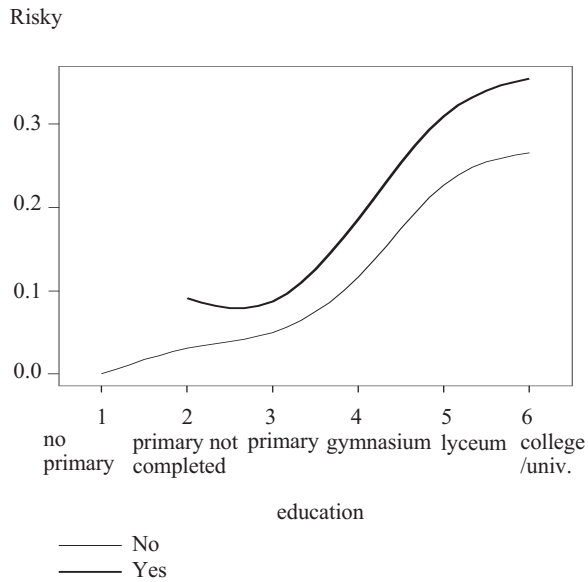


Figure 8 Predicted Probabilities in 1999 by Riskiness and Education



5 Conclusions

In this paper we examine the determinants of two of the most important types of debts, namely home secured loans and consumer credit card outstanding balances, using the Cyprus Survey of Consumer Finances. It should be noted that loans for primary residences account for the largest share of the Cypriot households' debt, something that also applies to other countries like the USA, although in the US the proportion of home secured debt to total debt exceeds that in Cyprus. This is probably due to the fact that Cypriot households borrow relatively more than the US households to purchase cars, finance the education of their offspring or invest in real estate.

For home secured loans the results suggest a polynomial of degree 2 with respect to the age of the household head. The other determinants for which evidence was found are income, family status (family size for 2005), employment status and specific attitude which is an of households' attitude toward the appropriateness of credit use. In fact, this indicator has a positive effect on one having a home secured loan. The form of the resulting econometric model implies that there is an age between 31 and 40 for which there is maximum probability of one having a mortgage is maximized.

Finally note that although the percent of households with any type of debt has decreased significantly, from approximately 63% before 2002 to almost 50% in 2005, home secured loans as a share of total household debt has increased considerably, from approximately 55% before 2002 to 71.5% in 2005. This clearly shows that although other needs may be neglected and fewer families may be in debt, the need for purchasing a house remains a high priority in Cyprus. In a world of overconfidence, many financial institutions in the States and in Europe have lowered considerably their criteria for mortgages by providing such loans without collateral to high-risk households (with low income and at low or high age) which usually struggle to meet their debt obligations. The first results of these tactics are the losses recently occurred due to the problems of the US subprime mortgage industry. The consequences of such practices have dramatically affected the international market and the global economy in the second half of 2007 with rapid drying up of liquidity. The efforts of global central banks to increase liquidity in the financial system may not be enough to clear the risk of a financial crisis. After the recent market turmoil, financial institutions have to reconsider their tactics. Some analysts believe that they should return to firm financial criteria for mortgages since the new tactics have reached the tipping point where they contribute to instability rather than mitigate it. Although the complexity of the financial instruments involved makes accurate forecasts impossible, there are bankers and regulators who think that the market problems may be intense now but will abate over time. After all, no big institution is likely to go under in stark contrast to the Savings and Loan Crisis of the 1980's. Some policymakers believe that what we are experiencing is a process of adjustment and learning, and through this learning process, no matter how painful it may be, the system could emerge in a much better shape.

As concerns credit cards with outstanding balances, among the main determinants one notices a number of parameters related to households attitude toward credit, namely the riskiness (whether the household invests in stocks, warrants or rights), the existence or not of a home secured loan, and the general attitude toward the appropriateness of

credit use. The other determinants are age, educational level, income (for 1999 and 2002 only) and the combination of age and income.

One of the key risks associated with credit card debt and unsecured debt in general is that it is increasingly used by high-risk borrowers. Indeed, our results show the negative effect of home secured loans and low income on the chance of keeping outstanding balances on credit cards. It is true that the expanded availability in recent years, of card-based credit especially to lower-income households has raised a number of concerns. The first issue is whether households fully understand the costs and implications of using credit cards, whereas the second refers to whether the credit card availability has encouraged widespread overindebtedness, particularly of lower-income households. These issues are very serious, since debt and real estate auctions have increased considerably over the years. At the same time, the continued use of credit as a payment device in lieu of cash may result in further financial distress. The problem may become more serious if one takes into consideration the fact that Cyprus entered the Eurozone on January 1st, 2008. Indeed, the Eurozone interest rates have a tendency to increase, obviously causing distress to households, especially those that have borrowed at variable interest rates. It is worth mentioning that in some Eurozone countries (e.g. Greece) the number of real estate auctions increased by 40% between 2006 and 2007.

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