

# Household financial portfolios in an emerging economy – the case of Chile

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## Abstract

This paper investigates household financial portfolios in Chile. With application of latent class modelling our analysis reveals presence of nine diverse patterns of financial behaviour. Chilean households demonstrate a strong tendency to mix credit and savings in their financial portfolios contradicting classical economic assumptions. We demonstrate that significant share of indebted seeks credit in the informal sector even when they are able to save on regular basis and thus should be a target group for the formal credit. By investigating marginal effects, we show that households with moderate and high income are more likely to be immersed in non-banking debts, while much less likely seek the debt for education. This has strong policy implications pointing to high liquidity constraints for households with lower incomes and high potential burden of educational debt among disadvantaged populations. Investigation of marginal effects of participation in different groups with respect to age revealed a number of non-linearities. At the early stages of the life cycle age acts towards inclusion to the financial market, while households with head aged over 50 and especially 70 tend to withdraw from the market. However, households with older heads become much more vulnerable increasing their likelihood of entering in the over-indebted state.

JEL-codes: G11, G02, O12

Keywords: financial behaviour, latent class models, financial portfolio, Chile

# 1 Introduction

Under imperfect financial markets various forms of assets become conceptually distinct from various forms of liabilities (Bertola & Hochguertel, 2007) rendering the analysis of household financial portfolios an important issue for the research on human economic behaviour, regulatory policy and the financial sector itself. As described by Kamleitner & Kirchler (2007) the process of financial product acquisition is complex and multi-stage. Additionally, because households are not the only actors in the process, their financial decisions require sometimes difficult trade-offs between financial products (“Household finance,” 2015). These conditions create environment for existence of variety of financial products but more importantly stimulate use of multiple products in a single household. This is evident on developed markets but even more so on the markets undergoing the process of development with a large group of disadvantaged, impoverished households. In consequence, a differentiated financial product mix emerges as a reflection of interactions between supply, regulation and demand.

Households freely choose between different providers of financial products leaving little or no trace of currently owned financial product mix among financial service providers. Hence, investigation of financial products bundles needs to rely on household data. The analysis conducted in this article is especially important from the behavioural perspective as it enables us to define how do the consumers, in an emerging economy like Chile, mix financial products and what are the socio-economic determinants of the financial product mix.

Consequently, the objectives of the paper are twofold. First, we want to shed light on how financial products are mixed and consequently, what is the number of classes of financial product users in Chile. The second objective is to search for determinants of specific selections of financial products. To this end, we employ segmentation with latent class models to analyse the bundles in which financial products are held. Segmentations with simultaneous analysis of all dimensions are important for marketing strategies utilising similarities and dissimilarities in consumer behaviour but also are a very important tool for product development, product introduction, and cross-selling (Bijmolt, Paas, & Vermunt, 2004). Comparisons from the international perspective yield a value added for financial company growth as they facilitate adequate market entry (Marois, 1997).

## 2 Literature review

International segmentations conducted by deriving cross-national segments of consumers has been performed by various authors (e.g., Bijmolt et al., 2004; Ter Hofstede, Steenkamp, & Wedel, 2002), yet approaches to the financial market are still rare. One of the initial studies in this respect was published by Gunnarsson & Wahlund (1997). They demonstrate segmentation of consumers on Swedish market with respect to their financial strategies involving savings and debt. Their clusters differ in their risk-taking attitudes and behaviour but, due to a lack of information on credit targeting at the household level, very little detail regarding household borrowing strategies is provided. Viaud & Roland-Lévy (2000), using information from 50 semi-structured interviews, identify four types of household behaviour based on their financial strategies: “prudent” and “savers”, who rarely use credit instruments, and “fragile borrowers” and “prodigal households”, who use credit extensively.

An approach to segmentation with respect to financial products can be also found in (Bijmolt et al., 2004). Their analysis indicates that in the light of Eurobarometer 2001 data Europe seemed to be made of a group of heterogeneous countries considering ownership of the financial products. They identified certain countries with similarities, like Belgium, the Netherlands and Germany, but also they showed that little similarities in financial product possession patterns can be found in Southern European countries. Numerous consumer segments identified in their study point to very diversified attitudes in holding financial products. Similar study has been conducted for South African citizens by (Ngwenya & Paas, 2012), who find that larger differences between households result from the number of financial products they own and are not limited to the choice between either saving or taking credit behaviour. They also show that the conclusions resulting from classic life-cycle theory, which assumes that those in the middle stages of their life-cycle should be more active on the financial market being manifested with larger possession of financial products, do not hold. They find that young and middle aged households are the most active with possession of the financial products, which suggests that participation in segments with high financial product use has its roots in the innovation theories of the financial market (Chakravarty & Dubinsky, 2005) and hence is more pronounced among the innovators – usually young, wealthy and educated. We suspect that Chile can also be exhibiting the same pattern.

As demonstrated also by Christelis, Georgarakos, & Haliassos (2013) households of comparable characteristics apparently make a different portfolio choices. It stimulates further search for the motives behind the financial product choice especially in the area of financial product mix, i.e.

identification of the patterns in which households use bundles of financial products. Financial portfolio choices are not uniquely determined by the individual characteristics. Studies conducted with European data show also that it is hard to identify geographical patterns. Within Europe similarities emerge between countries perceived as highly differentiated (e.g. Spain and the UK), which additionally hardens establishing traditional divisions between ‘northern’ and ‘southern’ group of countries (Haliassos et al. 2016).<sup>1</sup> However, there is a set of arguments in the literature pointing to specific household behaviour and explaining portfolio choices.

Financial product choice to a large degree relates to long-term household strategies. In long term horizon household financial behaviour is probably best defined by traditional life-cycle hypothesis (Friedman, 1957; Modigliani & Brumberg, 1954). In order to meet the life-cycle goals, especially significant borrowing needs at the early stages of the life-cycle, households seek long-term financing with mortgages and loans for purchase of durables. Jappelli and Pagano (1989) showed, however, that households often do not have unlimited access to credit. Their participation is limited by capital market imperfections leading to strong-form liquidity constraints. Under such constraints a group of households is completely excluded from the credit market<sup>2</sup> and consequently their portfolios lack credit products – mortgages but also ones of the smaller value like credit cards or consumer credit. Differential interest rates between savings and credit but also between different credit products or even between different goals for credit uptake, create an additional wedge leading to exclusion of a group of households – in the form of weak liquidity constraints. Households are subject to weak liquidity constraints very often due to their relatively low incomes. Their position is additionally aggravated as, following Piketty (2014), they tend to obtain low rates of return on their savings and even if are able to obtain any kind of credit financing, they face higher interest rates. As a result, liquidity constraints flatten the life cycle saving profile, limiting access to all kinds of debt at the early stages of the life-cycle when incomes are low. Additionally, they reduce household participation in credit markets leading to reduced ownership of credit products in households’ portfolios.

The life-cycle theory even with liquidity constraints fails to provide sufficiently good explanation for diversified household financial portfolios. The most puzzling behaviour is associated with

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<sup>1</sup> Christelis et al. (2013) claim also that differences in the use of financial products are more pronounced between the European countries than between US regions, which indicates that European integration is far from being concluded.

<sup>2</sup> Empirical support for this finding has been presented by Flavin (1981).

simultaneous possession of positive financial assets and credit products. Households, instead of drawing on their assets finance consumption with expensive short-term debt (consumer, credit card) (Telyukova, 2013). There are probably few reasons for this.

First of all, household access to credit products is to a large extent associated with the ‘ability to pay’ hypothesis (Crook & Banasik, 2012). This hypothesis states that households default when they lose ability to repay their debts. So, households with higher risk of default face higher interest rates, which in turn increases their probability to default creating a vicious circle. Hence, presence of differentiated ‘ability to pay’ in the economy should manifest itself in differentiated access to groups of products. Households with the lowest ability to pay might be excluded from long-term, low-interest credit markets.

Second, the presence of the ‘ability to pay’ is also partially recognised by households, which want to increase perception of their creditworthiness and increase, even potentially, their access to credit. To meet this goal they select a product mix that might not be the most efficient from the perspective of the life-cycle hypothesis but rather associated with demonstration of their financial capability (Noctor, Stoney, & Stradling, 1992), i.e. making informed judgements and effective decisions in the area of money management. Financially capable persons manage their finances combining variety of factors, like being able to cope with income reduction, having financial resources to meet unexpected expenditures, etc., and thus create portfolios which might be astray of the life cycle behaviour.<sup>3</sup>

Third, an important influence on household financial portfolios might stem from uncertainty of the future (Blanchard & Mankiw, 1988; Browning & Lusardi, 1996; Hall, 1978, among others). It is shown that there is a strong negative influence of uncertainty on the household credit decisions and potentially positive influence on savings in precautionary form. One of the key manifestations of uncertainty is the situation on the labour market and anxiety associated with becoming unemployed. The role of uncertainty has been shown with respect to the consumption decisions (Malley & Moutos, 1996) but also with respect to the durable goods purchases (Carroll & Dunn, 1997). Such unfavourable market conditions increase presence of savings in their most accessible forms – like

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<sup>3</sup> For comprehensive list of characteristics of financially capable persons refer to Atkinson, McKay, Kempson, & Collard (2006).

current accounts – but also limit pursuit for credit. In consequence, precautionary motive associated with financial capabilities might fine-tune the life cycle behaviour.

An important reason for household portfolio choice might stem from intertemporal inconsistencies in the financial behaviour. A theory in this vein was presented by Bertaut, Haliassos, & Reiter (2009), who, with the accountant-shopper model, solve the puzzle of existence of a groups of individuals holding both short-term debt and liquid assets. They suggest that each consumer makes consumption choices in two stages (Bertaut et al., 2009). In the first stage, when she adopts a role of accountant, plans expenditures and makes basic payments. In the second stage, the shopper comes into the stage. He is also rational but less patient. As the accountant is aware of shoppers attitudes, he does not want to leave too much space to the shopper and thus holds positive short-term debt. Based on this approach it is possible to show that households would maintain positive short-term debt, like credit card or non-collateralized loans, even in light of increasing incomes and financial assets.

Different patterns of financial product possession can be also attributed to very diverse motives for using financial products. Some of them are not only the source of financial resources but also provide additional benefits to their users, which exhibits a strong impact on their possession. A good example is visible among credit card users. Although it is a credit instrument, it is also used by wealthy individuals (gold, platinum, black credit cards), who barely seek their credit function but rather seek its convenience and prestige functions (Wickramasinghe & Gurugamage, 2009). Yet, in the case of credit products, motives for acquisition and the procedure behind the acquisition play an extremely important role in shaping the final financial product mix. It seems that rules governing debt are more complex than it is the case in savings products. Kamleitner and Kirchler (2007) show that the process of acquiring credit product by households is multistage and takes into account (1) credit product accessibility and diversity of available products on the market, (2) various motives for the choice of either internal or external financing for a given purchase,<sup>4</sup> but also (3) effort related to credit product acquisition. Acquisition of unsecured debt is also a consequence of incentives

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<sup>4</sup> Very often external financing is not associated with lack of resources but is household decision resulting from availability, convenience or other reasons.

provided by the supply side of the market. In face of seemingly low-cost instruments<sup>5</sup> consumers may tend to substitute secured debt for the unsecured one (del Río & Young, 2006).

Behavioural factors manifest in the choices related to financial assets. Haliassos and Bertaut (2013) report very low rates of stockholdings. Sieglar and Thaler (1997) show that in order to justify the observed levels of aversion to stocks, highly implausible assumptions regarding risk aversion would need to be fulfilled. The diversity of savings products in household portfolios can be explained also by mental accounts (Thaler, 1999, 2008), which facilitate household consumption choices by dividing the flow of income into baskets devoted to certain purposes. By assuming a set of rules which households adopt for management of their finance (Thaler, 1990) explanation of diversity in saving portfolios is straightforward. His argument is that some portion of savings serves the purpose of a rainy-day account, while some, like saving for retirement, require non-discretionary rules for savings. Following this argument, also savings for major purchases, like an apartment or a car, can be placed in accounts with limited access and certain restraining rules. In consequence, to serve this goal a diversified set of instruments emerges.

The final argument for the emergence of diversified portfolios can be traced back to credit repayment. Because it is usually split into monthly instalments, it yields a variety of possibilities. Diversified ways to manage debt might also influence the final financial product-mix as credit may be repaid (i) slowly (as agreed) and thus savings might be accumulated to hedge against unexpected fluctuations in income, (ii) as quickly as possible and thus savings and credit tend to be depleted simultaneously or (iii) refinanced with a cheaper alternative, which favours emergence of cheaper credit products in the place of more expensive ones – mortgages instead of consumer credit.

Financial portfolio choices are also subject to inertia. Changes in financial portfolio are often associated with considerable transactional costs. It is very visible in the case of credit cards. Individual pricing policies impedes or even exclude market comparisons. Additionally, those who carry outstanding card balances are also very reluctant to switch providers (Calem & Mester, 1995).<sup>6</sup>

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<sup>5</sup> Instruments like no interest rate bearing credit cards (if repaid by the end of the next month) can be perceived this way. However, even very expensive payday loans might be perceived as low cost instruments because those high interest rates translate into very moderate costs due to very short maturities.

<sup>6</sup> It stems from two factors. First of all, banks are reluctant to accept household credit applications if those have lower incomes. Second of all, less wealthy households very often lack ability to repay their current debts, which limits their transition to a different bank, even if potentially profitable due to lower interest.

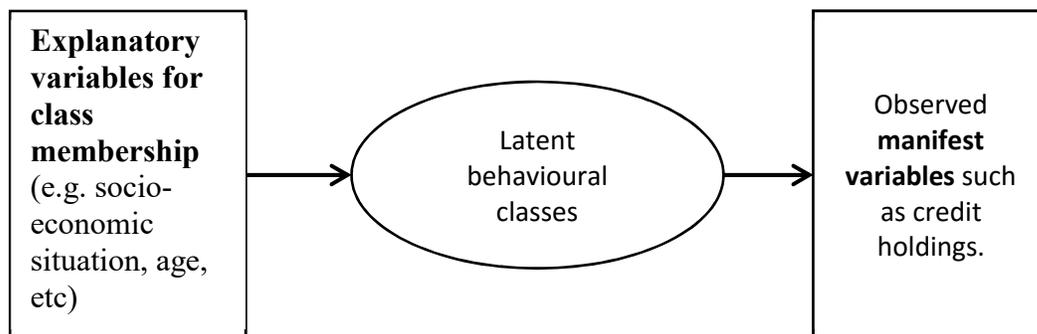
### 3 Methodology

Our methodological approach is based on the presumption that households can be grouped into different behavioural classes that represent household financial behaviour and its product-mix. Behaviour only manifests the underlying pattern and thus classes are not directly observable. However, using an adequate statistical approach, it is possible to identify such classes by grouping together similar behaviour. For this purpose, we use latent class analysis enabling exogenous identification of a number of different behavioural groups. This analysis can be carried out for different numbers of groups and we then use the Bayesian Information Criterion (BIC) to identify the best number of classes for our data.

In a second step, we then aim at explaining the class membership by socio-economics background variables. This approach will not only provide us with a classification, but also help us understand why some households end up in their respective classes.

Schematically, the idea of our modelling approach can be represented as show in the following figure:

Figure 1: Graphical representation of the estimation approach



In a first step, we limit our attention to the latent behavioural classes and the manifest variables. Only in a second step we then add the explanatory variables to the model.

### 3.1 Latent Class Analysis

Let us start with the manifest variables, which are categorical. We denote  $Y_{ijk}$  a binary indicator for individual  $i$  taking the value of 1 if the individual responded affirmative to outcome  $j$  in the manifest variable  $k$ . Hence, we have  $kj$  binary indicators in our model. Furthermore, we define  $\pi_{rjk}$  as the conditional probability of an individual in class  $r$  to have outcome  $j$  in the manifest variable  $k$ . By definition, the sum over all possible outcomes of a given manifest variables equals one ( $\sum_{j=1}^{J_k} \pi_{rjk} = 1$ ).

Finally, let us define  $p_r$  as the proportion of individual in class  $r$ . The probability density function across all classes is then the weighted sum (Linzer & Lewis, 2011):

$$\Pr(Y_i | \pi, p) = \sum_{r=1}^R p_r \prod_{k=1}^K \prod_{j=1}^{J_k} (\pi_{rjk})^{Y_{ijk}}$$

Using a maximum likelihood estimation, we obtain parameter estimates for  $p_r$  and  $\pi_{rjk}$ , which can then be used to compute the likelihood for each individual  $i$  to be part of class  $r$ . Using these parameters, it is then easy to compute the likelihood for each individual  $i$  to be in class  $r$ . All our estimations were carried out with the *poLCA* package for R (Linzer & Lewis, 2013).

### 3.2 Latent Class Regression Models

In a second step, we aim at understanding what socio-economic factors determine the class membership. Put differently, we aim at explaining through a series of exogenous variables in what group people might end up. For this estimation, we have essentially two possibilities. First, we could estimate both steps in a single maximum likelihood estimation as proposed in Linzer and Lewis (2011) or we can proceed in two steps. Given our data, the estimation in a single model turned out to be too much computationally intensive, thus we opted for the two-step approach. For the latent class model, we obtain a probability for each individual to be in each of the groups. We could now simply classify each individual into the group with the highest probability, but this would no longer take into account that for some individuals there might be more than one plausible group. Hence, draw 100 replications of group memberships based on the individual probabilities. We then estimate a multinomial logit model on class membership based on each of the 100 imputations and finally combine them using Rubin's rule (Rubin, 1987).

## 4 Data

In this study we use the *Encuesta Financiera de Hogares (EFH) 2014* survey carried out by the Chilean Central Bank. The EFH series was established in 2007 and since then carried out on annual basis. The main goal of the survey is to collect information in order to better understand the financial situation of Chilean households and to design adequate public policies. For our study, this data has several advantages over similar data sources. First, detailed information about different financial positions hold by the household are available. Second, we have information on some behavioural aspects such as the use of payment methods and thirdly we have some information on the socio-economic background of households. The sample is nationally representative for urban areas and covers 4502 households. The survey is of exceptional quality which translates in a minimal loss of observations due to missing data. For our main model, we use 4'468 observations, which represent 99% of the initial sample.

### 4.1 Manifest variables

Let us now turn to the key variables for this study. In a first step, we focus on outcome variables that will help us identify the classes. The idea of manifest variables is that each of them carries some information on the type of behaviour but only when putting them together we obtain a reliable estimate of classes.

Table 1: Descriptive statistics of manifest variables

Manifest variable	Type	Outcome	Proportion
<b>Has a bank account with positive balance?</b>	Binary	Yes	16.6%
<b>Has financial assets?</b>	Binary	Yes	30.6%
<b>Has other assets?</b>	Binary	Yes	12.8%
<b>Has physical assets?</b>	Binary	Yes	83.3%
<b>Has debt?</b>	Binary	Yes	71.6%
<b>Has car debt?</b>	Binary	Yes	4.0%
<b>Has a consumer credit?</b>	Binary	Yes	62.6%
<b>Has a credit card from a bank?</b>	Binary	Yes	21.8%
<b>Has a credit card from a department store?</b>	Binary	Yes	44.7%
<b>Has a consumer credit from a Bank?</b>	Binary	Yes	16.4%
<b>Has a consumer credit line?</b>	Binary	Yes	8.4%
<b>Has a consumer credit from a</b>	Binary	Yes	6.6%

<b>department store?</b>			
<b>Has education debt?</b>	Binary	Yes	8.5%
<b>Has mortgage?</b>	Binary	Yes	19.9%
<b>Has other debt?</b>	Binary	Yes	5.8%
<b>How much does debt payment represent?</b>	Categorical	NO charges	47.7%
		Up to 50% of income	42.7%
		> 50% of income	9.6%
<b>Uses credit card as payment method?</b>	Binary	Yes	15.8%
<b>Uses a non-bank credit card as payment method?</b>	Binary	Yes	20.0%
<b>Frequency of savings</b>	Categorical	Does not save	69.7%
		Annually	6.0%
		Every 6 months	1.3%
		Every quarter	3.8%
		Monthly	19.3%

Our manifest variables are based on four different sections of the survey. The first four variables relate to different types of assets the household might have. The second block of variables concerns various types of credits the family might have, the third to the use of credit cards as payment method and finally the last variable deals with the saving behaviour.

It is important to notice that the question regarding bank accounts was conditioned on having a positive balance. This might help explain why the proportion is with 16.6% very low. The emerging status of the Chilean economy is also confirmed by a very low share of households with any financial assets (30.6%) and even lower of those with other types of assets (12.6%). The only form in which households accumulate resources more broadly are physical assets. On the other hand, the share of indebted households is very large (71.6%) in comparison to highly developed countries, where it usually remains below 40%. Most striking is the proliferation of consumer credit, which typically in developed countries is present at no more than 10% of all households. In Chile 62.6% of the surveyed declare presence of consumer debt, while 44.7% declared a department store credit. Our set of variables approximated also the value of debt by investigating the value of debt repayments with respect to incomes. Almost one in ten households in Chile (9.6%) devotes more than half of their monthly incomes to debt repayment. Within the scope of indicators of representing financial behaviour we decided to include also active use of credit cards. This payment method is very significant from the behavioural perspective as it creates an illusion of lack of money

involved in transaction. Also, due to grace period often offered on credit card purchases, it plays on myopia of users who do not directly see the link between the purchase and the way it affects their portfolio choice. 15.8% of households report using credit card issued by a bank as a payment method, while 20% declare non-bank card as a way in which they pay. The difference between Chile and developed economies is also in the approach to savings. Almost seven in ten households do not save at all, while only 19.3% manage to do it on monthly basis. It creates financial fragility and exposes them to use more consumer credit.

## 4.2 Socio-economics characteristics

For the second part of our study we aim at relating the class membership to different socioeconomic background variables. Table 2 displays descriptive statistics and a brief explanation of these variables.

Table 2: Descriptive statistics of socio-economic background variables

Variable	Mean	Std.dev	Range
Years of education of respondent	12.72	4.08	0/19
Age in years of respondent	50.27	16.57	18/98
Household size	3.27	1.67	1/19

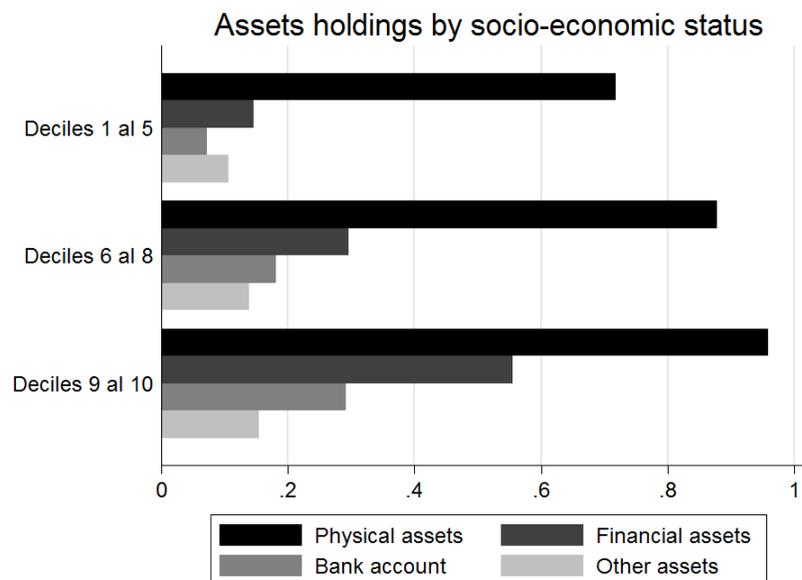
Variable	Outcome	Proportion
Gender	Female	59.9%
	Male	40.1%
Socio-economic status	Decile 1-5	42.14%
	Decile 6-8	29.54%
	Decile 9-10	28.31%
Marital status	Married/living together	55.53%
	Separated/divorced	11.62%
	Widower	8.73%
	Single	24.13%

The number of socio-economics background variables is limited in the survey, but we believe that these variables capture a few key characteristics of Chilean households. We opted to use the categorical variable for the socio-economic status rather than a measure of household income because we fear this income variable to be quite noisy. Furthermore, we include education as continuous variables rather than in categories because we do not expect discontinuities by education level like in wage equations.

### 4.3 Descriptive evidence

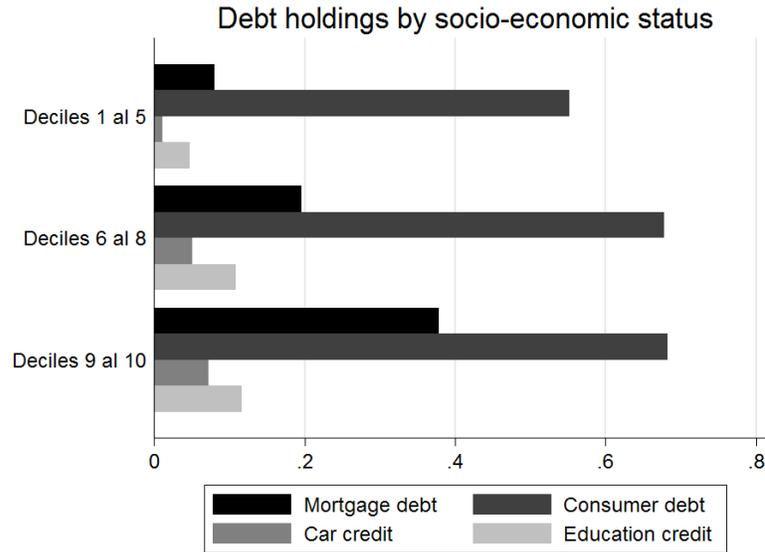
Before turning to the results of our econometric model, we present some descriptive evidence on the link between behaviour and the socio-economic status of the household. Figure 2 displays the assets holdings by socio-economics groups. We can observe a general pattern for all types of assets where richer household are more likely to possess them. A probably more surprising result is the very low percentage of households indicating that they have a bank account with a positive balance, while in all groups more than 70% report physical assets.

Figure 2: Assets holdings by socio-economic status



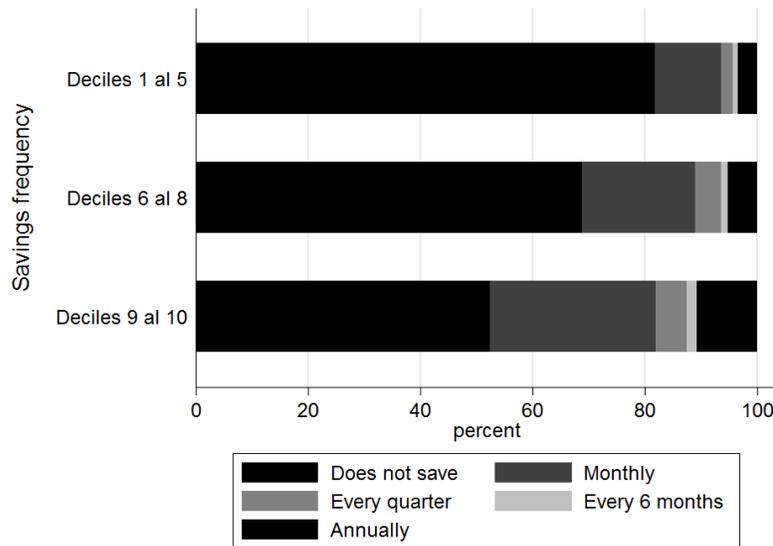
In Figure 3, we explore the differences in debt holdings by socio-economics groups. Again, we can see strong differences from one group to the next. Mortgage debt is much more common among the richest in society, while education debt are especialy importante for both higher groups. In contrast, all groups display high percentages of consumer credits, which are by far the most common types of debt.

Figure 3: Debt holdings by socio-economic status



Finally, Figure 4 refers to savings and there we find very interesting results. In all socio-economic groups, the majority reports that they do not save at all. While this proportion is close to 50% for the richest households, it is as high as 80% for the first five deciles.

Figure 4: Saving behaviour by socio-economic status



The second largest group for every decile are households being able to save every month, while the remaining families do save but less frequently.

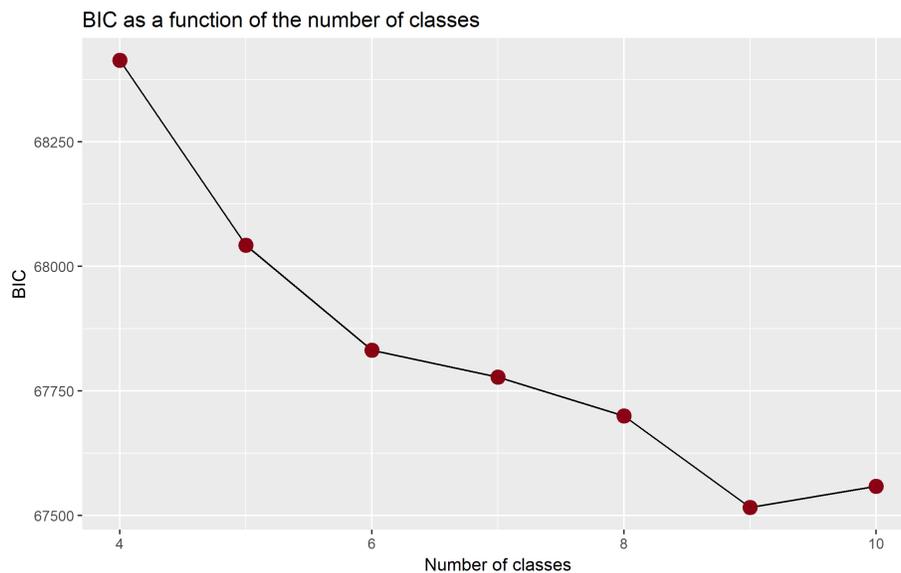
## 5 Results

In this section, we present the main results of our study which are complemented by additional results in the appendix. We proceed in two steps. First, we focus on the identification of classes and in a second step we then introduce explanatory variables.

### 5.1 Latent class analysis

Before being able to discuss the different classes, we have to select the model that best fits our data. We use the BIC as our main criterion of choosing the best model. Having too few classes forces the model to put quite heterogeneous households into the same class, while having too many classes makes interpretation very hard and the risk of defining two very similar classes becomes more important. We estimated the model starting with only two classes and going up to the point where the BIC starts to increase again. Figure 5 displays the BIC as a function of the number of classes.

Figure 5: Bayesian Information Criterion (BIC) in function of the number of classes.



We can see that the best model includes 9 different behavioural groups. For the remainder of this section, we will focus exclusively on this model.

Table 3 displays the main results of the 9-class model.

Table 3: Latent class model: Average outcomes when grouping households into the most likely class

	Financially inactive	Non-banking borrower	Over-indebted	Education debt users	Mortgage users	Heavily indebted	Savers	General credit users	Heavy non-banking borrower
Has a bank account?	2%	3%	10%	21%	30%	44%	44%	42%	5%
Has financial assets?	8%	10%	31%	24%	46%	83%	65%	57%	15%
Has other assets?	6%	8%	13%	14%	16%	18%	20%	33%	7%
Has physical assets?	73%	67%	91%	70%	100%	99%	91%	88%	100%
Has debt?	0%	100%	100%	100%	100%	100%	0%	100%	100%
Has car debt?	0%	0%	9%	6%	10%	9%	0%	3%	9%
Has a consumer credit?	0%	100%	100%	2%	0%	100%	0%	100%	100%
Has a credit card from a bank?	0%	6%	94%	0%	0%	80%	0%	17%	10%
Has a credit card from a department store?	0%	84%	58%	0%	0%	57%	0%	75%	69%
Has a consumer credit from a Bank?	0%	12%	37%	0%	0%	34%	0%	27%	37%
Has a consumer credit line?	0%	2%	44%	0%	0%	26%	0%	2%	5%
Has a consumer credit from a department store?	0%	10%	13%	0%	0%	2%	0%	12%	15%
Has education debt?	0%	4%	16%	51%	9%	11%	0%	15%	13%
Has mortgage?	0%	0%	32%	0%	95%	47%	0%	19%	42%
Has other debt?	0%	8%	7%	49%	2%	4%	0%	8%	5%
How much does debt payment represent?									
>0% and <50% of income	0%	75%	43%	15%	70%	46%	0%	79%	48%
>50% of income	0%	7%	31%	2%	3%	17%	0%	7%	19%
Uses credit card as payment method?	2%	1%	42%	3%	27%	60%	25%	5%	8%
Uses a non-bank credit card as payment method?	2%	30%	31%	5%	13%	31%	14%	28%	20%
Frequency of savings									
Monthly	6%	9%	11%	18%	27%	48%	41%	53%	0%
Every quarter	1%	1%	1%	5%	5%	10%	13%	10%	0%
Every 6 month	1%	0%	1%	1%	2%	4%	3%	2%	1%
Annually	2%	3%	2%	3%	7%	17%	15%	13%	2%
Estimated class population shares	21%	21%	11%	3%	6%	9%	7%	10%	11%
Predicted class memberships	22%	24%	12%	3%	6%	9%	7%	9%	9%

In the top row, we added a name of the group based on the observed behaviour. The main body of the table presents the likelihood of specific financial behaviour by group and indicator. For instance, in the group *financially inactive* only 2% of households have a bank account (with positive balance) while 44% of households have a positive balance in a bank account in the group of *savers*. Finally, at the bottom of the table the relative importance of each group is displayed.

The most significant financial behaviours in Chile can be wrapped up under common denominator *financially inactive* and *non-banking borrowers*. Roughly 20% of households belong to each group. In the class of *financially inactive* not having debt and saving only on very rare occasions is reflecting the group membership. These households seem to operate outside the formal financial sector and consequently neither generate savings nor incur any debts.

The second group with approximately the same share in the population is what we call *non-banking borrowers*. Similar to the financially inactive, households in this group save very little and have almost never a positive balance in a bank account. However, in contrast to the first group, households in this group do have debts but primarily from the non-banking sector. The most important source for debts are department stores. The amount of charges for debt is most often not excessive. Only 7% of households in this group pay a 50% or more of their income towards repayment, which is below the average for all households. Their behaviour is very often (30%) linked to non-bank credit card use.

Although much less wide-spread, interesting financial behaviours are present among other Chilean households. Pattern of *over-indebtedness* has been observed among 11% of households. This financial behaviour is primarily driven by demand for variety of financial products and is associated with very infrequent saving patterns. A pretty wide-spread behaviour is associated with targeted debt. Groups of *Education debt users* and *Mortgage debt user* comprise households with specific objectives behind credit uptake. Especially the latter group in Chile is very specific and with 95% declares possession of a mortgage and with 10% chance debt for a car. Group of *heavily indebted* households is slightly different from *over-indebted* households. The group of *heavily indebted* households comprises much larger proportion of households with sufficient financial resources to back their credit activity. Their current accounts much more often exhibit positive balances (44% vs. 10%) and their probability of saving at least annually equals to 79%, while the *over-indebted* have merely 15% chance of saving at least on annual basis.

Small proportion of households (7%) can be found in a group of *savers*. Households in this group have no debt but 72% chance of exhibiting saving behaviour and very high chance of holding positive financial assets (65%) and positive balance on their current bank account (44%).

The class of *General credit users* includes households that have consumer but also other types of debt but additionally they are able to save (78%) and very often demonstrate positive financial assets (57%) and positive balance on their current bank account (42%). Households lacking protection of the formal banking system but also very often heavily indebted comprise group of *heavy non-banking borrowers*. Their debt is always in the form of consumer credit and as much as 19% of households in the group bear extremely heavy burden associated with their debt, devoting to debt repayments monthly over half of their incomes. Their saving ability is extremely low and only 3% can save at least on annual basis. Their vulnerability is further increased by very low prevalence of financial assets (15%) and bank accounts with positive balance (5%).

## 5.2 Latent class regression models

We present our results of the latent class regression model in two steps. First, we focus on the multiply imputed data where we consider the fact that class membership is not deterministic. We therefore impute 100 class memberships and estimate a model for each of these samples. Table 4 presents the estimates for this approach.

Table 4: multinomial logit results based on 100 imputations of the class membership.

	Financially inactive	Non- banking borrower	Over- indebted	Education debt users	Mortgage users	Heavily indebted with savings backup	Savers	General credit users	Heavy non- banking borrowers
Years of education	-0.014***	-0.001	0.003**	-0.016***	0.018***	0.007***	-0.001	-0.000	0.004*
Female head	-0.014	-0.001	-0.005	0.027*	-0.012	0.003	0.005	-0.015	0.012
Socio-economic status									
Deciles 1-5	base	base	base	base	base	base	base	base	base
Deciles 6-8	-0.100***	0.056***	0.013	-	0.057***	0.015	-0.004	-0.012	0.048***
Deciles 9-10	-0.130***	0.085***	0.042***	0.072****	0.164***	0.057***	-0.003	-0.035**	0.027
Marital status									
Married/living together	base	base	base	base	base	base	base	base	base
Separated/divorced	0.032	-0.013	-0.003	0.013	-0.008	-0.027**	-0.001	0.040**	-0.032
Widower	0.006	0.032	-0.011	0.045	-0.024	-0.054***	-0.007	0.013	0.001
Single	0.045***	0.008	0.008	0.012	-0.022	-0.028***	0.000	0.010	-0.034**
Household size	-0.004	-0.000	-0.011***	0.009*	0.000	-0.006*	-0.002	0.005	0.009**
Age (at 30 years)	-0.003***	0.001	-0.007	-0.001	0.000	0.002***	-0.001**	0.001	0.002**
Age (at 50 years)	0.003***	-0.001	0.001***	-0.001	-0.001**	-0.001**	-0.0008*	0.001*	-0.001*
Age (at 70 years)	0.011***	-0.003***	0.004***	-0.003***	-0.002***	-0.002***	-0.000	-0.001	-0.003***

**Notes:** Marginal effects at the mean are reported, except for the variable age, where we report the marginal effect at three different ages (30,50 and 70), holding co-variates at the mean. Significance levels: \*=10%, \*\*=5%, \*\*\*=1%.

Results of the multinomial logistic regression indicate a significant role of socio-economic characteristics in shaping the class membership, i.e., the profile of use of financial products within the household. Financial inactivity declines with the number of years of education but also with incomes, yet membership in this group is higher among households, where household head does not have a partner. Marginal effects are different for households with head at different stage of the life-cycle. For younger individuals, the age acts towards a decrease in the probability of being in this group, yet for older ones, the relationship is reversed.

A surprising relationship between years of education and being in the class of over-indebted was observed. More education stimulates over-indebtedness and even more surprising is that probability of being in an over-indebted state is by 4.2 pp. higher for households in the highest income deciles. Over-indebtedness also non-linearly interacts with age. For younger individuals, the effect of age is negative for class membership, while for older individuals, probability of over-indebtedness tends to increase with age. Non-banking borrowers would normally not be expected in higher income groups. Specificity of Chile is that access to financial products for households from the lowest income deciles is extremely limited and consequently, probability of using non-banking debt increases by 5.6 pp. for individuals from income deciles 6-8 and by 8.5 pp. for the households with highest incomes.

Education debt seems to be highly influenced by education of household head but the relationship is not as expected. Households with lower education level of the household head have 1.6 pp. lower probability of incurring debt for education with each additional year of education of household head. It points clearly to the fact that education debt is used by those households to ameliorate the educational gap for the next generations. Debt for education is also present among less wealthy ones. Households from deciles 6-8 have 7.2 pp. lower probability of being in the class of educational debtors and those from top two deciles have probability as much as 20.7 pp. lower to be in the class than individuals from the lowest 5 deciles. The opposite is true for mortgage debt. Better educated and more wealthy households have higher access to the market and much more often end up in the group.

Being in the class of heavily indebted with savings backup is positively conditioned on the years of education and income. The effect of age is in turn highly non-linear. For younger individuals age stimulates membership in the class, while for the older ones it strongly discourages it. General credit users are less common among wealthy ones. Decrease by 3.5 p. is observed for households in the top two deciles in comparison to those from bottom five deciles. Class of general debt holders has

also links with family status with strong positive effect of being separated or widowed on membership in the class - 4 pp. higher than among households created by individuals living with a partner.

Heavy non-banking borrowing is positively conditioned on years of education but also exploding in middle income groups. Households from decile 6-8 have probability 4.8 pp. higher to be in the group than those with income from the bottom five deciles. Single person households are less likely to be in the class - probability 3.4 pp. lower than the one observed among those living together. The effects of age are highly non-linear for the class with age increasing the probability of membership for households run by younger individuals and strongly decreasing it for those being run by older ones.

## 6 Conclusion

The results for Chile present a dramatically different picture of financial product use than those that might be observed in Europe and other developed countries. First striking departure of the Chilean financial market is a very significant role of borrowing from the non-banking sector. Large groups of households either focus solely on borrowing from the non-banking sector or include non-banking borrowing in a mix with bank loans. Our study indicates that the problem of over-indebtedness is also significant. One in eight households demonstrates behaviour likely pointing to over-indebtedness. Not uncommon for Chilean households is mixing saving and debt. We were able to identify two groups of households with very high probability of saving on monthly basis but at the same time heavily indebted. This may point to strong departures from the behaviour postulated by the life-cycle theory, where either solely debt or savings should be present within a given household.

Even more striking departures from regular findings were revealed by regression analyses. Years of education are strong predictor of over-indebtedness and debt for education. Yet, the relationship is counterintuitive with larger share of over-indebted expected among better educated and larger proportion of debt holdings for education among less educated. Higher probability of non-banking borrowing among middle and high income households also reveals completely different financial behaviour than the one observed in developed countries, where non-banking sector is reserved for those of lower socio-economic standing.

## 7 Bibliography

- Atkinson, A., McKay, S., Kempson, E., & Collard, S. (2006). Levels of Financial Capability in the UK: Results of a baseline survey. *Consumer Research*, *46*, 1–150.
- Bertaut, C. C., Haliassos, M., & Reiter, M. (2009). Credit Card Debt Puzzles and Debt Revolvers for Self Control. *Review of Finance*, *13*(January), 657–692. <http://doi.org/10.1093/rof/rfn033>
- Bertola, G., & Hochguertel, S. (2007). Household Debt and Credit: Economic Issues and Data Problems. *Economic Notes*, *36*(2), 115–146. <http://doi.org/10.1111/j.1468-0300.2007.00181.x>
- Bijmolt, T. H., Paas, L. J., & Vermunt, J. K. (2004). Country and consumer segmentation: multi-level latent class analysis of financial product ownership. *International Journal of Research in Marketing*, *21*(4), 323–340. <http://doi.org/10.1016/j.ijresmar.2004.06.002>
- Blanchard, O. J., & Mankiw, N. G. (1988). Consumption: Beyond Certainty Equivalence. *The American Economic Review*, *78*(2), 173–177.
- Browning, M., & Lusardi, A. (1996). Household Saving: Micro Theories and Micro Facts. *Journal of Economic Literature*, *34*(4), 1797–1855.
- Calem, P. S., & Mester, L. J. (1995). Consumer Behavior and the Stickiness of Credit-Card Interest Rates. *The American Economic Review*, *85*(5), 1327–1336. Retrieved from <http://www.jstor.org/stable/2950992>
- Carroll, C. D., & Dunn, W. E. (1997). Unemployment Expectations, Jumping (S,s) Triggers, and Household Balance Sheets. *NBER Macroeconomics Annual*, *12*, 165–217.
- Chakravarty, S., & Dubinsky, A. (2005). Individual investors' reactions to decimalization: Innovation diffusion in financial markets. *Journal of Economic Psychology*, *26*(1), 89–103. <http://doi.org/10.1016/j.joep.2003.10.003>
- Christelis, D., Georgarakos, D., & Haliassos, M. (2013). Differences in Portfolios across Countries: Economic Environment versus Household Characteristics. *Review of Economics and Statistics*, *95*(1), 220–236. [http://doi.org/10.1162/REST\\_a\\_00260](http://doi.org/10.1162/REST_a_00260)
- Crook, J., & Banasik, J. (2012). Forecasting and explaining aggregate consumer credit delinquency

- behaviour. *International Journal of Forecasting*, 28(1), 145–160.  
<http://doi.org/10.1016/j.ijforecast.2010.12.002>
- del Río, A., & Young, G. (2006). The determinants of unsecured borrowing: evidence from the BHPS. *Applied Financial Economics*, 16(15), 1119–1144.  
<http://doi.org/10.1080/09603100500438791>
- Flavin, M. A. (1981). The Adjustment of Consumption to Changing Expectations about Future Income. *Journal of Political Economy*, 89(5), 974–1009.
- Friedman, M. (1957). *A Theory of the Consumption Function*. Princeton, NJ.
- Gunnarsson, J., & Wahlund, R. (1997). Household financial strategies in Sweden: An exploratory study. *Journal of Economic Psychology*, 18(2–3), 201–233. [http://doi.org/10.1016/S0167-4870\(97\)00005-6](http://doi.org/10.1016/S0167-4870(97)00005-6)
- Haliassos, M., & Bertaut, C. C. (2013). Why do so Few Hold Stocks? *The Economic Journal*, 105(432), 1110–1129.
- Haliassos, M., Jansson, T., & Karabulut, Y. (n.d.). Incompatible European Partners? Cultural Predispositions and Household Financial Behavior. *Management Science*.
- Hall, R. E. (1978). Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence. *Journal of Political Economy*, 86(6), 971–987.
- Household finance. (2015). In *World Development Report*. World Bank.
- Jappelli, T., & Pagano, M. (1989). Consumption and Capital Market Imperfections: An International Comparison. *The American Economic Review*, 79(5), 1088–1105.
- Kamleitner, B., & Kirchler, E. (2007). Consumer credit use: a process model and literature review. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, 57(4), 267–283.  
<http://doi.org/10.1016/j.erap.2006.09.003>
- Linzer, D. A., & Lewis, J. (2011). poLCA: an R Package for Polytomous Variable Latent Class Analysis. *Journal of Statistical Software*, 42(10), 1–29. Retrieved from <http://www.jstatsoft.org/v42/i10>
- Linzer, D. A., & Lewis, J. (2013). poLCA: Polytomous Variable Latent Class Analysis. Retrieved

from <http://dlinzer.github.com/poLCA>

- Malley, J., & Moutos, T. (1996). Unemployment and Consumption. *Oxford Economic Papers, New Series*, 48(4), 584–600.
- Marois, B. (1997). French banks and European strategy. *European Management Journal*, 15(2), 183–189.
- Modigliani, F., & Brumberg, R. (1954). Utility Analysis and the Consumption Function: An Interpretation of the Cross-Section Data. In K. Kurihara (Ed.), *Post-Keynesian Economics*. Rutgers University Press.
- Ngwenya, M. a., & Paas, L. J. (2012). Lifecycle effects on consumer financial product portfolios in South Africa: An exploratory analysis of four ethnic groups. *Journal of Economic Psychology*, 33(1), 8–18. <http://doi.org/10.1016/j.joep.2011.09.008>
- Noctor, M., Stoney, S., & Stradling, S. (1992). *Financial Literacy: A Discussion of Concepts and Competencies of Financial Literacy and Opportunities for its Introduction Into Young People's Learning*. Slough.
- Piketty, T. (2014). *Capital in the Twenty-First Century*. Cambridge, Massachusetts; London, England: The Belknap Press of Harvard University Press.
- Rubin, D. B. (1987). *Multiple imputation for non response in surveys*. New York: John Wiley & Sons.
- Siegel, J. J., & Thaler, R. H. (1997). Anomalies: the equity premium puzzle. *The Journal of Economic Perspectives*, 11(1), 191–200. Retrieved from <http://www.jstor.org/stable/2138259>
- Telyukova, I. a. (2013). Household Need for Liquidity and the Credit Card Debt Puzzle. *The Review of Economic Studies*, 80(3), 1148–1177. <http://doi.org/10.1093/restud/rdt001>
- Ter Hofstede, F., Steenkamp, J.-B. E. M., & Wedel, M. (2002). Identifying spatial segments in international markets. *Marketing Science*, 21(2), 160–177.
- Thaler, R. H. (1990). Saving, Fungibility, and Mental Accounts. *Journal of Economic Perspectives*, 4(1), 193–205.
- Thaler, R. H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*, 12(3), 183–206. [http://doi.org/10.1002/\(SICI\)1099-0771\(199909\)12:3<183::AID-BDM318>3.0.CO;2-F](http://doi.org/10.1002/(SICI)1099-0771(199909)12:3<183::AID-BDM318>3.0.CO;2-F)
- Thaler, R. H. (2008). Mental Accounting and Consumer Choice. *Marketing Science*, 27(1), 15–25.

<http://doi.org/10.1287/mksc.1070.0330>

Viaud, J., & Roland-Lévy, C. (2000). A positional and representational analysis of consumption. Households when facing debt and credit. *Journal of Economic Psychology*, 21(4), 411–432. [http://doi.org/10.1016/S0167-4870\(00\)00011-8](http://doi.org/10.1016/S0167-4870(00)00011-8)

Wickramasinghe, V., & Gurugamage, A. (2009). Consumer credit card ownership and usage practices: empirical evidence from Sri Lanka. *International Journal of Consumer Studies*, 33(4), 436–447. <http://doi.org/10.1111/j.1470-6431.2009.00779.x>