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Household debt, automatic bill payments and inattention: Theory and evidence☆

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ABSTRACT

In this article we analyze the impact of automatic bill payment (ABP) on household debt. We present a theoretical intertemporal consumption model that shows an inattention effect when individuals subscribe an ABP for their debts. This effect causes a higher level of indebtedness (beyond optimal) and, therefore, well-being loss. Furthermore, we empirically test this theory for Chile, an emerging economy. We estimate a Tobit-Probit conditional mixed process (CMP) model, using data from the Central Bank of Chile's Household Financial Survey (HFS). The results confirm the existence of a positive and significant effect of the use of ABP on the financial burden of households.

1. Introduction

In recent years, household finance has become an attractive field of research. The way people make decisions about consumption, savings and investment has become more complex over time. From an economic perspective, individuals face constraints that are not captured by traditional models (Campbell, 2006). This fact has become a challenge that prompts researchers and policymakers to seek new answers to the phenomena associated with household behavior, and that allows the discussion and policy development that improve the population's well-being.

Indebtedness is a relevant aspect in household decision-making and its increase to historical levels in recent decades has attracted the interest of researchers and policymakers (Girouard, Kennedy, & André, 2006; Gathergood, Mahoney, Stewart, & Weber, 2019). Indebtedness is strongly related to the liabilities contracted by households to finance consumption. However, non-payment of liabilities is a source of risk that can lead to over-indebtedness or insolvency (Keese, 2012). In addition, many households make wrong decisions due to a lack of financial knowledge (Darriet, Guille, Vergnaud, & Shimizu, 2020) or by not considering all the relevant information on financial liabilities (Chang, Webb, Benn, & Reynolds, 2017). Consequently, this results in the payment of more interest, which leads to a loss of well-being.

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The increase in household indebtedness also coincides with the development of more sophisticated forms of payment. Technological advances have allowed people to access payment alternatives that generate savings in time and resources. Koulayev, Rysman, Schuh, and Stavins (2016) state that these technological advances have led to the growing development of automatic bill payment (ABP) mechanisms.[1] ABP has achieved a significant penetration in the population, mainly for the payment of debts with banks and other financial institutions. Empirical evidence has indicated that ABP has many benefits, mainly those related to the different ways in which the debt and financial products can be paid through an automated system. For medium- and long-term loans (e.g., consumer credits, mortgages, among others), an individual can subscribe an ABP for monthly balances. In the case of credit cards, this mechanism may be linked to all or part of monthly-billed amounts (e.g., minimum payment). Existing evidence shows the benefits of debt-related ABP programs, consisting of a reduction in penalty fees because they eliminate the negative effects of inattention related to meeting payment dates (Gathergood, Sakaguchi, Stewart, & Weber, 2020; Adams et al., 2018).

Despite the benefits of ABP programs, they also have an unwanted side effect on their relationship with indebtedness. According to various studies, an ABP enrollment causes an inattention effect in relation to the price of goods and services that users actually pay, due to lack of salience. This effect would tend to make individuals consume beyond their optimal levels according to their preferences and budget. From this perspective, evidence has been found for the implementation of electronic toll collection (Finkelstein, 2009), payment of water bills (Lott, 2017) and energy costs (Gilbert & Graff Zivin, 2014; Sexton, 2015; Wichman, 2017). Nevertheless, despite the important advances in this area, the focus has been on analyzing the inattention in consumer goods and public services, but it has not yet been analyzed in bills associated with indebtedness (e.g., credit card billing balances, consumer credits, etc.). More specifically, we propose and study this possibility, defining this inattention to debt as the lack of salience at its cost, underestimating it. If an individual were not conscious of the act of paying loan balances and/or monthly amounts of credit card accounts, he/she would perceive that the total interest and fees would be less than the real ones. In consequence, by law of demand, consumers could increase their indebtedness if they are fully attentive (i.e., increasing the use of credit cards, applying for new loans or even cash advances). This fact could cause a reduction in well-being because households would increase their financial leverage to levels higher than those related to full attention (i.e., overspending).

Our research aims to determine the impact of individuals' inattention on the financial burden of debt generated by the subscription of an ABP in the Chilean market. Chile is characterized by high household indebtedness compared to other emerging economies in its region, reaching 42% of GDP (IMF, 2017). According to figures from the Central Bank of Chile, household indebtedness has increased significantly in the last 10 years and currently stands at 74.3% of monthly disposable income. This figure could be related, in part, to the expansion of credit and the use of automatic payment methods linked to these debts. For these reasons, we formulate a theoretical model that serves as the basis for empirical analyzes, the implications of which would contribute in two points. First, we provide a theoretical explanation through the two-period intertemporal consumption model on the quantity-effect of subscribing to ABP programs for debt. The model shows the impact of inattention on people's indebtedness. It is possible that individuals fall into a greater debt than they would decide with complete information. Second, our research seeks to provide empirical evidence of the existence of an inattention effect in the Chilean economy, whose characteristics could be related, in part, to the high households' indebtedness with ABP enrollment.

We use data from the 2014 and 2017 versions of the Household Financial Survey (HFS) of the Central Bank of Chile, and we estimate a conditional mixed process (CMP) model to control endogeneity among the main variables. Our theoretical model supports that indebtedness generates a loss of well-being for individuals, and our results empirically confirm the existence of a positive and significant effect of the use of ABP programs on the financial burden of debt in proportion to household income.

This article is structured as follows. Section 2 presents a literature review and a theoretical model that explains the effect of inattention on debt, under an intertemporal consumption decision approach. Section 3 presents the data and methodology. Subsequently, Section 4 presents the obtained results. Finally, Section 5 discloses the conclusions of our research and its implications for economic policy and household decisions.

2. Theoretical framework

present in the individual's financial decisions; especially in regards to the different ways of borrowing money. Next, we show a two-period intertemporal consumption model that explains the effects of subscribing an ABP on indebtedness levels and, consequently, on well-being, ceteris paribus.

2.1. Inattention in household financial decisions

Many times, individuals make their financial decisions ignoring relevant information. These decisions may be affected by the costs of acquiring, absorbing and processing the available information (Gabaix, 2017), but not necessarily due to the lack of financial knowledge (Scholnick, Massoud, & Saunders, 2008; Jiang, Lee, Liu, & Meng, 2018). From a rational perspective, people decide based solely on the information they have or can obtain. For this reason, they remain inattentive the rest of the time (Sims, 2003; Reis, 2006). Empirical studies support that inattention is closely related to households' education level and specifically reveal that poorer and less educated households are more likely to make financial mistakes due to inattention (Campbell, 2006; Calvet, Campbell, & Sodini,

[1] Sexton (2015) defines an ABP as a voluntary program that enables the timely payment of recurring bills through automatic credit and debit card transactions or deposit account withdrawals without individuals even having to see their bills.

2009).

Inattention has been analyzed from the point of view of household debt decisions. More optimistic forecasting errors lead to higher levels of debt burden, which can lead to over-indebtedness. Therefore, household expectations are inefficient because they do not consider past forecast errors (Hyytinen & Putkuri, 2012).

Regarding very short-term household debt, Stango and Zinman (2014) studied the effects of limited consumer attention in the payment of checking account overdrafts. The authors conducted surveys on overdrafts and found that people were significantly less likely to pay fees for those services. Obviously, this result indicates that inattention leads people to pay higher fees. This effect is stronger among people with less financial knowledge and education (Campbell, 2006). When reviewing the progress linked to the loss of attention in credit card use, some authors found that the causes were the impact of competing stimuli and the salience of the decision. Even if people have sufficient funds on deposit, many of them incur in credit card penalty fees for late payment or exceeding the limit (Scholnick et al., 2008; Agarwal, Driscoll, Gabaix, & Laibson, 2008). These costs could be avoided if people were more attentive to their credit card refunds (Stango & Zinman, 2009). This situation not only occurs in the poorest segments of the population where people have lower levels of financial education; it also occurs in the wealthiest segments, in which individuals may show an inattentive attitude towards the use of credit cards due to the fact that not paying the monthly balance generates a relatively low cost (Scholnick, Massoud, & Saunders, 2013).

Not all individuals have inattentive behavior in the same way. The literature distinguishes two types of people in this matter (Mandel, Scott, Kim, & Sinha, 2017). On the one hand, there are sophisticated agents who choose to pay their credit card balances in advance, because they are aware of their inattention problem. This attitude seems to avoid additional costs such as penalties, but paying in advance implies incurring an opportunity cost. Second, there are naive agents, who often forget to pay their credit bills before the due date, because they are not aware of the loss of attention in their debt information. Nevertheless, these agents can obtain more attention as they face more last-payment experiences, being able to make a behavioral adjustment (Jiang et al., 2018). Similarly, Grubb (2014) states that if inattentive consumers were naive, then they would underestimate the possibility of paying surprising penalty fees and overestimate the probability of redeeming loyalty discounts or perks. Furthermore, this author emphasizes that contract design for goods and services should be cognizant of consumer inattention.

The effects of policies that seek to eliminate or mitigate the inattention problem have not been excluded from the analysis. Sitzia, Zheng, and Zizzo (2012) propose that a 'smart nudge' policy of automatically switching default tariffs can be used to exploit the inattention-based households' inertia to achieve better outcomes. In this matter, Jones, Loibl, and Tennyson (2015) analyze the impact of changes in billing disclosure required by the Credit Card Accountability Responsibility and Disclosure Act on household decisions about their credit card debt repayments in the United States. This policy was effective in inducing consumers to increase the amount of credit card debt they paid each month. Among households that continue to carry credit card debt, there is minimal evidence of changes in repayment behavior.

Other policies that affect long-term household debt have been studied, and such policies seek to mitigate the salience effects. In this sense, Bajo and Barbi (2015) determine a causal relationship between sluggish behavior (mortgage refinancing reform carried out in France in 2007, related to a reduction of fees), investors' inattention and their level of financial illiteracy. They find that households underestimate the effective refinancing gain. Only borrowers with a high level of financial knowledge can fully perceive the profitability of the new opportunity. Furthermore, Andersen, Campbell, Nielsen, and Ramadorai (2019) conclude that Danish households respond slowly to changing financial incentives. In mortgage financing, the fixed costs of taking action cause households to borrow only when the benefits are great enough. Those costs are related to gathering information, leading to inattention (Sims, 2003).

Finally, regarding the use of payment methods, some authors have analyzed the effects of using ABP programs. Subscribing to an ABP program can cause a loss of attention to the accounts served by it, generating a reduction in the salience of the prices of products and services that have been paid through these accounts, and potentially inducing a consumption above the levels that people would have chosen if they had paid full attention to price. Evidence has been found in developed countries for household electricity bills (Gilbert & Graff Zivin, 2014; Sexton, 2015; Wichman, 2017), electronic toll collection (Finkelstein, 2009) and water consumption (Lott, 2017). Regarding debt accounts, Gathergood et al. (2020) and Adams et al. (2018) conclude that ABP programs may solve the problem of increased penalty fees due to inattention related to non-compliance with credit card payment dates. Nevertheless, although ABP mechanisms generate a benefit in this way, the literature has not yet analyzed the existence of consumer inattention caused by the use of ABP programs for debt.

2.2. The model

In this section, we present a two-period intertemporal consumption model that incorporates an inattention effect on the debt-level of households that subscribe to an ABP mechanism, ceteris paribus. Suppose that a representative individual has a subjective utility function indicated in equation (1):

$$U(c_1, c_2) = u(c_1) + \beta u(c_2) \tag{1}$$

where c_1 and c_2 are the present and future consumption levels, respectively. $u(c_t)$, for $t = 1, 2$, is a growing and concave continuous function with respect to consumption. The additive separability of the utility function allows disaggregating the effects of the consumption decision over time. Furthermore, β is a parameter that captures the level of the individual's impatience, expressed as a positive discount factor, but less than unity. Finally, $U(c_1, c_2)$ is a function that indicates the level of well-being of the individual when consuming certain levels both in the present and in the future. This function is monotonic, concave, and assumes that c_t groups normal

goods.

On the other hand, the individual faces a budget constraint that is limited by his/her present and future income levels; which are y_1 and y_2, respectively. This is

$$c_1 + \frac{c_2}{1+r} \leq y_1 + \frac{y_2}{1+r} \tag{2}$$

where r is the intertemporal discount rate; or, from another perspective, the cost of debt service. Therefore, the budget constraint clearly indicates that the current value of consumption cannot exceed the current value of the individual's income. The problem is to maximize the utility subject to such restriction. When solving this problem, the optimal consumption levels (indicated with an asterisk) satisfy the condition:

$$\frac{u'(c_1^*)}{u'(c_2^*)} = \beta(1+r) \tag{3}$$

In this case, we assume that the individual will adopt a consumption pattern that will imply being a net debtor in the financial system. This is related to the fact that in emerging economies it is possible to appreciate data whose statistics show that debt ratios on household income are greater than savings ratios; even taking into account mandatory savings programs[2]. This decision implies that the individual is fully aware of the payment of the debt service and the principal[3]. However, the contribution of our research is to incorporate the effect of inattention when people subscribe to an ABP service. This separates the individual from consciously making payments on their debts. DellaVigna (2009) and Sexton (2015) establish that inattention generates an undervaluation of the price of goods and services. For this model, a loss of attention in the payment of the debt service for subscribing an ABP is equivalent to underestimating its cost; or in this case, the interest rate (Jones et al., 2015). Let $\theta \in [0,1]$ be a parameter that measures the level of inattention of the individual that is generated when subscribing to an ABP. Note that if $\theta = 1$, there will be full inattention of the cost of debt, while if $\theta = 0$, there will be no inattention. This indicator works as a weighting of the financing cost, so the individual assumes that his/her budget constraint is

$$c_1 + \frac{c_2}{1+(1-\theta)r} \leq y_1 + \frac{y_2}{1+(1-\theta)r} \tag{4}$$

That is, each individual believes that his/her constraint has a lower slope than the slope of the constraint without the effect of inattention. This is generated as a consequence of the fact that the individual considers the cost of the debt as a fraction of its real cost, due to a decrease in salience when subscribing an ABP. Given this information limitation, the individual will optimize consumption taking into account the condition mentioned in (5):

$$\frac{u'(c_1)}{u'(c_2)} = \beta(1+(1-\theta)r) \tag{5}$$

This allows us to infer about the individual's decision. The more inattentive, or the larger the value of θ, the expression on the right side of the equality will be smaller. This implies that the marginal rate of substitution between present and future consumption is reduced, promoting a higher level of present consumption and, therefore, greater indebtedness. This reduction is consistent with the lower market price observed by the individual for non-payment. For greater accuracy, we detail a standard specification for the utility function, which remains as

$$U(c_1, c_2) = \frac{c_1^{1-\sigma}}{1-\sigma} + \beta\frac{c_2^{1-\sigma}}{1-\sigma} \tag{6}$$

where σ is a non-negative parameter that represents the multiplicative inverse of the intertemporal constant elasticity of substitution. In addition, this specification assumes that risk aversion is constant. When solving the problem, the individual decides to carry out the present consumption plan (indicated with a double asterisk in equation (7))

$$c_1^{**} = \frac{w_2}{(1+r) + [\beta(1+(1-\theta)r)]^{\frac{1}{\sigma}}} \tag{7}$$

where w_2 is the future value of the individual's wealth. As θ increases, the denominator of the previous expression becomes smaller; and therefore, higher consumption is expected. The problem is that this decision is based on a budget constraint that does not really exist, because the cost of obtaining debt is undervalued. If there was no inattention, the amount of debt requested by the individual would be

[2] For empirical evidence purposes that have been shown in this article, Central Bank of Chile (2015) and Central Bank of Chile (2018) confirm this fact.

[3] In this context, the principal is the sum of all the types of household debt, such as consumer loans, mortgages, credit cards, among others. Debt service is the total amount of interest on each debt.

$$D^* = \frac{y_2 - y_1[\beta(1+r)]^{\frac{1}{\sigma}}}{(1+r) + [\beta(1+r)]^{\frac{1}{\sigma}}} \tag{8}$$

As the individual is a net debtor, the necessary condition is

$$y_1 < \frac{y_2}{[\beta(1+r)]^{\frac{1}{\sigma}}} \tag{9}$$

If there were inattention, the amount of the requested debt and the current consumption could not satisfy the optimal condition and, therefore, a loss of well-being would be generated for the consumer. However, the debt increases compared to the case of not using an ABP system.

$$E = \frac{w_2\beta^{\frac{1}{\sigma}}\left[(1+r)^{\frac{1}{\sigma}} - (1+(1-\theta)r)^{\frac{1}{\sigma}}\right]}{\left\{(1+r) + [\beta(1+(1-\theta)r)]^{\frac{1}{\sigma}}\right\}\left\{(1+r) + [\beta(1+r)]^{\frac{1}{\sigma}}\right\}} \tag{10}$$

This conclusion can be seen in Fig. 1. Point A corresponds to the individual's decision with full attention; without linking the debt to an ABP. But otherwise, the use of this system will cause the individual to stop paying attention to the cost of debt, undervalue it and incorrectly define his/her budget constraint. The individual wants to develop the consumption plan that has been indicated in point B, but it is not possible since it is outside the set of feasible possibilities, generating a reduction in consumption levels. However, the individual will borrow at a higher level than is necessary. This can be seen in point C. The loss of well-being that is observed goes from a utility level U_A to a level U_C.

This makes us think that, although subscribing an ABP could have multiple benefits in terms of saving time and having the guarantee of complying payment obligations within the contractual terms, caution should be exercised when linking it to debt, to avoid inefficiencies in the consumption pattern due to inattention. Therefore, based on this model, we propose our research hypothesis:

H1: The subscription of an ABP has a positive effect on household indebtedness.

3. Empirical evidence

In Section 3 we present a detailed description of the variables and their source of data with which they were measured. Furthermore, we explain and specify the econometric model to test the effect of using ABP programs on households' financial burden.

3.1. Data and variables

This research uses data from the Household Financial Survey (HFS) of the Central Bank of Chile. We consider a pooled-data set composed of two cross-sections, corresponding to the 2014 and 2017 versions of the survey (Central Bank of Chile, 2015; Central Bank of Chile, 2018). After filtering the data and considering only those households that register information on their financial debt burden,

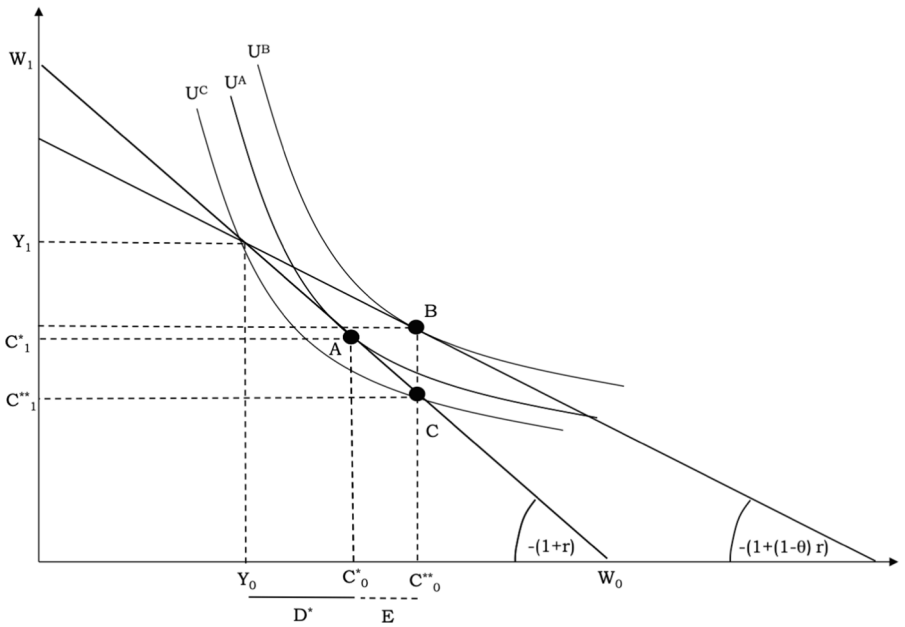

Fig. 1. Intertemporal consumption model with debt inattention due to the use of ABP programs. Source: Own elaboration.

our database has 3105 households from the 2014 version, while the 2017 version presents 3464 observations. The data available correspond to sociodemographic characteristics of the households in the sample, with their levels of financial debt burden and subscription to ABP programs (if applicable), either in full or in part of the debt. Table 1 presents the variables used in this study and their description.

3.2. Econometric strategy

To analyze a possible inattention effect on the financial burden of the debt, we must prove the existence of a positive relationship between ABP programs subscription and debt payments. However, this relationship can be simultaneous. As individuals request increased debt from financial institutions, they condition or encourage their customers to subscribe an ABP program for the fees associated with such debt. This fact implies that a greater financial burden can generate an increase in the probability that households subscribe to this means of payment of credit debts. Therefore, this endogeneity problem is key to selecting the econometric model for our research.

A simultaneous equations model is a suitable strategy. However, conventional methodologies in this area estimate models in which the nature of the dependent variables is the same. In our case, the ABP variable is binary and FIR corresponds to a continuous percentage greater than or equal to zero. Given this background, we rely on the statistical programming of Roodman (2011) to estimate a CMP model, which allows us to estimate equation systems for dependent variables of different nature. More specifically, we estimate a Tobit equation that explains the variable financial-burden-to-income ratio (main equation), and a Probit equation for the binary variable ABP (secondary equation). The CMP model does not consider these equations only as apparently unrelated, but rather captures simultaneity, returning the estimated latent variables from the endogenous variables. The empirical model is:

$$FIR_i = \beta_0 + \beta_1 ABP_i^* + \mathrm{B}_i X_{1i} + \varepsilon_{1i} \tag{11}$$

$$P(ABP_i = 1) = \Phi\left(\gamma_0 + \gamma_1 FIR_i^* + \Gamma_i X_{2i}\right) + \varepsilon_{2i} \tag{12}$$

where FIR_i is the financial-burden-to-income ratio of household i, ABP_i is the variable that refers to the use of an automatic repayment that is linked to some debt. On the other hand, $X_{1i}$and X_{2i} are vectors of control variables for equations (11) and (12), respectively, with vectors of parameters to be estimated, B_i and Γ_i. $\Phi(\cdot)$ corresponds to the cumulative density function of the standard normal distribution of the Probit model. The estimation errors correspond to ε_{1i} and ε_{2i}. Finally, the variables with an asterisk refer to the estimated latent variables.

Equation (11) incorporates control variables as determinants of the households' financial burden. These control variables include characteristics of the head of the household such as age, marital status, gender, and employment status; and other variables such as household income, use of internet banking, ownership and payment status of the main dwelling, household size and control over time. In relation to equation (12), which estimates the probability of using automatic payments of debt-related accounts, we consider the findings of Schuh and Stavins (2010) and Delgado (2018). Our specification includes the characteristics of the head of household, income, use of online banking and time as control variables. In other words, we seek to capture financial inclusion gaps on this issue. In addition, we add the current bank account holding variable.

4. Empirical results

In this section, we present the descriptive statistics of all the variables used in this research. Next, we show a set of non-parametric tests comparing the financial burden between households that use ABP programs versus those that do not. Finally, we present the results of the CMP model and discuss our findings.

4.1. Descriptive analysis

Table 2 presents the descriptive statistics of the variables. Of all households, 11.65% are subscribed to an ABP program in at least one financial debt product (e.g., credit cards, consumer credits, mortgages, among others). On average, their financial burden corresponds to 31.13% of their total monthly effective income. In relation to the characteristics of the heads of household, they are 50 years old on average, with 13 years of education. The 82.08% of the heads of household are employed and 64.79% are male.

Regarding the characteristics of the households, we observe that on average they have an effective monthly income of 1.77 million Chilean pesos[4], presenting high volatility. In addition, households are made up of approximately three members. The 56.09% of households declare that they use Internet banking services, 40.91% have a checking account and 20.32% have their own home with pending mortgage credit payments.

A relevant aspect in this analysis is the range of values of the financial-burden-to-income ratio. There are households that report having a financial burden greater than their monthly income. These and other households in the sample present an over-indebtedness situation, in addition to being insolvent. For these observations, there are other unobservable characteristics that would explain their very high financial burden, and this could, in some way, skew our results in terms of inattention. That is why we also adjusted the

[4] This amount is equivalent to $2878 dollars, according to the exchange rate observed as of December 29, 2017. Source: Central Bank of Chile.

Table 1
Description of variables. Notes: (*) The value attributed to the main housing is excluded. Source: Own elaboration.

Name	Description
Main variables	
ABP	Dummy that takes value 1 if any member of the household has subscribed an automatic bill payment associated with any debt, and 0 otherwise.
FIR	Financial-burden-to-income ratio. Financial burden is the sum of debt that the household needs to pay in a month. Effective monthly income* is considered.
Control variables	
Age	Age of the head of household, expressed in natural logarithm.
Age (<35)	Dummy that takes value 1 if the head of the household is under 35 years of age, and 0 otherwise.
Age (35–49)	Dummy that takes value 1 if the head of the household is between 35 and 49 years old, and 0 otherwise.
Age (50–64)	Dummy that takes value 1 if the head of the household is between 50 and 64 years old, and 0 otherwise.
Age (65 or more)	Dummy that takes value 1 if the head of the household is 65 years or older, and 0 otherwise.
Education	Years of education of the head of the household.
Employment	Dummy that takes value 1 if the head of the household is working, and 0 otherwise.
Marital status	Dummy that takes value 1 if the head of the household is married or lives with a partner, and 0 otherwise.
Gender	Dummy that takes value 1 if the head of the household is male, and 0 otherwise.
Income	Total effective monthly income* of the household, measured in millions of Chilean pesos.
Deciles 1st–5th	Dummy that takes value 1 if the household is located between the 1st to 5th income decile, and 0 otherwise.
Deciles 6th–8th	Dummy that takes value 1 if the household is located between the 6th to 8th income decile, and 0 otherwise.
Deciles 9th and 10th	Dummy that takes value 1 if the household is located between the 9th or 10th income decile, and 0 otherwise.
Online banking	Dummy that takes value 1 if any household member uses online banking services, and 0 otherwise.
Checking account	Dummy that takes value 1 if any household member has a bank checking account, and 0 otherwise.
Mortgage	Dummy that takes value 1 if the main dwelling of the household is owned, but continues to pay mortgage loan installments.
Size	Number of household members.
Time	Dummy that takes value 1 if the observation belongs to year 2017 cross-section, and 0 otherwise.

Table 2
Descriptive statistics of the variables. Source: own elaboration based on data from HFS 2014 and 2017.

Sample	Full sample			Adjusted full sample		
Variables	Obs.	Mean	S. D.	Obs.	Mean	S. D.
PAC	6569	0.1165	0.3208	6504	0.1162	0.3205
FIR	6569	0.3113	1.4068	6504	0.2258	0.3509
Age (years)	6569	50.2833	16.2136	6504	50.3281	16.2238
Age (<35)	6569	0.1851	0.3884	6504	0.1848	0.3882
Age (35–49)	6569	0.3236	0.4679	6504	0.3227	0.4676
Age (50–64)	6569	0.2911	0.4543	6504	0.2915	0.4545
Age (65 or more)	6569	0.2002	0.4002	6504	0.2010	0.4007
Education (years)	6551	13.2852	4.2771	6487	13.2830	4.2787
Employment	6569	0.8208	0.3835	6504	0.8221	0.3825
Marital status	6569	0.5962	0.4907	6503	0.5970	0.4905
Income	6569	1.7705	6.2815	6504	1.7781	6.3103
Deciles 1st–5th	6569	0.4684	0.4990	6504	0.4665	0.4989
Deciles 6th–8th	6569	0.2835	0.4507	6504	0.2851	0.4515
Deciles 9th and 10th	6569	0.2481	0.4320	6504	0.2485	0.4322
Gender	6569	0.6479	0.4777	6504	0.6487	0.4774
Online banking	5930	0.5609	0.4963	5869	0.5601	0.4964
Mortgage	6560	0.2032	0.4024	6495	0.2023	0.4018
Size	6569	3.1038	1.5630	6504	3.1039	1.5645
Checking account	6565	0.4091	0.4917	6500	0.4092	0.4917
Time	6569	0.4727	0.4993	6504	0.4726	0.4993
Percentiles FIR						
Minimum value		0.0000			0.0000	
25%		0.0000			0.0000	
Median		0.1054			0.1027	
75%		0.3074			0.2994	
90%		0.6345			0.6031	
95%		0.9719			0.8843	
99%		2.8750			1.8350	
Maximum value		61.640			2.8750	

sample size, to exclude outliers that could affect the significance of our results. In this sense, the adjusted sample considers 99% of households, thus excluding only 1% of households with higher levels of FIR. The descriptive statistics of the variables for this sample of households are found in the last columns of Table 2. The average values and ranges of the control variables do not differ much from

those corresponding to the total sample of households. Regarding the main variables, 11.62% of households had subscribed an ABP and their monthly financial burden corresponds on average to 22.58% of their monthly income.

4.2. Analysis of the effect of subscription to ABP on household financial burden

First, we perform non-parametric tests to compare the credit behavior of households that subscribe an ABP to their debts, with those that do not have one. Table 3 shows the Wilcoxon tests for the mean and median FIR, which take different samples based on temporal criteria and adjustment conditions.

We can observe that the groups of households that have subscribed an ABP have on average a significantly higher FIR than those that do not. The results are consistent with both the mean and the median. Furthermore, the same occurs with households that only belong to the adjusted sample. In all cases, this indicates that the use of ABP and the level of financial burden of the debt have a positive relationship. Although these tests may not necessarily indicate causality, they do indicate an association between indebtedness decision-making and the form of payment linked to it.

Table 4 presents the estimates of the CMP model for the financial-burden-to-income ratio and the decision to subscribe to ABP. We made eight estimations, where half of them considered only the adjusted sample. We used different variables related to the age of the head of household and income to verify whether the estimators are sensitive to the measurement of the control variables. The estimations use robust variances to control for the effects of heteroskedasticity patterns. Finally, all our models are statistically significant in their overall form, according to the Wald test.

The control variables had relevant effects on FIR and ABP decision. According to the Tobit model of CMP, we observe that the financial-burden-to-income ratio is positively affected by the use of internet banking, ownership of a home with payments of pending dividends, and the number of members of family group. There is a negative effect of the monthly household income, but a positive one with the age of the head of household (although it is negative for very old individuals). The education of the head of household (measured by years) has a positive effect (Yilmazer & DeVaney, 2005; Tudela & Young, 2005; Ottaviani & Vandone, 2011; Brown & Taylor, 2008; Brown, Garino, & Taylor, 2013; Ruiz-Tagle, García, & Miranda, 2013; Ruiz-Tagle & Vella, 2016). There are no significant results for the variable occupation status. According to the Probit model, the effect of the control variables on the probability of using ABP shows similar results to those found by Schuh and Stavins (2010) and Delgado (2018). If households have checking accounts, this allows households to be more likely to access more financial services and, in this case, to subscribe to an ABP.

The CMP Tobit model indicates that the parameters associated with the marginal effect of the ABP variable on FIR are all positive, but not significant due to the high volatility of financial burden levels. If we consider only the adjusted sample, regressions (5)–(8) show that these estimators are all highly significant and positive. This research allows us to infer that households that use ABP for debt have higher levels of debt financial burden compared to those that do not. This is in line with what is mentioned in our theoretical model. For Chilean households, it is possible that there is a debt inattention effect due to the subscription to a corresponding ABP, which could generate a loss of well-being, ceteris paribus. Many other authors infer the inattention effects of ABP programs in other products and services by detecting higher consumption levels when using these means of payment instead of others. Econometric models allow isolating and separating this effect from other control variables that affect consumer demand, such as income and demographic characteristics, among others (Gilbert & Graff Zivin, 2014; Sexton, 2015; Wichman, 2017). Nevertheless, to fully validate our hypothesis, future research needs to use more detailed and disaggregated data. Furthermore, it would be interesting to compare these results with other countries, both emerging and developed.

In a complementary way, the results of the probit model show that the FIR variable positively and significantly affects the probability of subscribing an ABP. This further confirms that at higher indebtedness levels, financial institutions encourage or condition the granting of a loan with an ABP subscription.

Finally, policymakers are interested in households managing their debts at adequate levels without paying unnecessary interest and falling into default. ABP programs can benefit individuals to pay their obligations to financial creditors on time, but they can lead to forgetfulness, and thus keep abreast of the current levels of indebtedness of the respective financial products. Hence the need to promote actions and mechanisms that mitigate the adverse effects of the use of ABP programs in debt financial products and enhance their desirable effects. This does not mean that people should not use ABP programs at all, but rather use them correctly.

Table 3
Wilcoxon test for FIR. Notes: Values of means and medians are expressed in percentages. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Source: own elaboration.

Sample	ABP				Test	
	Yes		No		Mean	Median
	Mean	Median	Mean	Median	z-statistic	χ^2-statistic
Full sample	52.70	30.00	28.29	8.43	(19.96)***	(328.37)***
Panel 2014	49.86	32.71	27.87	9.32	(13.30)***	(134.26)***
Panel 2017	54.37	28.70	28.80	7.31	(15.01)***	(196.58)***
Adjusted full sample	40.92	29.33	20.17	8.27	(20.19)***	(325.02)***
Adjusted Panel 2014	42.59	32.11	20.09	9.09	(13.21)***	(133.40)***
Adjusted Panel 2017	39.96	28.61	20.26	6.80	(15.39)***	(196.33)***

Table 4
CMP Tobit-Probit regressions for FIR and ABP. Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. *Z*-statistics in parentheses. Source: own elaboration.

Panel A: Tobit model where FIR is the dependent variable.

	Full sample				Adjusted full sample			
FIR	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ABP	0.0902	0.0839	0.1419	0.1377	0.0883***	0.0848***	0.1172***	0.1136***
	(1.11)	(1.10)	(1.62)	(1.66)	(5.47)	(5.46)	(6.44)	(6.44)
Age	6.8122***		6.7124***		1.9518***		1.8090***	
	(3.52)		(3.44)		(5.37)		(5.15)	
Age^2	−0.9280***		−0.9125***		−0.2648***		−0.2432***	
	(−3.60)		(−3.51)		(−5.46)		(−5.18)	
Age (<35)		0.2124*		0.1982*		0.0328		0.0150
		(2.30)		(2.09)		(1.31)		(0.58)
Age (35–49)		0.2455**		0.2368*		0.0434		0.0284
		(2.61)		(2.43)		(1.87)		(1.19)
Age (50–64)		0.1664		0.1730		−0.0062		−0.0100
		(1.84)		(1.85)		(−0.28)		(−0.44)
Education	−0.0119	−0.0109	−0.0008	−0.0063	−0.0094***	−0.0095***	−0.0059**	−0.0060**
	(−1.07)	(−0.97)	(−0.71)	(−0.59)	(−4.58)	(−4.63)	(−2.80)	(−2.87)
Employment	−0.1340	−0.0804	−0.1490	−0.0931	−0.0133	0.0180	−0.0053	0.0249
	(−1.34)	(−0.81)	(−1.51)	(−0.97)	(−0.66)	(0.88)	(−0.27)	(1.26)
Marital status	0.0580	0.0696	0.0491	0.0599	−0.0064	−0.0028	−0.0080	−0.0045
	(1.11)	(1.28)	(0.96)	(1.12)	(−0.51)	(−0.22)	(−0.66)	(−0.36)
Income	−0.0203**	−0.0202**			−0.0113***	−0.0111***		
	(−2.81)	(−2.80)			(−4.52)	(−4.58)		
$Income^2$	−0.0000	−0.0000			0.0000	0.0000		
	(−0.13)	(−0.12)			(0.49)	(0.52)		
Deciles 1st–5th			0.2828**	0.2870**			0.1897***	0.1864***
			(3.12)	(3.18)			(7.76)	(7.67)
Deciles 6th–8th			0.1699*	0.1734*			0.1075***	0.1059***
			(2.05)	(2.07)			(5.90)	(5.81)
Gender	−0.0644	−0.0737	−0.0520	−0.0617	−0.0297*	−0.0334*	−0.0251	−0.0290*
	(−1.42)	(−1.64)	(−1.15)	(−1.37)	(−2.09)	(−2.35)	(−1.74)	(−2.01)
Online banking	0.2569***	0.2675***	0.2672***	0.2761***	0.0584**	0.0622***	0.0656***	0.0684***
	(3.82)	(3.96)	(4.02)	(4.12)	(3.08)	(3.31)	(3.35)	(3.53)
Mortgage	0.6349***	0.6618***	0.6413***	0.6658***	0.2443***	0.2541***	0.2418***	0.2514***
	(5.21)	(5.35)	(5.15)	(5.28)	(13.55)	(13.98)	(13.50)	(13.93)
Size	0.0284*	0.0322*	0.0296*	0.0336*	0.0062	0.0074*	0.0083*	0.0096**
	(2.21)	(2.43)	(2.27)	(2.51)	(1.81)	(2.12)	(2.46)	(2.76)
Time	−0.1530**	−0.1542**	−0.1817***	−0.1832***	−0.0582***	−0.0589***	−0.0780***	−0.0782***
	(−2.74)	(−2.76)	(−3.45)	(−3.46)	(−4.39)	(−4.45)	(−5.48)	(−5.51)
Constant	−12.3550**	−0.2406	−12.3948**	−0.4302	−3.1805***	0.3265***	−3.0968***	0.1971***
	(−3.28)	(−0.66)	(−3.26)	(−1.17)	(−4.69)	(5.89)	(−4.72)	(3.64)
Observations	5905	5905	5905	5905	5845	5845	5845	5845
Wald X^2	(238.22)***	(236.22)***	(219.03)***	(218.52)***	(434.74)***	(441.21)***	(462.78)***	(475.35)***
ABP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FIR	0.4841***	0.4748***	0.4680***	0.4583***	1.6054***	1.5428***	1.5183***	1.4578***
	(5.34)	(5.38)	(5.36)	(5.39)	(15.03)	(12.52)	(13.50)	(11.58)
Checking account	0.7327***	0.7693***	0.7139***	0.7449***	0.8748***	0.9178***	0.8124***	0.8479***
	(9.02)	(8.59)	(8.91)	(8.52)	(10.27)	(10.14)	(9.52)	(9.53)
Age	0.1006		0.0574		0.1076		0.0368	
	(1.55)		(0.86)		(1.38)		(0.45)	
Age (<35)		−0.0171		0.0119		0.0020		0.0431
		(−0.24)		(0.16)		(0.02)		(0.48)
Age (35–49)		0.0259		0.0385		0.0732		0.0884
		(0.37)		(0.53)		(0.86)		(1.03)
Age (50–64)		0.0472		0.0341		0.1332		0.1060
		(0.65)		(0.46)		(1.61)		(1.26)
Education	0.0183*	0.0183*	0.0082	0.0078	0.0307***	0.0309***	0.0138	0.0138
	(2.26)	(2.24)	(1.07)	(0.99)	(4.10)	(4.07)	(1.76)	(1.74)
Income	0.0133**	0.0132**			0.0204**	0.0191**		
	(2.99)	(2.96)			(3.03)	(2.77)		
Deciles 1st–5th			−0.3607***	−0.3693***			−0.5742***	−0.5655***
			(−4.63)	(−4.77)			(−7.40)	(−7.23)
Deciles 6th–8th			−0.2244***	−0.2306***			−0.3449***	−0.3415***
			(−4.69)	(−4.72)			(−6.12)	(−5.98)
Gender	0.1075*	0.1120*	0.0921*	0.0958*	0.1565**	0.1602**	0.1273*	0.1305*
	(2.46)	(2.52)	(2.09)	(2.13)	(3.13)	(3.15)	(2.46)	(2.49)
Online banking	0.2337***	0.2412***	0.2128**	0.2201**	0.3389***	0.3453***	0.2845***	0.2929***

(*continued on next page*)

Table 4 (*continued*)

ABP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(3.70)	(3.69)	(3.24)	(3.25)	(4.32)	(4.33)	(3.58)	(3.65)
Time	0.2633***	0.2690***	0.2936***	0.2989***	0.3269***	0.3321***	0.3660***	0.3688***
	(7.07)	(6.95)	(7.55)	(7.42)	(7.01)	(6.98)	(7.59)	(7.55)
Constant	−2.3221***	−2.0197***	−1.8245***	−1.6764***	−3.3668***	−3.0730***	−2.4673***	−2.4435***
	(−6.15)	(−7.25)	(−5.21)	(−6.70)	(−9.86)	(−17.27)	(−6.74)	(−13.29)
Observations	5905	5905	5905	5905	5845	5845	5845	5845
Wald X^2	(238.22)***	(236.22)***	(219.03)***	(218.52)***	(434.74)***	(441.21)***	(462.78)***	(475.35)***

5. Conclusions and discussion

In this article we theoretically and empirically analyze the implications of the use of ABP programs on individuals' indebtedness decisions. Our intertemporal consumption model proposes possible consequences of the inattention of debt in the event that payments are linked to an automatic mechanism. Reducing the importance of the cost of debt due to loss of attention means that households go into debt more, causing a loss of well-being compared to the optimal debt decision by having complete information. The previous effect was empirically tested for Chile, an emerging economy, whose households are generally characterized by high levels of indebtedness.

The results of the CMP Tobit-Probit model give us some evidence for our research hypothesis for Chilean households. We found that using ABP programs has a positive effect on debt burden levels. Despite these results, it is important to highlight the limitations of this research. We used a measure that considers the sum of all debt payments for each household. The amounts of credit card debt and consumer credits were considered as a whole. Unfortunately, our ABP variable does not specify the type of financial debt product. It can be more than one debt product in many cases (e.g., credits cards and consumer credits, among others). This research constitutes a starting point in the analysis of inattention in debt products linked to ABP programs. A stronger support of this evidence must necessarily consider a more detailed monitoring of the state of household debts, with monthly data. From this perspective, it is convenient to collect data on the payment mechanisms of each debt product, be it cash, electronic transfers or ABP systems, among others.

This finding reveals some implications for household financial management and for financial market regulators, interested in promoting public faith in the system through greater financial education among the population. First, households must be clear about the advantages and safeguards that come with subscribing to ABP programs, especially for debt. While an ABP system has the advantage of helping individuals pay off their credit fees on due dates, if they do not pay attention to payments, people could adopt a behavior that would cause them to borrow more than they would actually decide if they had full knowledge of their bank account disbursements. This is especially important for the payment of fees for the amounts used in credit cards (Sakaguchi, Stewart, & Gathergood, 2018). There are ABP programs that are not tied to paying a full fee, but only to the minimum payment required by the financial institution. If households forget that they have to pay these fees, or do so late, there is a greater accumulation of interest and, therefore, higher fees in the future.

Second, as we mentioned above, the regulator seeks to promote public faith, so this study recommends that the mechanisms are adequate to mitigate or cancel the inattention generated by debt-related ABP programs, along with the implementation of campaigns to promote better financial behavior in the population, e.g., a set of smart nudge policies (Sitzia et al., 2012).

Our research provides lines for future studies. On the one hand, it is interesting to analyze the lack of attention caused by ABP systems in other types of services, in addition to those studied by Sexton (2015) such as the electricity bill, toll collection (Finkelstein, 2009) and water consumption (Lott, 2017). An example is the case of donations to non-governmental organizations, savings and internet services, among other types of accounts. In some cases, inattention could be beneficial when applied to savings. On the other hand, it would be convenient to deepen the study of debt inattention, detecting the specific causes why households stop paying attention to the payment of fees and understanding what types of debts are the most affected. An ABP for fixed installments of a consumer credit could not be the same as an ABP for variable credit card installments. This would require looking for other primary information gathering techniques and methodologies related to behavioral economics.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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