

PAPER OR PLASTIC? PAYMENT INSTRUMENT CHOICE IN URUGUAY¹

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RESUMEN

Estudiamos los determinantes de la elección de medios de pago que realizan los hogares uruguayos utilizando los datos de la Encuesta Financiera de los Hogares Uruguayos. Esta encuesta y las estadísticas agregadas del sistema de pagos muestran que los hogares realizan sus pagos con efectivo mayormente, mientras que el uso de tarjetas de crédito y débito es bajo y estable. Nuestros resultados indican que las características de los hogares son determinantes de la elección de medio de pago: el nivel de ingreso, edad y nivel educativo aumentan la probabilidad de usar medios electrónicos. El acceso a servicios financieros es un determinante importante del uso de medios electrónicos sobre el efectivo. Las condiciones de la oferta, como la aceptación de tarjetas en las tiendas, también juega un rol.

JEL: G20, D12, D14

Palabras clave: Sistema de pago, medios de pago, multihoming

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ABSTRACT

We study the drivers of Uruguayan households payment instrument choice using a new dataset from the Survey of Uruguayan Household Finances. Survey data and payment system aggregate data show that households are intensive in their use of cash while the use of credit and debit cards is low and stable. Our results show that household characteristics are important drivers of payment instrument choice: income, age and education increase the probability of using plastic. Access to financial services is an important determinant of using plastic over cash. Supply side conditions, like card acceptance at stores, also play a role.

JEL: G20, D12, D14

Keywords: Payment systems, payment instruments, multihoming

1. INTRODUCTION

Payment instrument choice has been widely studied in high income countries with well developed banking systems and extensive electronic payment networks. The literature has stressed the importance of household demographic characteristics, in particular income, age and gender, in explaining payment instrument choice. Probably due to the lack of data at the household level, the topic has not been analyzed in depth in developing countries. It is expected a bigger role of cash in countries with a low proportion of households holding bank accounts and electronic payment instruments.

In this paper we study the determinants of Uruguayan households' payment instrument choice using a novel dataset. Following the previous literature we first estimate a multinomial logit model in order to study the main drivers of household payment instrument choice. We then describe the extent of multihoming, that is, how households spread their purchases among alternative payment instruments. We show that a large proportion of households concentrate their purchases in a single payment instrument – cash – and present evidence on how the complexity of the use of payment instruments increases with income, education and the access to financial services.

Due to recent changes in its legal framework, Uruguay's payment system is an interesting case of study. One of the first incentives for the use of electronic payment instruments was given in 2005² through the reduction of 9 points in the VAT for payments made with cards in restaurants and other food services. Later on, the adoption of POS machines by small businesses was subsidized to facilitate the use of this technology. The subsidy scheme covered the total amount of the rent in 2013, and decreased to 70% and 40% in 2014 and 2015, respectively. Additional incentives –corporate tax, import tariffs and sale tax reductions, - were given in 2014 for firms that incorporated POS machines. These resulted in an increase of 120% in the number of POS between 2012 and 2014. A recently approved law³ aims to promote financial inclusion and the use of electronic payment instruments by households. In particular, the main objectives of the law are to promote

2 Law 17,934.

3 Law 19,210, known as *Finacial Inclusion Law*.

the access to and use of financial services, to increase the use of electronic payment instruments, to improve the efficiency of the payment system and increase the competition in the financial sector. It mandates the payment of wages, pensions and social benefits through bank accounts, benefits the use of debit and credit cards with reductions in the VAT when paying with them and introduces several measures⁴ with the aim of stimulating the use of electronic payment instruments. All these changes are expected to have a profound impact on how households pay in Uruguay.

The rest of the paper is organized as follows. Section 2 describes the use of payment instrument choice in Uruguay. In section 3 we include a brief literature review on the main empirical results of different studies on payment instrument choice. The data used in our empirical analysis is presented with summary statistics in Section 4. The methodology is presented in Section 5 and the main results on the drivers of payment instrument choice and the extent of multihoming are presented in Section 6. Finally, Section 7 concludes.

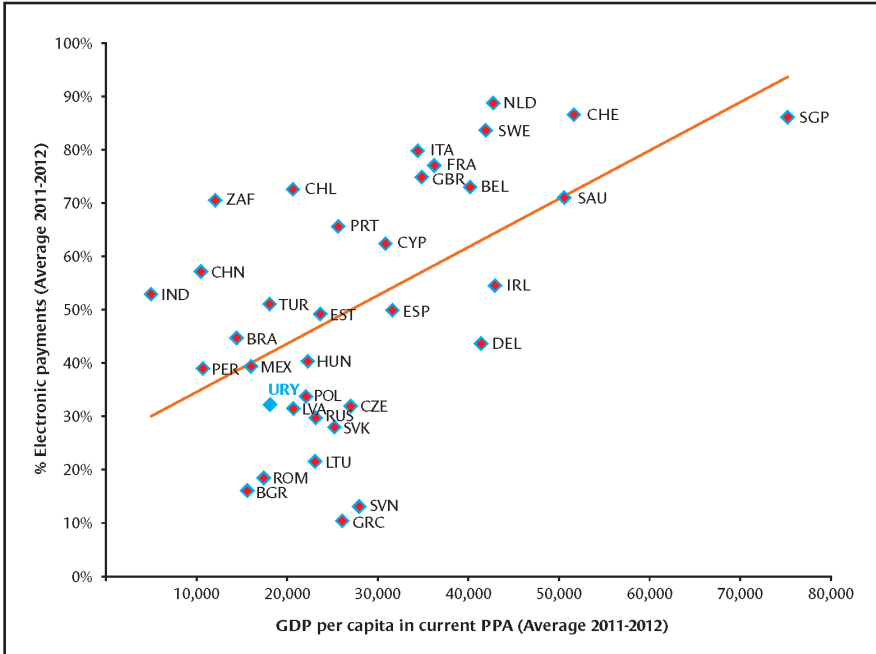
2. THE USE OF PAYMENT INSTRUMENTS IN URUGUAY

Uruguay lags behind similar income level countries in the use of electronic payment instruments. Figure 1 shows a positive correlation between the use of electronic payment instruments and GDP per cápita expressed in Purchasing Power Parity (PPP). Whilst about 30% of transactions⁵ in Uruguay are made using either credit cards, debit cards, bank transfers or direct debit, the figure is 51% in Turkey and 73% in Chile, countries with similar level of income per cápita. Former communist countries – Slovenia, Bulgaria, Romania, Lithuania, Slovak Republic, Russia and Czech Republic – together with Greece are the only countries in the sample for which the use of electronic payment instruments is below that in Uruguay. Moreover, Uruguay is the Latin American country in the sample in which the use of electronic payment instruments is the least developed.

⁴ For instance, the emission of electronic cash.

⁵ The index is calculated as the sum of the value of transactions made with credit cards, debit cards, bank transfers and direct debit – what we call electronic payment instruments – over the total value of transactions. The total value of transactions includes electronic payment instruments plus ATMs extractions which aim to capture the use of cash.

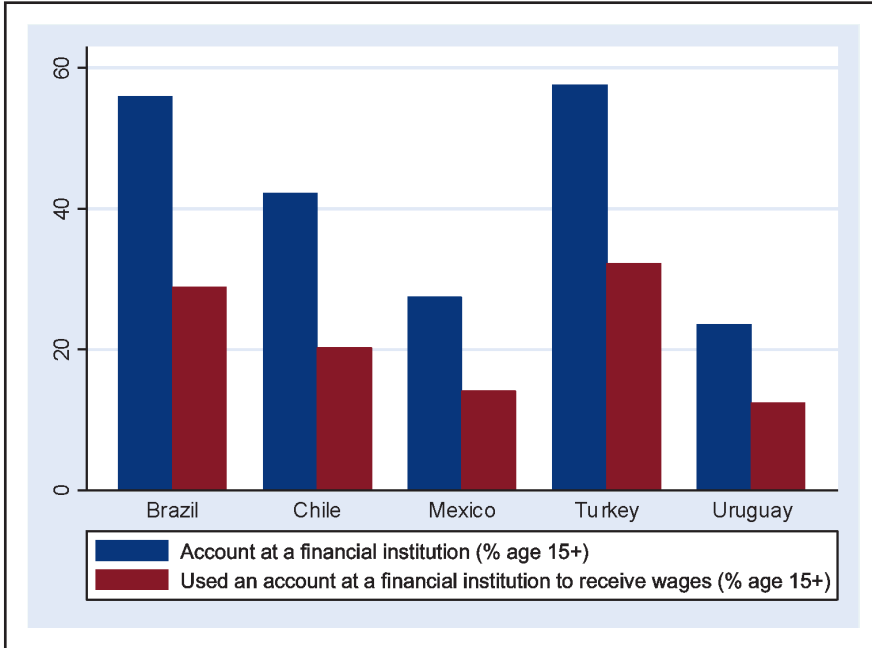
Figure 1: Electronic payments and GDP per cápita: international comparison



Source: Own calculations using data from Banco Central del Uruguay, Reporte de Pagos Minoristas (several years), Bank of International Settlements, Eurostat and Banco Central de Reserva de Perú

Low use of electronic payment instruments in Uruguay could be related to difficulties in accessing financial services. Figure 2 shows important differences in access to bank accounts in Uruguay compared to countries with higher usage of electronic payments and similar income level. Moreover, in terms of financial inclusion, Uruguay is ranked 43th out of 82 countries in an index elaborated by Cámara and Tuesta (2014). They find that access to financial services, measured by ATMs and bank branches, is the most important dimension of financial inclusion, followed by usage and barriers. Interestingly, Uruguay ranks poorly in access to financial services which might be correlated with the low use of electronic payment instrument.

Figure 2: Access to bank accounts in Uruguay and other countries with similar income levels



Source: Global Financial Inclusion 2011 (Global Findex) Database, World Bank Group

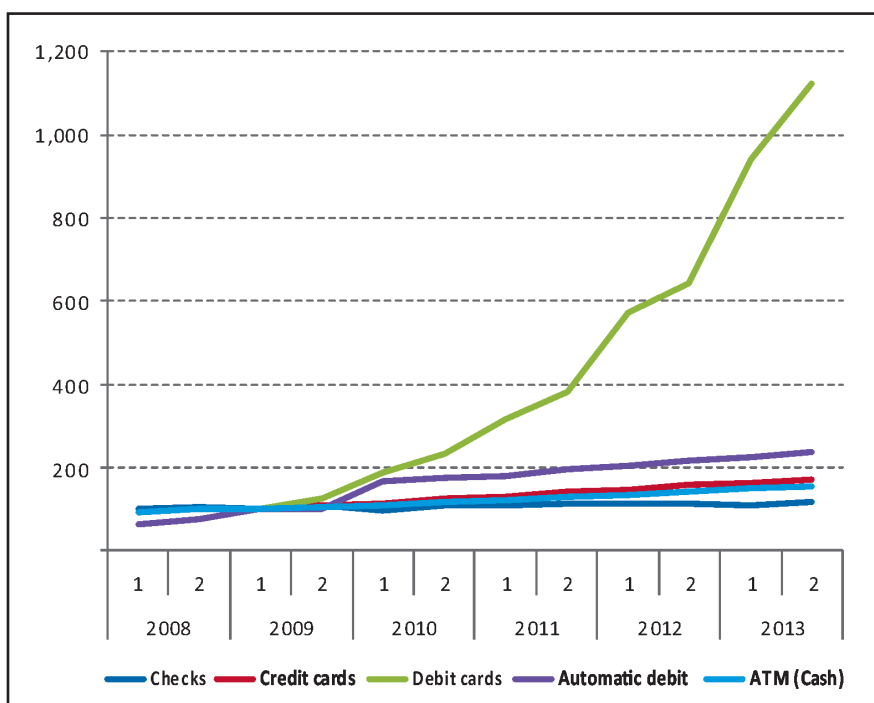
As expected and as we will see below, Uruguayan households make heavy use of cash for their regular purchases, and despite the underuse of electronic payment instruments from an international perspective, small changes towards an increase in the use of debit cards is seen even before the enforcement of the new law is in place. Figure 3⁶ shows the evolution of the the number of transactions using 5 payment instruments⁷ between 2008 and 2013. The total number of transactions has grown 78% during this period. But there is substantial heterogeneity in the evolution of the use of the different payment instruments. Whilst the number of transactions

6 Data for Uruguay include transactions made in US dollars which is important in Uruguay due to high dollarization.

7 A similar trend can be shown using amounts instead of transactions. The data were provided by the Payment System section of the Uruguay Central Bank and is reported twice a year in a detailed report (in Spanish) on the Uruguayan payment system that can be accessed from: www.bcu.gub.uy/Sistema%20de%20Pagos/Paginas/Reporte-Sistema-Pagos-Minorista.

using credit cards has grown 84% and that of automatic debit 242%, the number of checks has grown only 14% during the same period. Albeit from an almost negligible base, the number of transactions using debit cards has grown tenfold between the beginning of 2009 and the end of 2013. In spite of this impressive increase, by the end of the period, the use of debit cards only represents 4% of the total number of transactions.

Figure 3: Number of transactions by payment instrument (1st semester 2009 = 100)



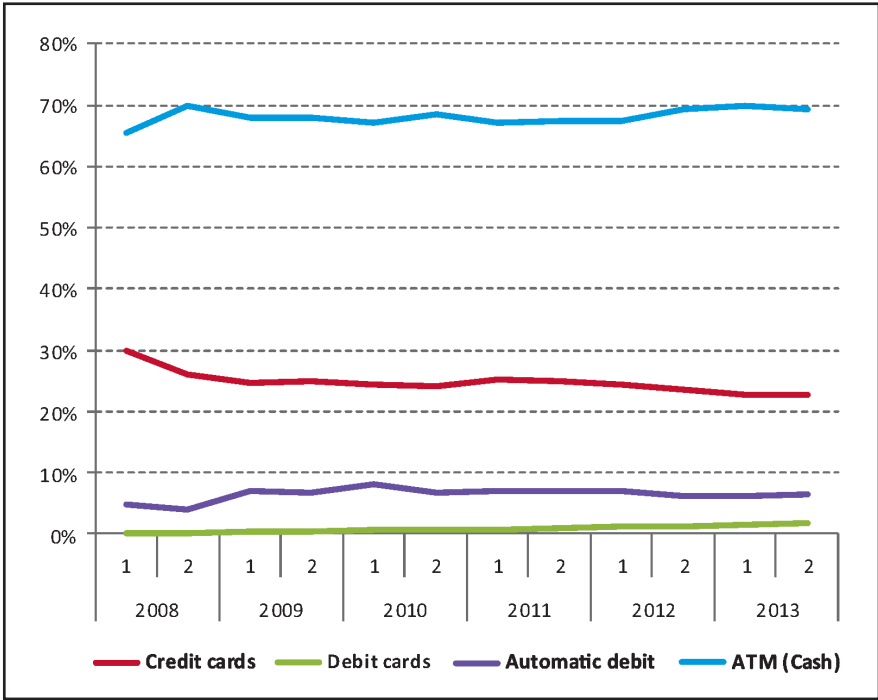
Source: Own calculations using data from Banco Central del Uruguay, Reporte de Pagos Minoristas (several years)

Considering that the use of checks is mostly by companies, we show in Figure 4 the proportion of the total value of transactions that passes through the payment system without considering checks. About 70% of the total value of transactions is done using cash⁸, a further 23% is using credit

⁸ Approximated with the cash extracted from ATMs.

cards and only 2% using debit cards. A second feature of the figure is that besides the small decline in the share of credit cards and the slow increase in the use of debit cards, there are not substantial changes during the last 5 years. Note that this does not imply that there is a decline in the use of credit cards. Indeed, in terms of number of transactions, the proportion of credit card operations remained relatively stable at 51% over this period.

Figure 4: Proportion of transactions by payment instrument (% of total value)



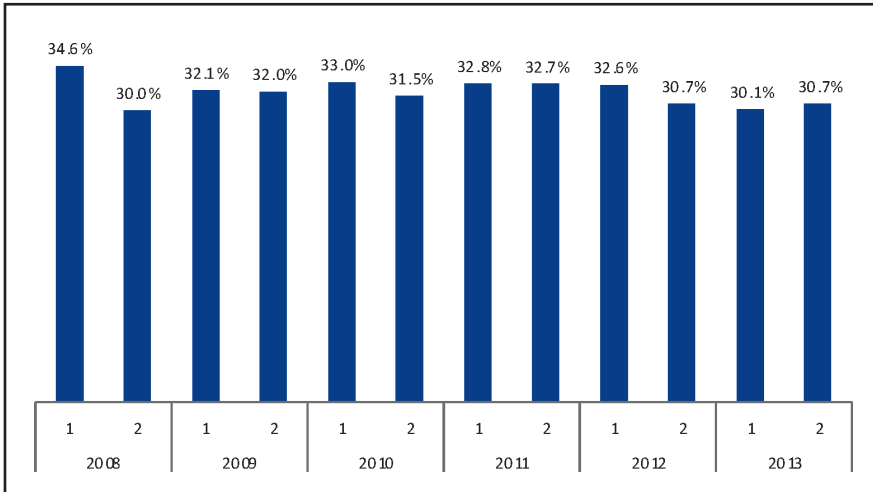
Source: Own calculations using data from Banco Central del Uruguay, Reporte de Pagos Minoristas (several years)

We can classify payment instruments into traditional (cash) and electronic (credit cards, debit cards and automatic debit)⁹. Figure 5 shows the proportion of electronic payment instruments in the total value of transactions, again without considering checks. About a third of the total

⁹ A similar classification is introduced in Banco Central del Uruguay (2014)

amount is paid using electronic payment instruments, with a slight decline in the last 3 semesters of the period under analysis.

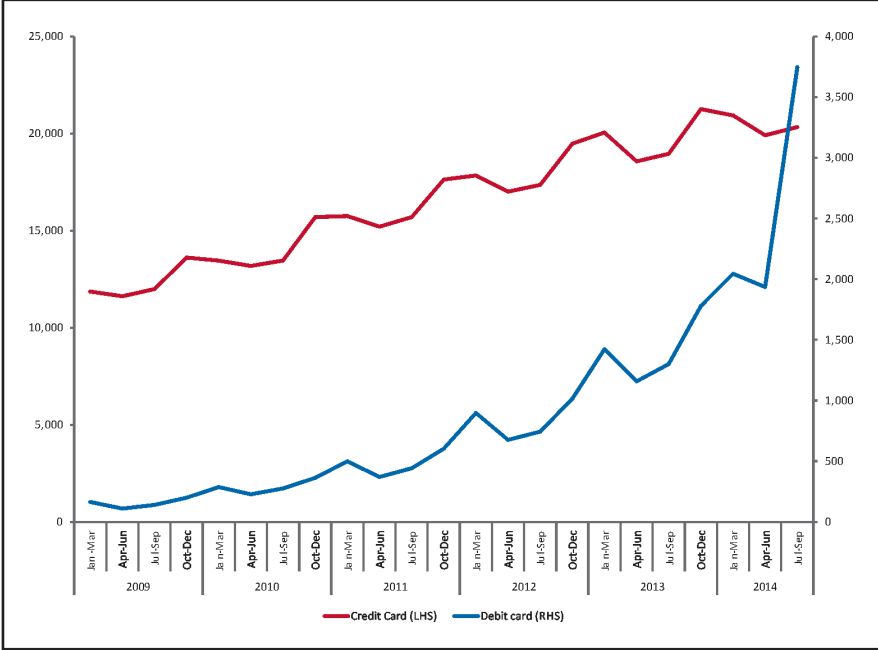
Figure 5: Proportion of electronic payments (% of total amount)



Source: Own calculations using data from Banco Central del Uruguay, Reporte de Pagos Minoristas (several years)

In sum, in spite of the relatively stability, substantial changes in the use of payment instruments are expected in Uruguay after the recently approved Financial Inclusion Law. Indeed, debit card transactions doubled immediately after the Financial Inclusion Law was in place (July-September 2014) with respect to April-June 2014; and tripled with respect to the same quarter of 2013 (See figure 6). This points to the need of a better understanding of what are the main drivers of households payment instrument choice.

Figure 6: Number of transactions with debit and cred cards (in thousands)



3. LITERATURE REVIEW

The choice of payment instruments has been widely studied in high income countries with well developed financial systems but, probably due to data limitations, has not had too much attention in developing countries.

Klee (2006) relates the use of payment instruments with household characteristics using survey data for the United States. The author finds that debit card use increases with income and education. She attributes the income effect to households gaining access to financial services, but also to the substitution between other forms of payment and debit cards. The paper also finds a positive relation between age and convenience card use, but a negative relation with debit card use.

Also using data from the US, Borzekowski and Kiser (2006) estimate a rank-ordered logit for payment instruments' attributes: older households suffer disutility from electronic and liquid attributes, that is, attributes

associated with debit cards. On the other hand, Cohen and Rysman (2013), using a panel of consumers, find a negative relation between age and card use. On the other hand, they find a positive relationship between income and cards and checks use, while the relation with cash is negative. Klee (2008) supports this hypothesis as she finds that debit card use increases with income, while cash, checks and credit card use decreases.

Several papers study the effect of supply side factors on payment instrument choice. Rysman (2007), for example, documents the existence of a positive feedback loop between consumer usage of a credit card and its acceptance by merchants. The rationale behind this result is that consumers value more a specific credit card if it is widely accepted by merchants, and vice versa. Huynh, Schmidt-Dengler and Stix (2014) study card acceptance at the point of sale and its impact on money demand. Their findings suggest a negative relation between acceptance and money demand.

Finally, Arango, Hogg and Lee (2015) study why cash is still a popular payment method in Canada. They use data from the 2009 Methods of Payment Survey, a household survey specifically designed to study payment instrument choice by Canadian households, and find that cash is used mostly because it is widely accepted by merchants, it is easy to use and has a low marginal cost.

The literature in Uruguay is not well developed yet. Mello (2011) describes the credit card market in great detail and studies the market concentration and the interchange fees charged. The author concludes that, compared with other countries, the credit card market in Uruguay is not well developed and that there is a lack of competition – an oligopoly market structure – in the supply side of the market. Lluberas (2014) studies the drivers of households payment instrument choice. Using data from the 2005-06 Uruguayan consumption survey – *Encuesta de Gastos e Ingresos de los Hogares* –, he finds that not controlling for transaction characteristics results in biased estimates of household characteristics effects. The author finds that once transactions characteristics are included in the estimations, income and age play a minor role in explaining households payment instrument choice in Uruguay.

Finally, Sanroman and Santos (2014) use the Survey of Uruguayan Household Finances to study the determinants of accessing financial

services, specifically having a credit card and a bank account. They find that household characteristics like income, education level and working status are the main drivers of the probability of holding those financial services.

4. DATA

4.1. Survey of Uruguayan Household Finances

This paper uses data from the Survey of Uruguayan Household Finances (SUHF). The SUHF was designed to gather information concerning the financial situation of Uruguayan households. As the survey is linked to the Household Survey (HS), financial data can be linked to a rich set of household characteristics, including demographic, social and economic information. It is noteworthy that for the first time this information is available for Uruguay. Sample summary statistics of the survey are presented in Sanroman, Cladera, Ferre and Santos (2013).

The SUHF was collected in two stages: at its first stage, the SUHF consisted of an additional module included in the HS. Data at this point was collected from 9,156 households, between October 2012 and January 2013. The data used in this paper corresponds to this stage. In its second stage, the survey was extended to include several modules which will deepen the financial information previously gathered. This broader survey is currently being implemented and is similar in its scope to the well-established US Survey of Consumer Finances (SCF) or the Italian Survey of Household Income and Wealth (SHIW).

4.2. Payment instrument use

The main purpose of this paper is to study the determinants of households payment instrument choice. Thus, we use the following two questions from the SUFH that are related to payment instrument use:

1. Regular purchases in food, cleaning products, clothing, etc. are paid with:
 - a. Cash and checks, exclusively.
 - b. Cash and checks mostly, but also debit or credit card.
 - c. Debit or credit card mostly.

- d. All of the above in similar proportions.
 - e. Other forms.
2. Monthly payments like utilities, health insurance, schooling fees, etc. are paid with:
- a. Cash and checks, exclusively.
 - b. Cash and checks mostly, but also debit, credit card or bank transfers.
 - c. Credit card mostly.
 - d. Direct debit mostly.
 - e. Bank transfers mostly.
 - f. All of the above in similar proportions.
 - g. Other forms.

We then define two dependant variables¹⁰: i) *regular purchases*, based on question 1, which takes values from 1 to 4 for answer choices a to d respectively; and, ii) *multihoming* (binary), based on questions 1 and 2, which takes value 1 if the household uses more than one payment instrument (multihoming), and 0 if the household uses cashes or checks exclusively (singlehoming). Note that the latter is defined for regular purchases and monthly payments.

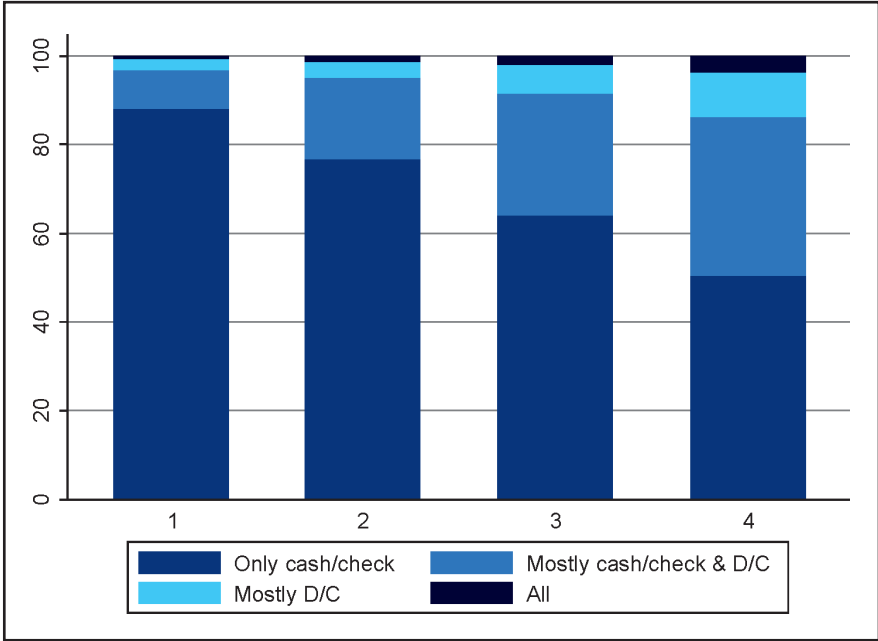
4.3. Descriptive statistics

Most households, 71% of them, use cash or check, exclusively, for their regular purchases; 22% use mostly cash or check but also debit/credit card; only 6% of households use mostly debit/credit card; while 2% use all of these payment instrument in similar proportions. However, there is variability in these proportions when considering several household characteristics. The following graphs illustrate the use of payment instrument for our *regular purchases* variable.

¹⁰ The answer “Other forms” is excluded from the variable definition, and thus, from the estimations, due to its low response (1% of the answers), and because it is not clear which payment instrument it includes. Nonetheless, estimation results are robust to including this response.

The use of cash or checks exclusively is decreasing with respect to income quartile as illustrated by Figure 7, ranging from 87% for households in quartile 1, to 51% for quartile 2. Debit and credit card use is, on the other hand, positively correlated with income.

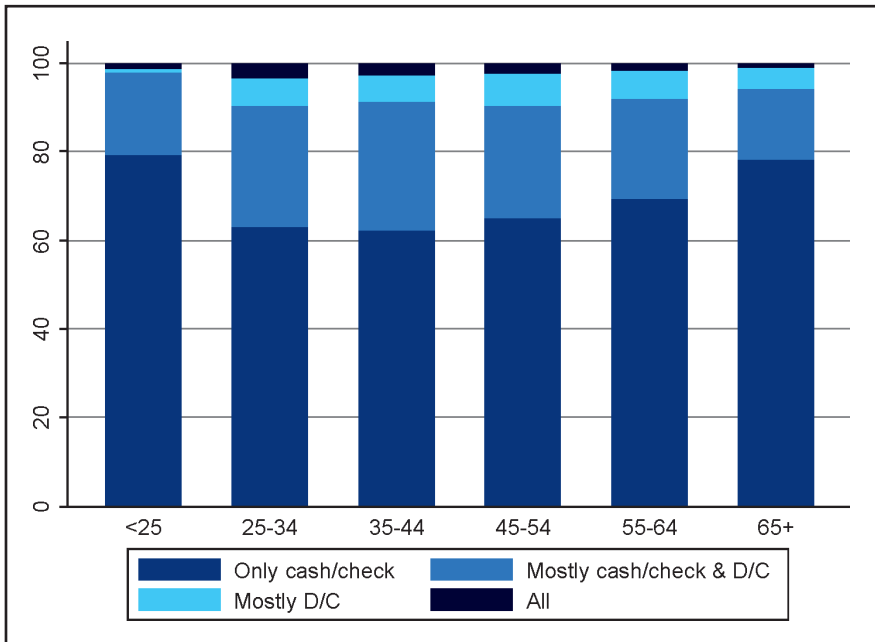
Figure 7: Payment instrument choice for regular purchases, by income quartile.



Source: Own calculations using data from the Survey of Uruguayan Household Finances

Payment instrument use, with respect to the age of the household head, has a U-shaped form. Households with the youngest and oldest heads of the distribution tend to use more cash and checks, while those in the middle age groups are more intensive in debit and credit card use.

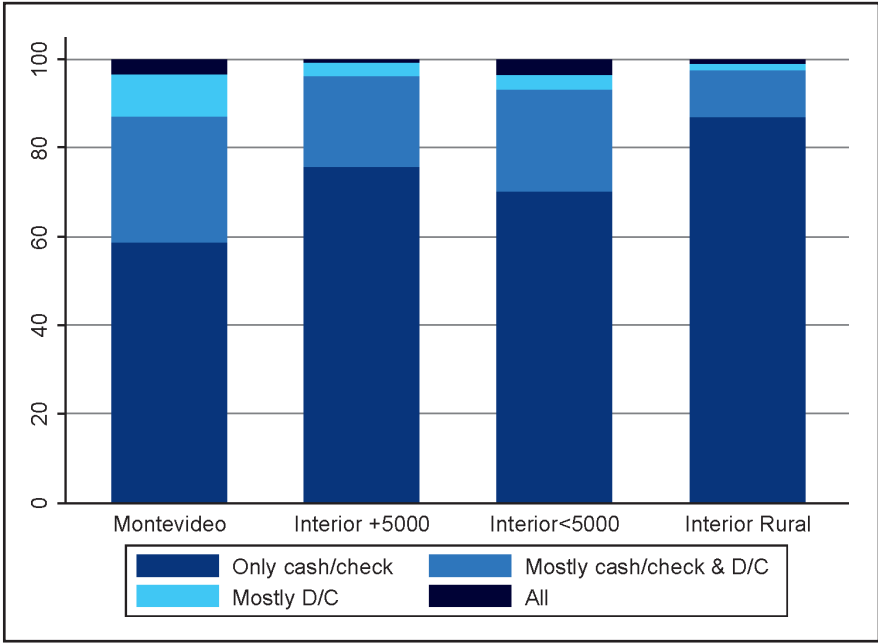
Figure 8: Payment instrument choice for regular purchases, by age group.



Source: Own calculations using data from the Survey of Uruguayan Household Finances

Considering the region where the households lives, those that reside in Montevideo, are those that make more use of debit and credit cards. On the contrary, households that live in rural areas, make more use of cash and checks.

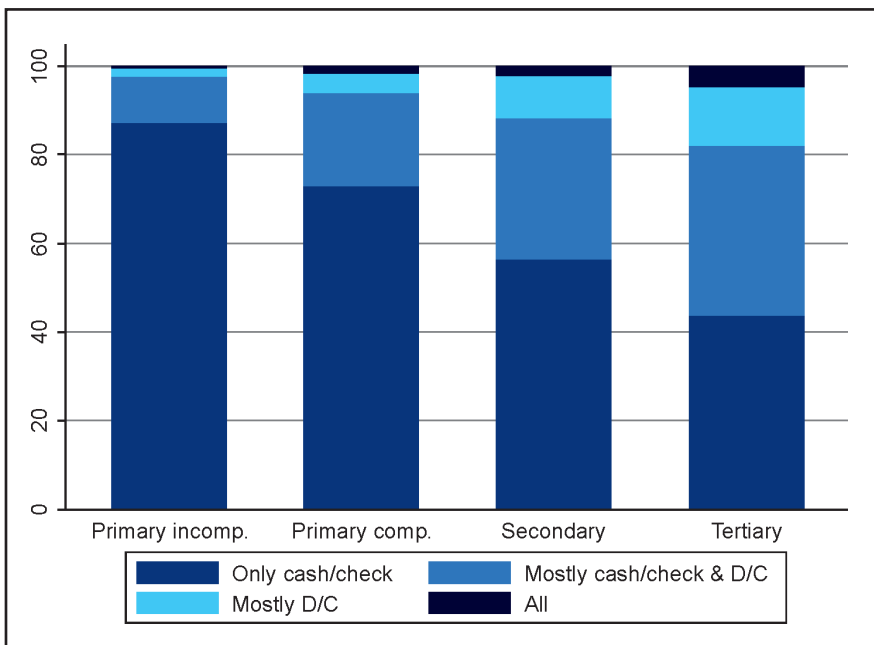
Figure 9: Payment instrument choice for regular purchases, by region.



Source: Own calculations using data from the Survey of Uruguayan Household Finances

Finally, there is a strong negative correlation between the education level of the household head and the use of cashes and checks, which is very similar to the relation described for income quartiles, probably due to the correlation between income and level of education. As the level of education is higher, households seem to substitute cash and checks for debit and credit cards, when paying for their regular purchases.

Figure 10: Payment instrument choice for regular purchases, by level of education.



Source: Own calculations using data from the Survey of Uruguayan Household Finances

We do not show descriptive statistics for monthly payments as responses show very little variation across characteristics.

Table 1 shows summary statistics of the data used in the empirical analysis (SUHF) and a comparison with a national representative Household Survey (HS). The first and last column show mean values of the variables included in the estimations in the SUHF and HS, respectively. We can infer from the table that the SUHF sample is representative of the Uruguayan population.

Table 1: Summary statistics

VARIABLES	SUHF				HS
	mean	sd	min	max	mean
Number of persons	2.71	1.53	1	14	2.75
<25	0.03	0.17	0	1	0.03
25-34	0.13	0.34	0	1	0.13
35-44	0.17	0.38	0	1	0.18
45-54	0.19	0.39	0	1	0.20
55-64	0.17	0.38	0	1	0.18
65+	0.3	0.46	0	1	0.29
Primary incomplete	0.14	0.35	0	1	0.14
Primary complete	0.61	0.49	0	1	0.60
Secondary complete	0.14	0.35	0	1	0.14
Tertiary complete	0.11	0.32	0	1	0.11
Montevideo	0.41	0.49	0	1	0.41
Cities with +5,000 inh.	0.46	0.5	0	1	0.44
Cities with -5,000 inh.	0.09	0.28	0	1	0.10
Rural areas	0.05	0.22	0	1	0.05
Quartile 1	12,531	4,046	0	18,872	11,795
Quartile 2	24,318	3,312	18,882	30,198	23,185
Quartile 3	37,819	4,926	30,231	47,878	36,363
Quartile 4	78,811	41,886	47,893	516,667	74,720
Retired	0.28	0.45	0	1	0.27
Female	0.43	0.49	0	1	0.42
House owner	0.59	0.49	0	1	0.60
Married	0.42	0.49	0	1	0.42
Doesn't have credit card	0.42	0.49	0	1	N/A
Credit card defaulter	0.08	0.27	0	1	N/A
Food card	0.05	0.21	0	1	0.05
Has bank account	0.46	0.5	0	1	N/A
Self-employed	0.2	0.4	0	1	0.21
Bank clients/1,000 inh ¹ .	548.4	287.48	224.9	886.1	N/A
Tenure	7.16	10.64	0	62	72.15
(less than one)	0.44	0.5	0	1	0.43
Number of POS ²	3,744	3,567	119	8,014	N/A

Source: Own calculations using data from the Survey of Uruguayan Household Finances and Household Survey. 1/ Reporte del Sistema Financiero 2012, Banco Central del Uruguay. 2/ Reporte Sistema de Pagos Minorista, Banco Central del Uruguay.

5. METHODOLOGY

We estimate a standard multinomial logit model to study payment instrument choice in *regular purchases*. A logit model is estimated to analyze the determinants of *multihoming*. All models are estimated with robust standard errors.

With respect to the independent variables included in the models, we followed Klee (2006) who uses three groups of variables to explain payment instrument choice. The first group of variables aim to capture the effect of demographic characteristics and includes head of household age, her education level, gender, marital status and the region where the household lives. The second group capturing employment related characteristics considers if the head of the household is retired, self-employed, the number of years with the current employer, and a dummy variable that is equal to 1 when the number of years with the current employer is less than one. Finally, the third group of control variables captures financial characteristics including income quartiles, homeownership, if the household is recipient of a State provided food card, if it has a bank account, if it does not have a credit card and if its credit card has and outstanding balance. For the *multihoming* regression we include a dummy that indicates whether the household holds a credit or bank account or not.

Additionally, we include other variables not related specifically to the household: a dummy variable for transaction type (regular purchase or monthly payment); the number of Point of Sale (POS) machines active in the region where the household reside; and the number of bank clients per 1,000 inhabitants.

Variables related to the access to financial services - having a bank account or a credit card - could be endogenous in our regressions. As a robustness check, we estimate the *multihoming* regression with OLS and instrumental variables. The instruments used for access to financial services are being a public employee and being self employed; both variables are significant at the 1% in the first step of instrumental variables estimation, and are presumably unrelated to multihoming. Results show very little variation in the significance and coefficient estimates, indicating that endogeneity is not an important issue in our specification. Results and first stage regression are reported in the Appendix.

6. RESULTS

In this section, we present the main results that derive from the estimations of the models. Due to the characteristics of our dataset we are not able to control for transactions – besides the fact that the purchase was regular or monthly – and payment instruments characteristics. Schuh and Stavins (2010) show that once we control for payment instrument characteristics the role of household characteristics in explaining payment instrument choice diminishes. Lluberá (2014) finds that once transaction characteristics are included, the role of household income in explaining payment instrument choice diminishes.

Marginal effects are computed, for variables, as the derivative of the probability with respect to the variable, evaluated at the mean of the other controls. Similarly, for dummy variables, the marginal effect is defined as the difference between the probability when the variable takes the value one and zero, also evaluated at the mean of the rest of the variables.

6.1. Regular Purchases

Table 2 presents marginal effects for each outcome of the variable *regular purchases*. Household characteristics are significant determinants of payment instrument choice, as it is well established in the literature, specifically see Klee (2006), Borzekowski and Kiser (2006), Klee (2008) and Cohen and Rysman (2013).

Our estimations suggest that age, income, education and access to financial services are the main determinants of households payment instrument choice. First, the probability of using mostly debit or credit card increases with the age of the household head. The exception is the oldest age group whose coefficient is not significant. This result suggests that there are changes in the use of payment instruments across the life cycle. On the other hand, the oldest group is the least intensive user of electronic payment instruments. Presumably, this could reflect a cohort effect: that is, the oldest group of households belongs to a generation with low propensity to use electronic payment instruments, and those habits could be persistent over time.

These results are not entirely consistent with the literature, mainly because in our dataset it is not possible to disaggregate electronic payments

use between debit and credit card. Klee (2006) finds a positive relation between age and convenience card use, and a negative relation with debit card use. Borzekowski and Kiser (2006) estimate a rank-order logit for payment instrument's attributes: older households suffer disutility from electronic and liquid attributes, that is, attributes associated with debit cards. On the other hand, Cohen and Rysman (2013), using a panel of consumers, find a negative relation between age and card use. Considering the low use of debit cards in Uruguay, this could imply that households in the 35 to 54 age groups are more likely to use credit cards for their daily purchases.

The level of education of the household head plays a role in explaining payment instrument choice. Indeed, having finished tertiary education reduces the probability of using cash or checks exclusively, in favor of a more intensive use of electronic payment instruments. This result is a stylized fact that appears in most papers. Households with higher levels of education are probably more informed, and more likely to adopt other forms of payment types besides cash.

Women are more likely to use cards, credit or debit and being married operates in the same direction. Having a food card increases the probability of using debit or credit card. Employment status, being self-employed and tenure increases the probability of using cash and checks exclusively. Income is also a determinant of payment instrument choice: as the level of income increases, households tend to substitute cash and checks for debit or credit card payment.

The latter result is very common in the literature of payment choice. Cohen and Rysman (2013) find a positive relationship between income and cards and checks use, while the relation with cash is negative. Klee (2006) finds that debit card use increases with income. The author attributes this effect to households gaining access to financial services, but also to the substitution between other forms of payment and debit cards. Klee (2008) supports this hypothesis as she finds that debit card use increases with income, while cash, checks and credit use decreases.

As already noted, we control for access to financial services separately from household income in our estimations. It is likely that the influence of income we found is reflecting a substitution effect between cash and electronic payments at higher levels of income. Presumably, the determinant factors behind this substitution effect could be transaction size

or supply side characteristics, which might favor the use of other forms of payment different from cash¹¹.

Financial variables – among them, having a bank account and having a credit card – aim to capture the access to financial services. It is noteworthy that not having a credit card increases the probability of using only cash or checks by 42%, while it decreases the probability of using debit or credit card also, and mostly debit or credit card. Interestingly, having a credit card with an outstanding balance decreases the probability of using cash or checks exclusively by 8%. The latter might reflect liquidity constrained households which use electronic payments more intensively.

The latter results relate to that of Sanroman and Santos (2014) in their study of the determinants of having a bank account and a credit card. As they note, nearly 50% of the households do not have a bank account and 38% of them do not hold a credit card.

Finally, the number of POS¹² machines in the region where the household lives increases the probability of using debit and credit card. The latter could be taken as a proxy for market supply side conditions that are also important in explaining household payment decisions. Low acceptance of electronic payments instruments by merchants could result in a high use of cash.

Several papers study the effect of supply side factors on payment instrument choice. Rysman (2007), for example, documents the existence of a positive feedback loop between consumer usage of a credit card and its acceptance by merchants. The rationale behind this result is that consumers value more a specific credit card if it is widely accepted by merchants, and vice versa. Huynh, Schmidt-Dengler and Stix (2014) study card acceptance at the point of sale and its impact on money demand. Their findings suggest a negative relation between acceptance and money. Our result, then, can be interpreted with this rationale if we consider the number of POS to be a proxy for card acceptance. This would imply that Uruguayan consumers do not use cards, mostly debit cards, because of the low acceptance level at the point of sale.

11 Cohen and Rysman (2013), Klee (2008).

12 POS: Point of Sale.

Table 2: Multinomial logit marginal effects: Regular purchases

Variables	Cash and checks exclusively	Mostly cash and checks but also debit or credit card	Mostly debit or credit card	All payment instruments in similar proportions
25-34	-0.041 (0.030)	-0.000 (0.024)	0.035* (0.018)	0.007 (0.006)
35-44	-0.045 (0.030)	0.001 (0.024)	0.038** (0.019)	0.006 (0.006)
45-54	-0.039 (0.031)	-0.008 (0.024)	0.042** (0.019)	0.006 (0.006)
55-64	-0.006 (0.031)	-0.031 (0.025)	0.033* (0.019)	0.004 (0.007)
65+	0.018 (0.033)	-0.050* (0.027)	0.029 (0.019)	0.003 (0.007)
Quartile 2	-0.010 (0.014)	0.018 (0.012)	-0.008 (0.006)	0.000 (0.003)
Quartile 3	-0.044*** (0.015)	0.046*** (0.013)	-0.004 (0.006)	0.002 (0.003)
Quartile 4	-0.051*** (0.017)	0.048*** (0.014)	-0.002 (0.006)	0.005 (0.003)
Interior +5,000 inh.	-0.029 (0.041)	0.050 (0.034)	-0.006 (0.018)	-0.015 (0.010)
Interior -5,000 inh.	-0.042 (0.044)	0.052 (0.037)	-0.001 (0.019)	-0.009 (0.009)
Interior rural	-0.030 (0.047)	0.042 (0.040)	-0.004 (0.021)	-0.008 (0.010)
Bank clients/1,000 inh.	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Number of POS (log)	-0.043*** (0.007)	0.037*** (0.006)	0.004 (0.003)	0.002 (0.001)
Primary incomplete	0.020 (0.017)	-0.017 (0.015)	-0.002 (0.007)	-0.002 (0.004)
Secondary complete	-0.020* (0.012)	0.012 (0.010)	0.010** (0.004)	-0.002 (0.002)
Tertiary complete	-0.056*** (0.014)	0.037*** (0.012)	0.018*** (0.005)	0.001 (0.002)
Number of persons	0.002 (0.004)	0.001 (0.003)	-0.001 (0.001)	-0.001* (0.001)
Female	-0.033*** (0.010)	0.025*** (0.008)	0.006 (0.003)	0.002 (0.002)
Married	-0.026*** (0.010)	0.016* (0.009)	0.010*** (0.004)	0.000 (0.002)
House owner	-0.003 (0.009)	0.001 (0.008)	0.002 (0.003)	-0.001 (0.002)
Food card	-0.047* (0.027)	0.017 (0.024)	0.023** (0.011)	0.007 (0.004)
Retired	-0.030 (0.020)	0.019 (0.017)	0.011 (0.008)	0.000 (0.004)
Self-employed	0.029** (0.012)	-0.017* (0.010)	-0.011** (0.005)	-0.000 (0.002)
Tenure	-0.001 (0.001)	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)
(less than one)	0.016 (0.015)	-0.005 (0.013)	-0.007 (0.006)	-0.004 (0.003)
Has bank account	-0.045*** (0.010)	0.017** (0.008)	0.025*** (0.004)	0.003 (0.002)
Doesn't have credit card	0.409*** (0.011)	-0.326*** (0.010)	-0.062*** (0.005)	-0.021*** (0.003)
Credit card w/ outstanding balance	-0.085*** (0.014)	0.054*** (0.012)	0.023*** (0.005)	0.008*** (0.002)
Observations	8,081	8,081	8,081	8,081

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

6.2. Multihoming

Table 3 presents marginal effects of the logit model for *multihoming*, that is, using more than one payment instrument. Then, the dependent variable takes the value one if the household spreads its purchases across more than one payment instrument and zero if all the purchases are made using cash¹³. The difference with respect to the previous analysis, is that in this case we can consider the two types of transactions available in the data we are using: regular purchases and monthly payments. Additionally, the category multihoming includes not only cash, checks and cards, but also direct debit and bank transfers.

As can be inferred from our results, monthly payments are more intensive in the use of cash or checks than regular purchases: the probability of doing multihoming is 15% higher for regular purchases. Note that this result might be explained by the fact that Uruguayan households pay their utilities in “payment networks”¹⁴ with cash because until recently this was the only payment method accepted. After the Financial Inclusion Law, they started to accept payments with debit cards.

Households with higher levels of education and income have a higher probability of doing multihoming than those with lower levels of education and income. Tenure, being a woman and being married operates in the same direction.

Financial variables are, once again, important determinants in our model. Having a credit card or a bank account is specially important as it increases the probability of doing multihoming. The number of POS, our proxy for the conditions of the network that permits electronic payments, is significant and increases the probability of doing multihoming.

13 Note that the answers refer to the exclusive use of cash and checks but we assume that, as it is practically impossible to make all your payments with checks, represent mainly cash payments.

14 “Payment networks” are intermediaries where people pay from utilities to credit cards balances.

Table 3: Logit marginal effects: multihoming

Variables	Multihoming
25-34	0.016 (0.013)
35-44	0.016 (0.013)
45-54	0.010 (0.013)
55-64	-0.004 (0.014)
65+	-0.019 (0.015)
Quartile 2	0.022*** (0.007)
Quartile 3	0.044*** (0.007)
Quartile 4	0.064*** (0.007)
Interior +5,000 inh.	0.016 (0.018)
Interior -5,000 inh.	0.018 (0.020)
Interior rural	-0.002 (0.021)
Bank clients/1,000 inh.	0.000 (0.000)
Number of POS (log)	0.025*** (0.003)
Primary incomplete	-0.015* (0.008)
Secondary complete	0.020*** (0.005)
Tertiary complete	0.052*** (0.006)
Number of persons	-0.005*** (0.002)
Female	0.009** (0.004)
Married	0.015*** (0.004)
House owner	0.008* (0.004)
Food card	0.028** (0.013)
Retired	0.013 (0.009)
Tenure	0.007*** (0.002)
(less than one)	0.001 (0.007)
Has a credit card or a bank account	0.218*** (0.006)
Regular purchases	0.147*** (0.005)
Constant	
Observations	16,250
R-squared	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

7. CONCLUSIONS

Deep changes in the use of payment instruments are expected in Uruguay after the recently approved Financial Inclusion Law. This points to the need of a better understanding of what are the main drivers of households payment instrument choice. We then study how household characteristics affect the choice of payment instruments by Uruguayan households.

Using microdata from a novel household survey we first estimate a multinomial logit model in order to study the main drivers of household payment instrument choice. We find that, as in the previous literature using data for developed countries, age, income, education and access to financial services are the main determinants of households payment instrument choice. Our results suggest that households in the 35 to 54 age groups are more likely to use credit cards for their daily purchases than younger and older age groups. We also find that having finished tertiary education reduces the probability of using cash or checks exclusively, in favor of a more intensive use of electronic payment instruments, and that the number of POS machines in the region where the household lives, a proxy for market supply conditions, increases the probability of using debit and credit card.

In the second part of the paper we analyze the extent of multihoming. We show that a large proportion of households concentrate their purchases in a single payment instrument – cash – and present evidence on how the complexity of the use of payment instruments increases with income, education and the access to financial services.

We do not study how the temporary financial incentives to use electronic payment instruments introduced by the Financial Inclusion Law affect households payment instrument choice. However, and according to our estimations, increasing access to financial services and the increase in electronic payment acceptance by merchants are expected to have a permanent effect on how households pay.

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APPENDIX

Table A1: Logit, OLS and IV marginal effects: multihoming

Variables	LOGIT	OLS	IV
25-34	0.016 (0.013)	0.023 (0.016)	0.022 (0.016)
35-44	0.016 (0.013)	0.021 (0.016)	0.021 (0.016)
45-54	0.010 (0.013)	0.009 (0.016)	0.010 (0.016)
55-64	-0.004 (0.014)	-0.012 (0.016)	-0.010 (0.017)
65+	-0.019 (0.015)	-0.032* (0.018)	-0.030* (0.018)
Quartile 2	0.022*** (0.007)	0.016** (0.007)	0.009 (0.017)
Quartile 3	0.044*** (0.007)	0.054*** (0.008)	0.042 (0.027)
Quartile 4	0.064*** (0.007)	0.105*** (0.011)	0.090*** (0.034)
Interior +5,000 inh.	0.016 (0.018)	-0.015 (0.025)	-0.020 (0.027)
Interior -5,000 inh.	0.018 (0.020)	-0.009 (0.026)	-0.013 (0.028)
Interior rural	-0.002 (0.021)	-0.026 (0.027)	-0.026 (0.027)
Bank clients/1,000 inh.	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Number of POS (log)	0.025*** (0.003)	0.026*** (0.004)	0.025*** (0.005)
Primary incomplete	-0.015* (0.008)	-0.001 (0.007)	0.004 (0.013)
Secondary complete	0.020*** (0.005)	0.039*** (0.010)	0.036*** (0.012)
Tertiary complete	0.052*** (0.006)	0.124*** (0.012)	0.121*** (0.014)
Number of persons	-0.005*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
Female	0.009** (0.004)	0.012* (0.006)	0.011 (0.007)
Married	0.015*** (0.004)	0.022*** (0.006)	0.021*** (0.007)
House owner	0.008* (0.004)	0.010* (0.006)	0.009 (0.006)
Food card	0.028** (0.013)	0.027** (0.012)	0.034* (0.018)
Retired	0.013 (0.009)	0.020* (0.011)	0.017 (0.013)
Tenure	0.007*** (0.002)	0.011*** (0.004)	0.010*** (0.004)
(less than one)	0.001 (0.007)	0.001 (0.009)	0.003 (0.010)
Has a credit card or a bank account	0.218*** (0.006)	0.171*** (0.005)	0.207*** (0.079)
Regular purchases	0.147*** (0.005)	0.213*** (0.005)	0.213*** (0.005)
Constant		-0.468*** (0.072)	-0.460*** (0.074)
Observations	16,250	16,250	16,250
R-squared		0.210	0.209

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A2: First stage regression (having a credit card or a bank account)

Variables	First stage
25-34	0.026 (0.022)
35-44	-0.008 (0.022)
45-54	-0.023 (0.022)
55-64	-0.022 (0.023)
65+	-0.023 (0.024)
Quartile 2	0.191*** (0.010)
Quartile 3	0.320*** (0.011)
Quartile 4	0.398*** (0.011)
Interior +5,000 inh.	0.153*** (0.031)
Interior -5,000 inh.	0.135*** (0.034)
Interior rural	0.009 (0.036)
Bank clients/1,000 inh.	0.000*** (0.000)
Number of POS (log)	0.038*** (0.005)
Primary incomplete	-0.143*** (0.012)
Secondary complete	0.081*** (0.009)
Tertiary complete	0.075*** (0.008)
Number of persons	-0.010*** (0.003)
Female	0.028*** (0.007)
Married	0.037*** (0.008)
House owner	0.033*** (0.007)
Food card	-0.174*** (0.019)
Retired	0.074*** (0.015)
Tenure	0.010** (0.004)
(less than one)	-0.077*** (0.011)
Public employee	0.092*** (0.009)
Self-employed	-0.055*** (0.009)
Constant	-0.225** (0.096)
Observations	16,250
R-squared	0.248

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1