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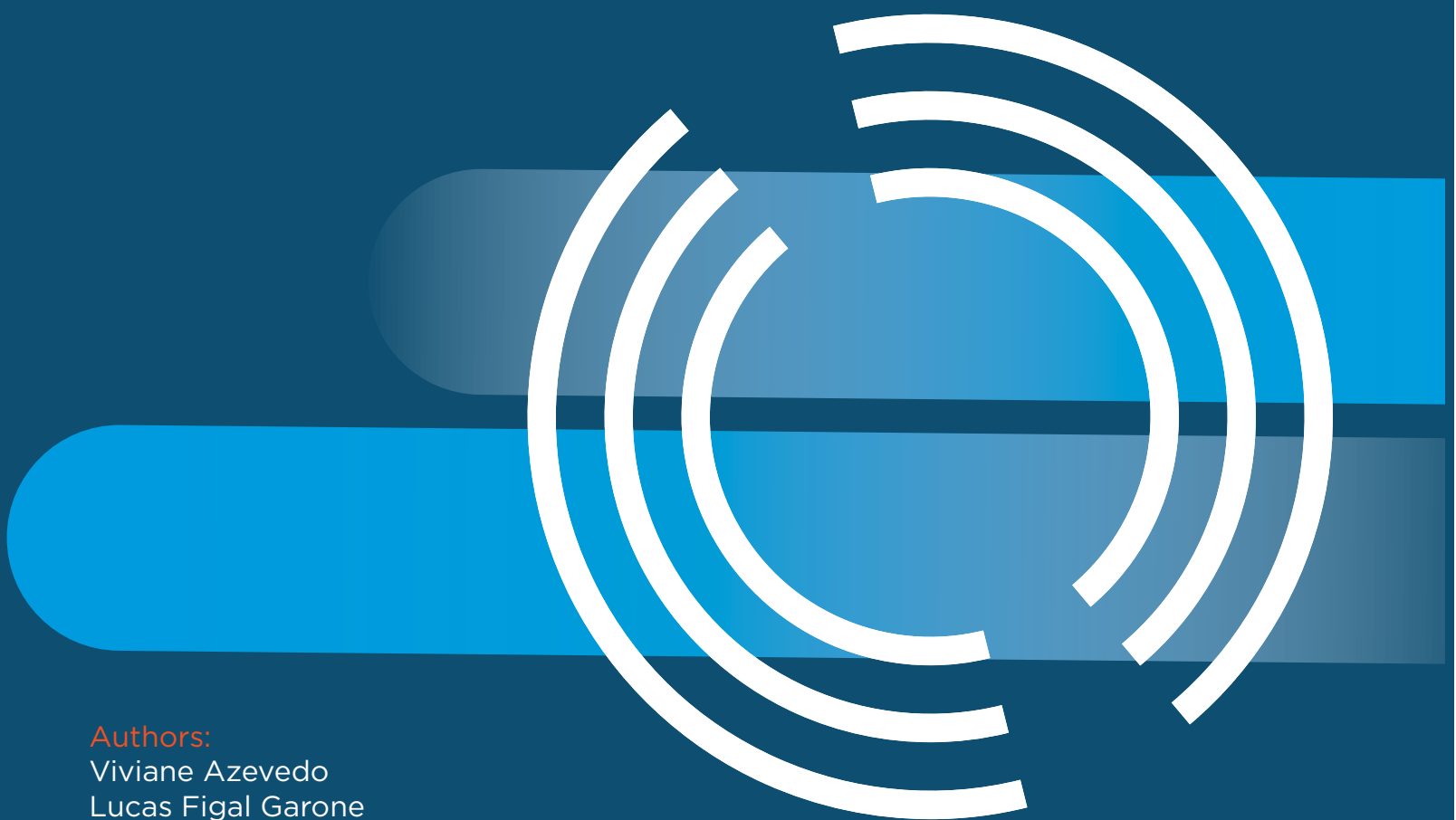
Credit Cards Issued by Non-Financial Companies:

An Alternative Tool for Financial Inclusion and Economic Development?



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Abstract

This study evaluates the impacts of access to credit cards issued by non-financial companies. Despite their increasing popularity in developing countries, there is limited evidence regarding their effectiveness in promoting financial inclusion and improving the quality of life. Using administrative records and field surveys from beneficiaries and a control group, the study assesses the effects of acquiring a credit card offered by a public utility company in Colombia. The card, which is mainly targeted at low-income and unbanked individuals, can be used to fund home improvements and purchase home and personal goods in selected stores. We apply Entropy Balancing combined with OLS and test the robustness of the results using Fixed Effects and correcting for Multiple Hypothesis Testing. We find that access to the credit card fostered financial inclusion and improved households' standard of living and well-being. Beneficiaries were more likely to obtain financing through credit cards, and increased their total debt and expenses in credit repayments while reducing the likelihood of borrowing from informal credit sources. However, we find no effect on accessing credit from the traditional financial sector. Acquiring the card also increased the likelihood of making key home improvements, such as adding floors, kitchens, and bathrooms to the dwelling, and purchasing certain expensive time-saving durables. Finally, the household's saving capacity increased, which signals an improvement in economic well-being and shows that the debt repayment is manageable. Credit from retail stores, public utility firms and other non-financial companies can be a very effective alternative financing source, especially when two conditions are met: (1) there is a qualitative housing deficit and/or the adoption rate of household technologies is low, and (2) there are high transaction costs and information asymmetries in access to credit, as is often the case among low-income and unbanked populations.

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1 Introduction

Many interventions have been proposed to solve the world's most entrenched development problems, particularly related to poverty reduction. These interventions range from child nutrition programs designed to reduce disparities in future productivity and incomes to programs to improve property rights or market functioning. In recent decades, efforts to reduce poverty and foster economic development have also focused on the potential transformative power of access to the financial system (Karlan & Morduch, 2010; Bruhn & Love, 2014; Dupas et al., 2018). As a key enabler for development, financial inclusion is firmly placed on the agenda of most national and sub-national governments as a key policy priority. Indeed, financial inclusion has been identified as an enabler for 11 of the United Nations' 17 Sustainable Development Goals (Klapper et al., 2016).[1]

Demirgüç-Kunt et al. (2008) describes the rationale for placing financial systems at the center of the development process. Inclusive and well-functioning financial systems are crucial for channeling resources more productively and efficiently and ensuring that risk is assumed by those with the greatest capacity to manage it. This, in turn, generates higher levels of growth (Aghion et al., 2005) and more equitable income distribution (Beck et al., 2007), and therefore reduces poverty (Zhang & Naceur, 2019). Indeed, in the absence of inclusive financial systems, poverty traps can hamper economic development since access to financing allows people to invest in their education and dwellings, save, finance projects, become entrepreneurs and improve their standard of living (Demirgüç-Kunt & Klapper, 2012; Demirgüç-Kunt, Klapper, & Singer, 2017).

The most obvious path to promoting greater access to financial services is to strengthen the traditional financial sector (Arbeláez et al., 2007). However, developing regions usually face several macro- and micro-level barriers to access. At the macro level, these challenges include vulnerability to volatile capital flows; a low capacity to devise and implement smart macro-prudential policies and regulations; institutional weaknesses; and a lack of strong legal, informational, technological, and physical infrastructure (such as an inclusive banking infrastructure and efficient retail payment systems). Developing countries also typically have inadequate national personal identification systems, fewer consumer protection regulations, and more informal labor structures (Shimada & Yang, 2011; Grandolini, 2015; Rojas-Suarez, 2016). At the micro level, asymmetric information and economies of scale generate bottlenecks in access to finance. These traditional market failures are compounded by the population's generally low level of financial literacy and a limited supply of useful and adequate financial products and services that cater to low-income people's needs (Grandolini, 2015; World Bank Group, 2016a).

For example, access to (and the use of) credit from financial institutions is dismally low in Latin America and the Caribbean (LAC), despite recent improvements

[1]Financial inclusion is mentioned in seven of the 17 Sustainable Development Goals (SDGs): no poverty (SDG 1); zero hunger (SDG 2); good health (SDG 3); gender equality (SDG 5); decent work and economic growth (SDG 8); industry, innovation and infrastructure (SDG 9); and reduced inequalities (SDG 10). Financial inclusion can also contributes to: quality education (SDG 4); clean water and sanitation (SDG 6); affordable and clean energy (SDG 7); and, peace, justice and strong institutions (SDG 16).

in other financial inclusion indicators such as account ownership. In 2018, while around 50% of adults in LAC had a bank account, which includes 40% of the poorest, only 20% of adults owned a credit card, and 10% of the poorest 40% did so.[2]

In this context, alternative means of promoting access to financial services – such as credit cards from retail stores, public utility companies, and other non-financial institutions – have flourished in LAC. Non-financial companies are sometimes very well positioned to ease traditional barriers and open new opportunities for specific population niches – e.g. low-income people and/or those who are unbanked or underbanked – to access formal financial products. These opportunities usually present themselves to companies that already track a constant flow of costumer data that can be used to assess risks and therefore to reduce information asymmetries. Most of these companies also rely on digital (commercial and financial) platforms that allow them to effectively manage their pool of clients, reduce the cost of lending, and gain significant scale. It is therefore not surprising that such companies have issued substantially higher numbers of credit cards in recent decades in LAC, and that the volume and total amount of transactions made using them has risen dramatically. For instance, retail stores managed around 210 million credit cards in 2018, which accounted for over 1.5 billion transactions totaling US$30 billion.[3]

However, and despite the increasing popularity of these alternative sources of credit, there is limited evidence of their effectiveness. Important questions remain: Do these credit cards effectively increase and improve financial inclusion? Do they help consumers access traditional loans or other bank products in the future? Do they promote the purchase of specific types of goods? Do they facilitate savings? Is debt repayment manageable?

To explore these questions, this study evaluates the impacts of having access to the credit card "Tarjeta EPM-Somos", offered by the Public Services Company of Medellín (Empresa de Servicios Publicos de Medellín, or EPM). The EPM card was designed to enhance financial inclusion, improve customers' quality of life by increasing their ability to make home improvements and acquire home durables, and foster the efficient use of public services. Although the card is offered to all EPM customers, it is mainly targeted at low-income customers and/or those with no or little previous experience with banks or credit institutions (the "unbanked"or underbanked population). The card can only be used to fund home improvements and purchase home and personal goods from selected stores.

We study a sample of approved applicants who either opted to take the credit card (treatment group) or declined the card (control group). We estimate the impacts using entropy balancing (EB) and ordinary least squares (OLS) methods on cross-sectional data, controlling for a very rich set of pre-treatment observable individual characteristics that might influence consumers' decisions about whether to accept the card. We then check the robustness of the results combining EB with a fixed-effects (FE) approach using retrospective data – which enables us to also control for unobservable characteristics that remain constant over time – and correcting for Multiple Hypothesis Testing (MHT).

We find that access to an EPM credit card fosters financial inclusion and improves

[2]Euromonitor Passport Database from Euromonitor International (Feb 2019).
[3]Euromonitor Passport Database from Euromonitor International (Feb 2019).

households' standards of living and well-being. Three main results emerge from our analysis. First, having an EPM card increased the likelihood of obtaining financing through credit cards (whether issued by EPM or banks or other non-financial institutions) as well as the amount of total debt and expenses in credit repayments, but decreased the probability of borrowing money from family members. However, we find no effect on the probability of obtaining traditional financial products (i.e. savings account, loans, or credit cards) from banks. Second, acquiring an EPM card is associated with making key home improvements, including renewing floors, kitchens, and bathrooms, and acquiring time-saving durable goods such as washing machines, which positively affects the household's quality of life. Finally, we find positive impacts on subjective well-being, namely households' saving capacity.

To the best of our knowledge, this is the first study to evaluate the effects of a credit card designed and provided by a non-financial company, similar in nature to retail store cards which are very popular in the region. Yet despite their popularity, it is not known whether this type of instrument contributes to financial inclusion and economic development. The paper contributes to the growing literature on the effects of access to credit for low-income and unbanked (or underbanked) people in developing countries. Although several prior studies have explored the macro-level effects of financial development on economic growth (Hassan et al., 2011; Arcand et al., 2015; Cecchetti & Kharroubi, 2012) and the impact of access to microcredit on business profits, consumption, and poverty reduction (Augsburg et al., 2014; Angelucci et al., 2013; Tarozzi et al., 2013; Attanasio et al., 2014; Banerjee et al., 2015), there is little evidence on the micro effects of other types of credit.

The rest of the paper is organized as follows. Section 2 discusses and reviews the literature on financial access and economic development and provides an overview of the EPM credit program. Section 3 defines the identification strategy, describes the sample, and offers descriptive statistics. Section 4 presents the results. Section 5 explains the robustness tests, and Section 6 concludes.

2 Background

2.1 Financial Access and Economic Development

Although financial access is a broad concept that encompasses a variety of services such as savings accounts, insurance, and credit lines, the international literature has focused mainly on microcredit provided to start or expand a business, and its impact on poverty reduction. According to Banerjee et al. (2015), throughout the 1990s and the beginning of the 2000s, microcredit generated considerable enthusiasm and raised hopes that it could rapidly and effectively help reduce poverty.[4] The height of publicity for microcredit came in 2006, when the Nobel Peace Prize was awarded to the microfinance company Grameen Bank and its founder, Muhammad Yunus.

[4]For instance, Burgess & Pande (2005) and Bruhn & Love (2014) report on non-experimental studies in India and Mexico, respectively, which found that an increase in the supply of financial services to poor and vulnerable populations reduced poverty and created employment for the poorest people, increased the number of new businesses they started, and boosted their incomes, among other effects.

However, impact evaluations on the area of microfinance that directly addresses the problem of causality have only begun to proliferate in the last decade; these studies have analysed interventions in several countries such us Bosnia-Herzegovina (Augsburg et al., 2014), Ethiopia (Tarozzi et al., 2013), India (Banerjee et al., 2015), Mexico (Angelucci et al., 2013), Mongolia (Attanasio et al., 2014), Morocco (Crépon et al., 2011), and the Philippines (Karlan & Morduch, 2010). A recent study by Meager (2018), which jointly estimates the average effect and the heterogeneity of effects across the aforementioned studies, finds that the impact on household business and consumption variables is unlikely to be transformative and may be negligible.

The empirical evidence on the impacts of microcredit has called into question the excessive attention given to it at the expense of other financial products, and the great expectations of poverty reduction associated with it. According to Karlan & Morduch (2010), the financial needs of the poor go beyond microcredit provided to start or expand a business, many of which are similar to those of higher-income households, such as mechanisms to manage their cash flow, accumulate assets over the short and long term, and manage risk. As Collins et al. (2009) explain in an appraisal of the financial lives of the poor and quasi-poor in Bangladesh, India, and South Africa, the financial activities of these populations are influenced by a basic combination of needs – i.e. guaranteeing daily meals, managing illnesses, paying for school expenses, improving their dwellings, and taking advantage of investment opportunities – that far exceeds creating, managing, or growing a small business.

Traditional microcredit is therefore just one of many possible financial mechanisms for poverty reduction, and is not necessarily the most effective Karlan & Morduch (2010). Financial inclusion mechanisms should also consider the needs of the poor and vulnerable beyond business creation and expansion.

Some basic needs are related, for instance, to the dwelling conditions and the possession of durable goods for the home. Due to their limited access to credit, low-income people often find it difficult to pay for such goods and home improvements. Rojas (2015) present evidence from 17 LAC countries indicating that 12% of homes have at least one of three types of qualitative shortages due to the use of poor construction materials: poor roofs, poor walls, and dirt floors. These shortages present significant heterogeneity between and within countries, and affect mostly countries with lower per capita GDP and households in the first deciles of the income distribution.[5] Possession of home durable goods follows a similar pattern. In LAC, 63% of households own a washing machine, compared to more than 85% in the United States (US), France, and the UK. These goods are heavily skewed toward the upper income brackets in LAC. In Ecuador, for example, 100% of households in the highest income decile have a washing machine, compared to only 6% of those in the lowest decile.[6]

Non-financial companies have responded to low-income people's inability to ac-

[5]For example, in Bolivia, Guatemala and Nicaragua, qualitative shortages affect more than 30% of households, while in Chile and Uruguay such shortages are close to 0%. In addition, around 20% of houses in the first income quintile in LAC present at least one type of qualitative shortage, while for the 5th quintile only 1% of households have shortages.

[6]Euromonitor Passport Database from Euromonitor International (Feb 2019).

cess traditional forms of financing for these types of investments by granting access to loans or credit, usually by issuing credit cards (Figal Garone et al., 2019).[7] While formal financial entities require applicants to have a credit history and collateral in case they default, these alternative credit cards often only require a valid ID and a work/income certificate (or sometimes a recommendation from a current customer), and customers may be instantly approved. By reducing transaction costs and information asymmetries, these non-financial companies provide financing with better terms and conditions, especially for the low-income and/or unbanked or underbanked population.

These alternative sources of credit often allow households to increase their investments in home improvement and acquire key durable goods. Such home improvements produce significant positive impacts on their standard of living and well-being (Bouillon, 2012). Previous studies have found that improving the quality of materials used to construct houses has positive effects on health (Cattaneo et al., 2009; Thomson et al., 2013; Galiani et al., 2017), children's education (Katzman, 2011; Moreno, 2011; Rosero, 2012; Rojas, 2015), and adults' well-being due to increased satisfaction with their dwelling and quality of life (Cattaneo et al., 2009; Mitchell et al., 2016; Galiani et al., 2017).[8]

Multiple empirical studies have demonstrated the importance of acquiring durables such as electrical appliances. For instance, labor-saving housing technologies have the potential to increase female participation in the formal labor market (Coen-Pirani et al., 2010; Ishani & Yabin, 2014; Chen et al., 2015).[9] Improved domestic appliances , such as cooking stoves, may also have positive effects on health (Smith-Sivertsen et al., 2009; Bensch & Peters, 2012; Hanna et al., 2016). Furthermore, the time saved by the use of home durables has positive effects on family relationships, including childcare, which improves children's education and reduces child labor (Chen et al., 2015; García-Jimeno & Peña, 2017; Kerr, 2019).

Credit cards issued by non-financial companies can also serve as a pathway to the traditional financial system. A possible channel for financial inclusion is through a reduction in information asymmetries caused by the generation and sharing of new credit records (Padilla & Pagano, 1997; Jappelli & Pagano, 1999). For instance, access to these credit lines allows unbanked users to access a different type of credit (Arbeláez et al., 2007), the probability of being approved for a formal bank loan (Agarwal et al., 2018), raise credit limits, and foster competition between lenders (Foley et al., 2018).

Finally, there is evidence that the use of new forms of consumer credit (or better

[7]Several non-financial companies in the region have been expanding their credit programs to low-income customers, including El Grupo Monge (Nicaragua, Peru, Honduras, Guatemala, El Salvador, and Costa Rica), Regal Forest Holdings (Trinidad, Guyana, Costa Rica, Barbados, and Paraguay), Garbarino (Argentina), Supermercados Peruanos (Peru), Distribuidora Liverpool, Grupo Famsa and Chedraui (Mexico), La Ganga (Ecuador), Exito, Alkosto, La 14 and Olimpica (Colombia), Falabella (Peru, Argentina, Colombia, Chile), and Ripley, Cencosud, Walmart, and Elecktra (across LAC).

[8]However, the positive effects on subjective well-being may be not lasting due to people's hedonic adaptation. Galiani et al. (2018) find that most of the positive effects on subjective well-being reported by Galiani et al. (2017) disappear after 24 months.

[9]Coen-Pirani et al. (2010) show that the acquisition of washing machines, dryers, and refrigerators explains 40% of the increase in US female labor participation between 1960 and 1970.

and increased access to it) can affect individuals' financial behavior and economic performance. Previous studies have shown that more experienced credit card users display better financial behavior and pay fewer financial fees (Agarwal et al., 2008). Furthermore, access to consumer credit positively impacts job flows, earnings, and entrepreneurship (Herkenhoff et al., 2016b); allows unemployed workers to increase the time they can dedicate to job searching and choose better-paid positions (Herkenhoff et al., 2016a); and improves credit scores (Brown et al., 2019). Finally, there is evidence that consumer credit enhances job retention, food consumption and subjective well-being (Karlan & Zinman, 2010), mortgage repayment rates (Morse, 2011), and job performance (Carrell & Zinman, 2014).[10]

2.2 The EPM Social Financing Program

Colombia is a typical LAC country with a low level of financial development. Its financial depth, approximated by the ratio of private credit to GDP, is far below that of high-income countries – 47% vs. 145% (World Bank Group, 2016b). However, the indicator for financial inclusion[11] increased from 55% in 2008 to 79% in 2017.[12] Additionally, 27% of the adult population has a credit card and 23% has a consumer credit product (Banca de las Oportunidades, 2017).[13] Yet financial access in Colombia remains very unequal: only 5% of the poorest 40% of the adult population reports having a credit card (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2017). Thus, the proliferation of alternative credit is not surprising: non-financial companies provide financing to an estimated 18% of the population (Banca de las Oportunidades, 2014). Indeed, the number of retailer store credit cards issued nearly doubled between 2011 and 2017, from 3.8 million to 9.3 million.[14]

EPM is a 100% state-owned enterprise founded in 1955 in Colombia that provides household utilities such as electricity, natural gas, water, sewerage, and sanitation. In 1998, it was renamed the State Industrial and Commercial Company (Empresa Industrial y Comercial del Estado) under the ownership of the Municipality of Medellín. The company has a presence in seven countries, with 48 enterprises. It has become the second-most important business group in Colombia and the largest

[10]This evidence is also related to a body of literature on the impact of access to high-cost consumer credit and *payday* loans, which have been found to have negative effects such as increased stress, depression, and personal bankruptcy (Morgan & Strain, 2007; Skiba & Tobacman, 2007; Melzer, 2011; Campbell et al., 2012).

[11]Financial inclusion is defined as the percentage of adults with at least one financial product in a formal financial institution. In Colombia, this indicator mostly includes institutions overseen by the Superintendencia Financiera de Colombia (Colombian government agency responsible for overseeing all banking institutions and preserving the stability of the securities market), and excludes those overseen by Superintendencia de la Economía Solidaria (known as Supersolidaria, the Colombian government agency in charge of overseeing institutions such as cooperatives, employee funds, etc.).

[12]The percentage for 2017 increases to 80% when all financial entities are considered (credit establishments, cooperatives overseen by Supersolidaria, and non-governmental organizations).

[13]These numbers were obtained by dividing the total number of adults with a credit card (9.2 million) or a consumer credit product (8 million) by the adult population in the year (33.83 million) reported in Banca de las Oportunidades (2017).

[14]Euromonitor Passport Database from Euromonitor International (2017).

public household utilities supplier. It provides services to more than 13 million Colombians and nearly 7 million customers in other Central American countries.[15]

With the support of the Inter-American Development Bank Group, EPM created the Social Financing Program in 2008, which aims to provide accessible credit to those at the base of the pyramid.[16] The program provides a card with revolving credit to allow EPM customers to purchase more than 229 products and services, including mainly home and personal goods (electrical and gas appliances, audio and video equipment, entertainment, technology, etc.), home improvement materials, transport, utilities, and water supply (Appendix A.1). The card can be used in 130 affiliated establishments, including seven chain stores that operate nationally (Appendix A.2).

The program differs from traditional forms of credit in three main ways. The first difference is that EPM is a non-financial company: its main activity is to provide public utilities (i.e. non-financial services). The second is how the EPM screens and approves customers and issues the card. EPM uses the billing information and utility payment records of millions of its customers to evaluate the credit card applications. All customers with a record of paying their utility bills on time are eligible to apply. Applicants are then assessed using a scoring model that employs various socio-demographic variables. This approach lessens the information requirements requested by traditional banks, and thus attracts low-income applicants as well as individuals with no (or poor) credit history. The third difference is the card's potential use: customers can only use the card to purchase the goods described above from participating stores.

Although this program may share some commonalities with traditional approaches to microcredit, such as the size of the loans or the use of proceeds in some cases, the products differ in structural ways: while microcredit is granted to entrepreneurs to promote entrepreneurship as a route out of poverty, the EPM program is designed to help supply people's more basic needs, such as improving the quality of their homes or owning electrical appliances, while also functioning as a gateway to access the financial system. Also, unlike some forms of microcredit it does not require social collateral (e.g. group lending with joint liability).

The EPM program seeks to produce three main impacts. First, it aims to increase and improve low-income and unbanked people's access to credit services at competitive market interest rates – 21%, vs. the 100–150% paid by the non-bankarized sector of the population to purchase electrical appliances in Medellín at the time of the program's inception. This would also help customers build up a credit history that can in turn pave the way to accessing other traditional financial services. Second, the program is expected to enhance beneficiaries' quality of life by providing access to financing to implement home improvements and purchase durable goods, along with other goods and services. Finally, the program aims to boost the efficient consumption of public services (electricity, gas, and water) by giving beneficiaries the chance to replace outdated appliances with more efficient ones.

To achieve these objectives, a beneficiary profile was created in 2009, targeting

[15]EPM Group. Estamos ahí, con toda la energía. Retrieved from https://www.epm.com.co/

[16]In October 2015, the program was renamed the SOMOS Recognition Program, and the EPM card was renamed the SOMOS card.

the lower-income segments of the population (strata 1, 2, and 3). These segments have the lowest levels of access to financial services, and are therefore the most likely to resort to informal credit markets, which have much higher interest rates and often engage in predatory lending practices. Starting in 2009, a differential interest rate[17] was established based on each borrower's income stratum.[18] This system was abandoned in late 2015 because the variable nature of the rate resulted in variable repayment stipends, which often caused administrative problems. The maximum interest rate allowed by law (29.45% as of October 2018) is now charged for all strata.[19]

2.3 Approval, Take-up and Use Rate of the EPM Card

Customers apply for a card either electronically via the EPM webpage or through a commercial advisor at one of the customer service points located in selected chain stores in Antioquia (the department in which Medellín is located). To be eligible for the card, a series of preliminary conditions must be met (see Table 1).[20]

Table 1: Conditions of Access

1	Be a customer of EPM (user of at least one of the company's public household utilities).
2	The customer must be between 18 and 74 years old.
3	The customer's supply of any of the services provided by EPM must not have been cut off on more than two occasions over the last 12 months.
4	The service must not be cut off at the time of the credit request.

Source: Official website of the SOMOS recognition program. Retrieved from https://www.somosgrupoepm.com/.

Applicants who fulfill these conditions must fill out a credit application form. The information requested on this form is flexible enough to allow housewives and self-employed and retired individuals to apply (see Appendix A.3). EPM then uses a logistic probability model to classify applicants according to their non-payment risk. This credit rating methodology is more appropriate for the program's pool of

[17]Individuals classified as income strata 1–4 were charged an interest rate of FTD (fixed-term deposits) +11 basis points, whereas those in strata 5 and 6 were charged a rate of FTD+15 basis points. The FTD is the average interest rate that banks, savings and housing corporations, financial corporations, and commercial financing companies commit to paying savers for 90-day fixed-term deposit certificates.

[18]In Colombia, residential buildings that receive public services are classified into six groups according to their geographic location. Residents of areas classified as stratum 1 pay the lowest utility bills, and those in areas classified as stratum 6 pay the highest rates. Stratification does not take into account personal or household income, although strata and income are highly positively correlated.

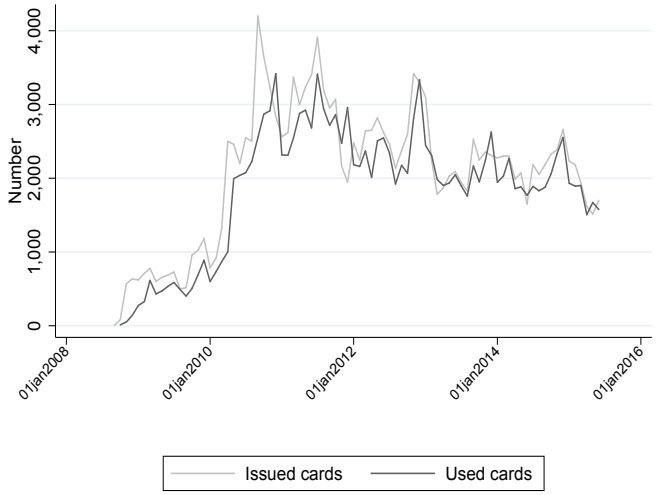
[19]Grupo EPM. Términos y Condiciones. Retrieved from https://www.somosgrupoepm.com/descubre/terminos.

[20]According to the information provided on EPM's website, a clean credit report is not required, but the applicant's estimated risk level must be above the threshold defined by EPM.

applicants, since it can be used to evaluate the creditworthiness of people with scant resources whose income cannot be easily verified. The score is tabulated based on 15 variables, which are weighted according to their relative importance.[21]

According to information provided by the EPM group, by December 2016 around 204,000 cards had been issued, 88% of which had been used at least once (Figure 1). The total value of the transactions has been growing since the program's inception. More people are choosing to use a higher percentage of their credit limit, increasing from an average of 25% of the limit in 2009 to an average of around 100% by 2014.

Figure 1: Cards Issued and Cards Used



Note: Author's own calculations using data provided by EPM.

To shed some more light on these preliminary figures, we also explored a more comprehensive dataset provided by EPM with administrative information on 9,478 individuals (5,293 men and 4,185 women) who applied for a card from September to December 2013. The credit rating scores ranged between 642 and 974. Applications that scored over 732 (n = 9,121) were approved, while those scoring less were denied (n = 357) (Figure 2). Program take-up was high: 76.3% of those who were approved decided to accept the card. An additional 5.3% of those who were initially rejected received a card.[22] Of those who accepted the card, 95% used it at least once, and used the card's credit lines up to 137% of its value.

3 Empirical Strategy

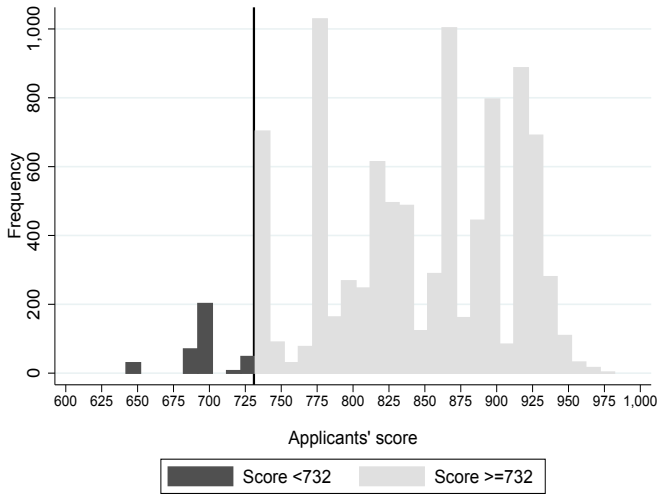
3.1 Identification Strategy

It is difficult to measure the impact (causal effects) of the program (i.e. how many durable goods a customer purchased because they obtained an EPM card) because

[21] EPM does not make the details of these variables public.

[22] For information about rejected applicants, see (Appendix B).

Figure 2: Applicants by Score (Sep-Dec 2013)



Source: Administrative data provided by EPM.
Note: The black vertical line represents the minimum score for approval.

it is impossible to know how many he or she would have bought without the card. Therefore, we built an appropriate comparison group to estimate this counterfactual.

Individuals who scored just below the approval threshold are likely to be similar in observable and unobservable characteristics to those scoring just above the threshold. Thus, the barely rejected applicants represent a counterfactual group to help us estimate the actions of the applicants just above the threshold (the barely accepted applicants) if they had *not* obtained an EPM card. Although this scenario seems ideal for applying a regression discontinuity design (RDD) to estimate impacts, given the assignment to treatment mechanism and its outputs, in this case its implementation is unsuitable. Very few individuals scored below the threshold, and they appear to be outliers with extremely negative credit histories (see Appendix B). In other words, the assumptions to apply RDD are not met in this scenario. This pattern is found both in the September to December 2013 universe of applicants and in the sample we employ to estimate impacts.

To analyze the impact of acquiring the EPM card on the outcomes of interest, we therefore compare the group of approved applicants (score $\geqslant 732$) who accepted the card (participants or treatment group) with the group of approved applicants who declined the card (non-participants or control group). Since both groups are comprised of approved applicants, they might have similar observable and unobservable characteristics before the intervention. Nevertheless, some differences between the two groups may remain. We thus employ EB techniques to correct for potential biases and identify effects.

EB is a multivariate reweighting method proposed by Hainmueller (2012). This reweighting scheme assigns a scalar weight to each sample unit such that reweighted groups satisfy a set of balance constraints that are imposed in the sample moments (for example, the median) of the covariates' distribution. This approach allows us to obtain a high degree of covariate balance by construction, while keeping the weights as close as possible to the base (unit) weights to prevent a loss of information. As

described by Hainmueller (2012), the weights ω_i are chosen as follows:

$$\min_{\omega_i} H(\omega) = \sum_{\{i/T_s=0\}} h(\omega_i)$$

subject to balance and normalizing constraints

$$\Sigma_{\{i/T_s=0\}}\omega_i k_{ri}(X_i) = m_r \qquad \text{with} \qquad r \in 1, ..., R \text{ , and}$$
$$\Sigma_{\{i/T_s=0\}}\omega_i = 1 \qquad \text{and} \qquad \omega_i \geq 0 \quad \forall i \quad \text{such that} \quad T_s = 0,$$

where T_s is the treatment status, $h(.)$ is a Kullback (1959) entropy metric, and $k_{ri}(X_i) = m_r$ describes a set of R balance constraints imposed, in our case, on the covariate mean of the reweighted control group in order to equal the covariate mean of the treatment group.[23] In other words, EB allows to construct a 'synthetic' control group based on pre-treatment characteristics. By doing this, EB helps to eliminate a potential source of bias since weighted non-beneficiaries are expected to be more similar to beneficiaries.[24]

Thereafter, we use the weightings that emerge from EB to estimate the following equation using the OLS method:

$$Y_i = \beta T_i + \gamma X_i + \epsilon_i$$

where T_i is the binary variable that indicates whether a person received the card or not (the treatment variable), X_i is a vector of control variables, and ϵ_i is the error term *iid* and estimated robustly. Our parameter of interest is β, which will capture the effect of the program on the outcome of interest Y_i or, in other words, the program's impact on i) access to credit, ii) characteristics of the dwelling and possession of durable goods, and iii) efficiency in the use of public services.

3.2 Sample and Descriptive Statistics

A unique survey designed to measure the EPM program's impacts on relevant outcomes was conducted from July to September 2015 in Medellín and its surrounding municipalities. The survey contained 11 modules that asked about the following aspects of applicants' households: housing (type of dwelling, homeownership, basic services, etc.), household goods (electrical appliances, audio and video equipment, etc.), household characteristics (size, ages, health, educational level, etc.), work (main occupation, business owner, etc.), income, expenses, access to financial services, use of time, subjective well-being, perception of EPM, and savings.

Figure 3 displays the 1,400 individuals who were surveyed from a pool of 2,286 applicants who applied for the credit card between September and December 2013 and whose credit score was near the approval threshold of 732 (range = 640–781). Initially the target was to survey all 357 individuals who scored below the threshold as well as a random sample of 1,528 of the 1,929 individuals who scored above the threshold, for a total of 1,855 individuals. This approach was designed to provide a

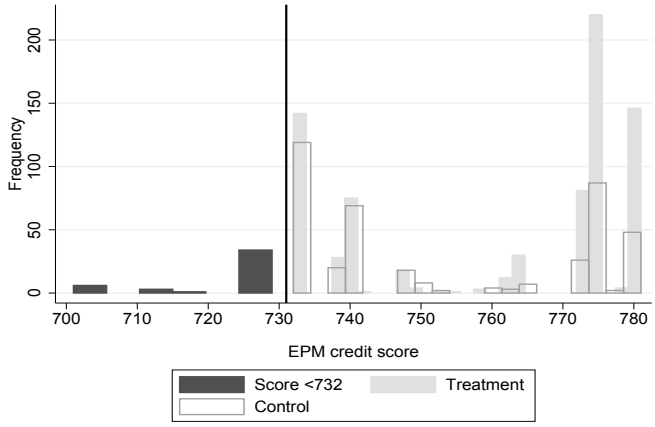
[23] We use the STATA package called ebalance, introduced by Hainmueller & Xu (2013). For implementation issues, see Hainmueller (2012).

[24] Heckman et al. (1997) and Heckman et al. (1998) describe these sources of biases.

better understanding of the characteristics of the individuals who were *not* approved, and to evaluate whether estimating the impact using an RDD would be feasible. However, due to challenges associated with conducting the fieldwork, a total of 221 individuals were surveyed below the threshold and 1,179 above the threshold. Of the approved applicants surveyed, 65% accepted the card, and of the rejected applicants surveyed, 4% managed to acquire the card anyway.

The data confirmed that individuals just above and just below the threshold are not comparable (see Appendix B). The treatment group was defined as approved applicants (score above 732) who accepted the card (766 individuals – solid gray bars to the right of the approval score in Figure 3), and the control group as approved applicants who declined the card (413 individuals – unshaded bars to the right of the approval score in Figure 3).

Figure 3: Histogram of Surveyed Individuals (1,400 applicants)



Note: The black line represents the approval score. Individuals who scored below 732 (solid dark bars to the left of the black line) were not eligible for the EPM card. Individuals who scored 732 or higher (solid and unshaded bars to the right of the black line), were eligible for the card, but not all of them accepted it.

Table 2, Column 1 displays applicants' characteristics and information from the baseline year of 2013, when the card applications were submitted, using retrospective questions from the survey. The approved applicants who accepted vs. declined the card are relatively homogeneous except for homeownership, consumption of public utilities, and ownership of certain durable goods. The approved applicants who accepted the card are more likely to be homeowners and to have Internet access; they also report higher levels of consumption of water and sanitation services. Additionally, these applicants less frequently report having been denied a loan, and are more likely to have opened a credit line with a store. They were also more likely to own washing machines, bicycles, cameras, and PCs. However, these differences disappear once the observations are reweighted using the weights that emerge from the EB method, which shows that the treatment and control groups are balanced in all baseline characteristics, and are therefore comparable (Table 2, Column 2).

Table 2: Descriptive Statistics for EPM Card Applicants at Baseline (2013)
Approved Applicants Who Accepted vs. Rejected the Card

	1. Sample				2. Weighted sample (EB)			
	Mean EPM card	Mean No EPM card	Difference	P-value	Mean EPM card	Mean No EPM card	Difference	P-value
Socio-demographic								
EPM score	761.61	753.44	8.17	0.00	761.61	761.64	-0.02	0.98
Age	33.34	32.51	0.83	0.10	33.34	33.34	0.00	0.99
Age^2	1,181.34	1,123.63	57.71	0.10	1,181.34	1,181.48	-0.13	1.00
Gender	0.53	0.56	-0.04	0.18	0.53	0.53	0.00	0.99
Married/common law relationship	0.57	0.56	0.02	0.59	0.57	0.57	0.00	0.98
Number of dependents	1.86	1.91	-0.05	0.41	1.86	1.86	0.00	0.98
Homeowner	0.16	0.12	0.04	0.09	0.16	0.16	0.00	0.96
Owner of motorcycle	0.14	0.12	0.02	0.43	0.14	0.14	0.00	0.99
Socioeconomic stratum 1	0.14	0.16	-0.02	0.28	0.14	0.14	0.00	0.97
Socioeconomic stratum 2	0.58	0.57	0.01	0.63	0.58	0.58	0.00	0.98
Education								
Completed primary education	0.07	0.08	-0.01	0.58	0.07	0.07	0.00	0.96
Completed secondary education	0.55	0.56	-0.01	0.82	0.55	0.55	0.00	0.99
Technical/Technological	0.37	0.35	0.02	0.59	0.37	0.37	0.00	0.99
Employment								
Has some kind of work contract	0.98	0.97	0.01	0.43	0.98	0.98	0.00	1.00
Incomes and expenses								
Log value of income from economic activity and other incomes	13.84	13.84	0.00	0.87	13.84	13.84	0.00	0.99
Log value of total income of applicant and partner	14.09	14.07	0.01	0.72	14.09	14.09	0.00	0.99
Log value of monthly personal expenses	12.44	12.44	0.00	0.97	12.44	12.44	0.00	0.99
Log value of total expenses	12.61	12.61	0.00	0.93	12.61	12.61	0.00	1.00
Public services								
Log value of energy consumption	9.26	8.97	0.29	0.23	9.26	9.24	0.01	0.96
Log value of water consumption	7.33	6.68	0.65	0.01	7.33	7.34	0.00	0.99
Log value of sanitation services consumption	7.34	6.87	0.47	0.08	7.34	7.34	0.00	0.99
Log value of natural gas consumption	4.27	4.33	-0.06	0.83	4.27	4.27	0.01	0.98
Log value of energy consumption in Kwh	4.16	4.03	0.12	0.27	4.16	4.15	0.01	0.96
Log value water consumption in m3	1.99	1.81	0.18	0.02	1.99	1.99	0.00	0.99
Log value of sanitation services consumption in m3	1.91	1.79	0.12	0.11	1.91	1.91	0.00	0.99
Log value of natural gas consumption in m3	1.19	1.18	0.00	0.96	1.19	1.18	0.00	0.98
Energy source for cooking is natural gas/electricity	0.70	0.70	0.00	0.97	0.70	0.70	0.00	0.99
Internet service	0.53	0.45	0.09	0.00	0.53	0.53	0.00	0.98
Characteristics of the dwelling								
Number of floors	1.14	1.14	0.00	0.95	1.14	1.14	0.00	0.99
Number of rooms	2.64	2.54	0.1	0.13	2.64	2.64	0.00	0.97
Number of rooms with exclusive use	2.54	2.46	0.07	0.24	2.54	2.54	0.00	0.97
Number of kitchens	1.00	0.99	0.01	0.11	1.00	1.00	0.00	0.74
Number of kitchens with exclusive use	1.00	0.99	0.01	0.09	1.00	1.00	0.00	0.74

Table 2: (Cont) Descriptive Statistics for EPM Card Applicants at Baseline (2013)

	1. Sample				2. Weighted sample (EB)			
	Mean EPM card	Mean No EPM card	Difference	P-value	Mean EPM card	Mean No EPM card	Difference	P-value
Number of bathrooms	1.15	1.14	0.02	0.50	1.15	1.15	0.00	0.99
Number of bathrooms with exclusive use	1.14	1.13	0.01	0.59	1.14	1.14	0.00	0.96
Presence of flush toilet and mains sewerage	0.98	0.99	-0.01	0.39	0.98	0.98	0.00	0.97
Roof finished	0.93	0.93	0.00	0.93	0.93	0.93	0.00	0.99
Living room/bedroom floors finished	0.60	0.64	-0.05	0.10	0.60	0.59	0.00	0.98
Living room/bedroom walls finished	0.97	0.97	0.00	0.89	0.97	0.97	0.00	0.97
Kitchen floors finished	0.62	0.65	-0.03	0.27	0.62	0.62	0.00	0.98
Kitchen walls finished	0.96	0.95	0.01	0.44	0.96	0.96	0.00	0.98
Bathroom floors finished	0.75	0.75	0.00	0.88	0.75	0.75	0.00	0.97
Bathroom walls finished	0.91	0.91	0.00	0.81	0.91	0.91	0.00	0.99
Ownership of electrical appliances and other durable goods								
Washing machine	0.66	0.60	0.06	0.05	0.66	0.66	0.00	0.98
Refrigerator	0.92	0.91	0.02	0.35	0.92	0.92	0.00	0.96
Stove	0.95	0.96	-0.01	0.29	0.95	0.95	0.00	1.00
Oven	0.17	0.14	0.03	0.12	0.17	0.17	0.00	0.99
Microwave oven	0.40	0.32	0.08	0.01	0.40	0.4	0.00	0.99
Water heater	0.24	0.26	-0.02	0.4	0.24	0.24	0.00	0.99
TV	0.93	0.93	-0.01	0.67	0.93	0.92	0.00	0.96
DVD	0.56	0.55	0.01	0.77	0.56	0.56	0.00	0.98
Sound system	0.59	0.57	0.02	0.45	0.59	0.59	0.00	0.98
Digital player	0.13	0.14	-0.01	0.72	0.13	0.13	0.00	0.99
Video game console	0.19	0.17	0.02	0.49	0.19	0.19	0.00	1.00
Electric motorcycle	0.01	0.01	0.00	0.73	0.01	0.01	0.00	1.00
Bicycle	0.38	0.33	0.05	0.09	0.38	0.38	0.00	0.99
Pay TV	0.79	0.76	0.03	0.22	0.79	0.79	0.00	0.97
Camera	0.33	0.25	0.08	0.00	0.33	0.33	0.00	0.99
PC	0.46	0.39	0.07	0.01	0.46	0.46	0.00	0.98
Laptop	0.21	0.20	0.01	0.60	0.21	0.21	0.00	0.99
Tablet	0.10	0.09	0.01	0.54	0.10	0.10	0.00	0.99
Financial inclusion								
Has a savings account	0.74	0.70	0.04	0.20	0.74	0.74	0.00	0.97
Refused credit by banks/financial entities	0.09	0.16	-0.06	0.00	0.09	0.09	0.00	0.99
Has bank credit card	0.13	0.12	0.02	0.40	0.13	0.13	0.00	0.99
Has a credit card (with a non-financial institution other than EPM)	0.10	0.08	0.03	0.14	0.10	0.10	0.00	0.99
Has credit with banks	0.16	0.15	0.02	0.38	0.16	0.16	0.00	0.99
Has credit with credit card	0.08	0.07	0.020	0.29	0.08	0.08	0.00	0.99
Has credit with cooperatives	0.08	0.08	0.010	0.55	0.08	0.08	0.00	0.99
Has credit with stores	0.22	0.16	0.06	0.020	0.22	0.22	0.00	0.99
Has credit with compensation funds	0.05	0.03	0.01	0.22	0.05	0.05	0.00	1.00
Has credit with family members	0.04	0.06	-0.02	0.16	0.04	0.04	0.00	1.00
Has trickle credit	0.02	0.02	0.00	0.87	0.02	0.02	0.00	1.00
Has credit from employer	0.01	0.02	-0.01	0.49	0.01	0.01	0.00	1.00
Observations	766	413			766	413		

Note: statistics were constructed using administrative data provided by EPM.
This data reflects information submitted and/or collected by EPM at the time individuals applied for the credit card from September to December 2013.

4 Results

Table 3 (Column 1) displays the impacts of the program from the EB+OLS estimations. The results are divided into five groups: financial inclusion (Panel A), home characteristics (Panel B), ownership of electrical appliances and other durable goods (Panel C), spending on public utilities (Panel D), and time spent on household chores and subjective well-being (Panel E).

Financial inclusion (Panel A). The results show that the program increased beneficiaries' access to finance. Having an EPM card increased the likelihood of obtaining financing through credit cards (whether issued by EPM or banks or other non-financial institutions) by almost 7 percentage points. In line with this result, the program increased the amount of total debt by 143% and expenses in credit repayments by 120%, likely due to an increase in the number of purchases and payments made with the EPM card.[25] These findings reinforce the statistics presented in Section 3 that most of the applicants who obtained an EPM card in fact used it.

In addition, card users were 4 percentage points less likely to borrow from family members. Thus, the program fostered the substitution of informal credit for formal credit sources. However, no statistically significant effects were found regarding cardholders' access to traditional financial products from banks.

Table 3: Impacts of the EPM Card
Panel A. Financial Inclusion

Outcomes	EB + OLS (1)	EB + FE (2)
Has credit with credit cards	0.066***	0.066**
	(0.025)	(0.030)
Log value of total amount of debts	1.431***	1.516***
	(0.423)	(0.548)
Log value of expenses in credit repayments	1.197***	-
	(0.369)	-
Has savings account, credit card, or loan from banks	0.014	0.023
	(0.021)	(0.029)
Has credit with cooperatives, stores, or compensation funds	0.017	0.012
	(0.032)	(0.045)
Has credit from family members	-0.039**	-0.039**
	(0.015)	(0.017)
Observations	**1,179**	**1,179**

Notes: (1) Column 1: OLS regression using EB weights, robust standard errors in parentheses. The set of control variables includes 2015 survey data on demography, education, employment, income and expenditures, and access to public services. The control variables also include EPM credit scores and 2013 administrative data on financial inclusion, characteristics of dwelling, durable goods, and access to public services. (2) Column 2: FE regression using EB weights, clustered standard errors at the individual level in parentheses. (3) ***,**, * statistically significant at 1%, 5%, and 10%.

[25] For all outcomes in logs, we apply the inverse hyperbolic sine transformation (IHST). Unlike traditional log transformation, IHST is defined at zero and can be interpreted in the same way as a log-transformed dependent variable. For a recent application, see Alix-Garcia et al. (2015).

Home characteristics and durable goods (Panel B and Panel C). In line with the program's aims, the results show that having the card is associated with an increase in the number of floors, kitchens, and bathrooms in the beneficiaries' dwellings and in the likelihood of purchasing a washing machine. These findings are not trivial, given that beneficiaries can use the EPM card for a variety of products including personal goods and time-spending technologies. However, they choose to use it to buy materials for key home improvements and a key, time-saving, durable good.

Panel B. Characteristics of the Dwelling

Outcomes	EB + OLS (1)	EB + FE (2)
Number of floors	0.049**	0.049**
	(0.020)	(0.025)
Number of rooms	0.067	0.067
	(0.042)	(0.052)
Number of kitchens	0.007**	0.007*
	(0.004)	(0.004)
Number of bathrooms	0.045**	0.045*
	(0.018)	(0.023)
Roof finished	-0.002	-0.003
	(0.010)	(0.014)
Observations	**1,179**	**1,179**

Notes: (1) Column 1: OLS regression using EB weights, robust standard errors in parentheses. The set of control variables includes 2015 survey data on demography, education, employment, income and expenditures, and access to public services. The control variables also include EPM credit scores and 2013 administrative data on financial inclusion, characteristics of dwelling, durable goods, and access to public services. (2) Column 2: FE regression using EB weights, clustered standard errors at the individual level in parentheses. (3) ***,**, * statistically significant at 1%, 5%, and 10%.

Dwellings represent perhaps the main asset of lower-income individuals. For instance, in Colombia, a 1% increase in the home quality index (e.g. after implementing home improvements) produces an estimated 1.6% increase in the value of the home and a correlated increase in possible rentals. Furthermore, households with a covered floor or remodeled bathrooms and kitchens experience a 15-20% increase in asset value.[26]

EPM advertises laptops and TVs more than washing machines, as the former are considered more attractive purchases. However, according to the National Quality

[26] Authors' own calculations based on the Inter-American Development Bank "Sociometro" database.

Panel C. Purchase of Durable Goods

Outcomes	EB + OLS (1)	EB + FE (2)
Washing machine	0.059***	0.058*
	(0.022)	(0.036)
Refrigerator	0.001	0.001
	(0.008)	(0.017)
Stove	0.001	0.001
	(0.009)	(0.015)
Oven	0.000	-0.000
	(0.019)	(0.021)
Microwave oven	-0.037	-0.037
	(0.029)	(0.037)
Water heater	0.009	0.009
	(0.025)	(0.028)
TV	-0.006	-0.007
	(0.009)	(0.018)
DVD, sound system, or digital player	0.015	0.033
	(0.021)	(0.028)
PC, laptop, or tablet	0.037	0.001
	(0.025)	(0.034)
Observations	**1,179**	**1,179**

Notes: (1) Column 1: OLS regression using EB weights, robust standard errors in parentheses. The set of control variables includes 2015 survey data on demography, education, employment, income and expenditures, and access to public services. The control variables also include EPM credit scores and 2013 administrative data on financial inclusion, characteristics of dwelling, durable goods, and access to public services. (2) Column 2: FE regression using EB weights, clustered standard errors at the individual level in parentheses. (3) ***,**, * statistically significant at 1%, 5%, and 10%.

of Life Survey (DANE, 2015), only 59% of households in Colombia report having a washing machine, compared with 63% in the region as a whole and 85% in the United States.[27] Furthermore, while 100% of individuals in the 10th income decile in Colombia have a washing machine, only 19% in the 1st decile have one; this may be due in part to their price and the fact that they are harder to buy secondhand than other appliances.[28] Our results suggest that the EPM credit card has helped

[27] Authors' own calculations of occupied dwellings, based on the 2013 U.S. Census Bureau Household Survey.

[28] Data from Euromonitor International (2016) shows that the average retail price for a new washing machine is USD $332 – significantly more than the national minimum wage that year (approximately USD $230). Although other home goods appear to be just as expensive (for example, the average retail price for a new TV is USD $559), the replacement cycles for major appliances, like washers, and consumer electronics (i.e. TVs) are different. For instance, the replacement cycle for TVs in 2016 was approximately 6 years, while the expected lifespan of a washing machine was about 10 years according to the National Association of Home Builders. Since shorter life cycles are associated with faster price drops, it is plausible to assume that data on price averages of appliances sold last year may not necessarily reflect the prices paid by low-income consumers for TVs, as they may access these goods (including relatively newer models) at

close this gap in Colombia.

Public services (Panel D). We find no statistically significant effects regarding the use or expense of public services. Although the program aimed to foster a more efficient use of public services through the acquisition of more efficient durable goods, this potential reduction could have been cancelled out by improvements in the quality of the dwelling – such as the creation of more rooms – or the possession of additional home goods, which increase the use of electricity. The absence of such an effect is also a relevant result. It implies that individuals can access credit through the EPM card without a corresponding increase in expenditures on EPMs' services.

Panel D. Public Services

Outcomes	EB + OLS (1)	EB + FE (2)
Log value of EPM utility bill expenses	0.033	-
	(0.040)	-
Energy for cooking is natural gas/electricity	-0.020	-0.020
	(0.022)	(0.031)
Log value of propane gas expenses	0.325	-
	(0.230)	-
Observations	**1,179**	**1,179**

Notes: (1) Column 1: OLS regression using EB weights, robust standard errors in parentheses. The set of control variables includes 2015 survey data on demography, education, employment, income and expenditures, and access to public services. The control variables also include EPM credit scores and 2013 administrative data on financial inclusion, characteristics of dwelling, durable goods, and access to public services. (2) Column 2: FE regression using EB weights, clustered standard errors at the individual level in parentheses. (3) ***,**, * statistically significant at 1%, 5%, and 10%.

Use of time and subjective well-being (Panel D). We find no effects on cardholders' use of time. However, the results suggest that the program improves users' savings capacity and thus their subjective well-being. These findings indicate not only that the EPM card helps beneficiaries manage, control, and plan their family economy better, but also that the new debt they acquire is sustainable over time.

Overall, our findings bolster the arguments put forward by Karlan & Morduch (2010), who find that specific financial products for vulnerable people can be an effective way to satisfy their needs, such as consumption smoothing, facilitating access to durable goods, improving saving capacity and dwelling conditions, and obtaining loans for sporadic needs. The fact that more far-reaching effects were not found, such as access to the traditional financial sector, is also in line with the empirical evidence and the discussion presented in Section 2. According to the cited evidence, financial products targeted at poor and vulnerable segments of the population can be important for satisfying specific needs, but are often insufficient to achieve other development goals such as entrepreneurship growth and bankarization.

cheaper prices from secondhand markets.

Panel E. Use of Time and Subjective Well-being

Outcomes	EB + OLS (1)
Use of Time	
Time spent on household chores (hours)	-0.010
	(0.110)
Fraction of waking hours spent on household chores	0.000
	(0.007)
Subjective well-being	
Saving capacity in 2015 is better than in 2012	0.066**
	(0.033)
The economic situation in 2015 is better than in 2012	-0.006
	(0.032)
Moderately/entirely satisfied with the household	-0.023
financial situation in 2015	(0.031)
Observations	**1,179**

Notes: (1) Column 1: OLS regression using EB weights, robust standard errors in parentheses. The set of control variables includes 2015 survey data on demography, education, employment, income and expenditures, and access to public services. The control variables also include EPM credit scores and 2013 administrative data on financial inclusion, characteristics of dwelling, durable goods, and access to public services. (2) Column 2: FE regression using EB weights, clustered standard errors at the individual level in parentheses. (3) ***,**, * statistically significant at 1%, 5%, and 10%.

5 Robustness Checks

5.1 Entropy Balancing and Fixed Effects

The main advantage of the econometric method implemented (EB+OLS) is that it can be applied to a cross-sectional sample of individuals. However, the main disadvantage is that its underlying assumption of conditional independence could be too strong. It implies that the evaluator observes all the information that determines (influences) participation in the program.

Yet it is likely that only more motivated and entrepreneurial individuals accept the card once they are approved. Therefore, selection into the program (i.e., the decision to accept the card and use it) may also depend on characteristics that are unobservable to the evaluator. If an individual's capacity or motivation (or other factors) is among the drivers of participation, we cannot control for self-selection using EB+OLS.

Therefore, to test the robustness of our results, we combine EB with the FE methodology using retrospective data from 2013.[29] The FE methodology allows us to control for unobservable heterogeneities that are constant over time. For this purpose, we estimate the following equation:

[29] Figal Garone et al. (2015) provides a recent application of EB in combination with FE.

$$Y_{i,t} = \alpha_i + \beta T_{i,t} + \gamma X_{i,t} + \epsilon_{i,t}$$

where α_i captures fixed effects at the individual level, and $\epsilon_{i,t}$ are errors clustered at the individual level.

Table 3 (Column 2) confirms the previous results. Having an EPM card is associated with more and better access to credit, home improvements, and the acquisition of washing machines. It was not possible to estimate the effects on spending on public utilities, use of time, or subjective well-being using EB+FE as there is no retrospective data for these outcome variables.

5.2 Multiple Hyphotesis Testing

Given that more than one null hypothesis is tested simultaneously for each area of impact, we need to adjust p-values for the number of hypotheses tested. In other words, it is necessary to control for the "type I error" rate. Thus, we test the robustness of our results by correcting for MHT using Family-wise Error Rate and False Discovery Rate corrections, which are common practice in the literature.

Section 4 displays the p-values adjusted for MHT for all our outcomes of interest and for both the EB+OLS and EB+FE estimations. Our main results remain statistically significant across several corrections.

Table 4: Family-Wise Error Ratio & False Discovery Rate

Panel A. Financial Inclusion

Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Coeficient		p-value								q-value			
			Original		Bonferroni		Sidak		Westfall-Young		FDR		FDR Sharp	
	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE
Has credit with credit card	0.066	0.066	0.01	0.03	0.03	0.10	0.03	0.10	0.06	0.12	0.02	0.04	0.01	0.04
Log value of expenses in credit repayment	1.197	-	0.00	-	0.01	-	0.01	-	0.01	-	0.00	-	0.00	-
Log value of total amount of debts	1.431	1.516	0.00	0.01	0.00	0.03	0.00	0.03	0.01	0.03	0.00	0.03	0.00	0.03
Has savings account, credit card, or loan from banks	0.014	0.023	0.49	0.43	0.97	0.86	0.73	0.67	0.75	0.71	0.58	0.54	0.24	0.27
Has credit with cooperatives, stores or funds	0.017	0.012	0.60	0.80	0.97	0.86	0.73	0.80	0.75	0.79	0.60	0.80	0.25	0.47
Has credit from family members	-0.039	-0.039	0.01	0.03	0.04	0.10	0.03	0.10	0.06	0.12	0.02	0.04	0.01	0.04

Panel B. Characteristics of the Dwelling

Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Coeficient		p-value								q-value			
			Original		Bonferroni		Sidak		Westfall-Young		FDR		FDR Sharp	
	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE
Number of floors	0.049	0.049	0.01	0.04	0.06	0.22	0.06	0.20	0.14	0.25	0.04	0.09	0.04	0.10
Number of rooms	0.067	0.067	0.11	0.20	0.22	0.40	0.21	0.36	0.24	0.38	0.14	0.25	0.07	0.11
Number of kitchens	0.007	0.007	0.04	0.06	0.12	0.22	0.12	0.20	0.17	0.25	0.07	0.09	0.04	0.10
Number of bathrooms	0.045	0.045	0.01	0.05	0.06	0.22	0.06	0.20	0.14	0.25	0.04	0.09	0.04	0.10
Roof finished	-0.002	-0.003	0.82	0.85	0.82	0.85	0.82	0.85	0.84	0.87	0.82	0.85	0.20	0.33

Panel C. Purchase of Durable Goods

Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Coeficient		p-value								q-value			
			Original		Bonferroni		Sidak		Westfall-Young		FDR		FDR Sharp	
	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE	EB+OLS	EB+FE
Washing machine	0.059	0.058	0.01	0.10	0.08	0.93	0.07	0.62	0.13	0.60	0.08	0.93	0.08	1.00
Refrigerator	0.001	0.001	0.88	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	1.00	1.00
Stove	0.001	0.001	0.95	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	1.00	1.00
Oven	0.000	0.000	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	1.00	1.00
Microwave oven	-0.037	-0.037	0.19	0.32	1.00	1.00	0.78	0.93	0.82	0.93	0.58	0.96	1.00	1.00
Water heater	0.009	0.009	0.72	0.76	1.00	1.00	0.99	1.00	0.99	1.00	0.99	0.99	1.00	1.00
TV	-0.006	-0.007	0.50	0.72	1.00	1.00	0.98	1.00	0.99	1.00	0.91	0.99	1.00	1.00
DVD, sound system, or digital camera	0.015	0.033	0.47	0.24	1.00	1.00	0.98	0.89	0.99	0.88	0.91	0.96	1.00	1.00
PC, laptop, or tablet	0.037	0.001	0.14	0.98	1.00	1.00	0.70	1.00	0.77	1.00	0.58	0.99	1.00	1.00

Panel D. Public Services

Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Coeficient	p-value				q-value	
	EB+OLS	Original EB+OLS	Bonferroni EB+OLS	Sidak EB+OLS	Westfall-Young EB+OLS	FDR EB+OLS	FDR Sharp EB+OLS
Log value of EPM utility bill expense	0.033	0.42	0.75	0.61	0.64	0.42	0.72
Energy for cooking is natural gas/electricity	-0.020	0.38	0.75	0.61	0.64	0.42	0.72
Log value of propane gas expenses	0.325	0.16	0.47	0.40	0.38	0.42	0.72

Panel E1. Use of Time

Outcomes	(1) Coeficient	(2) p-value	(3) p-value	(4) p-value	(5) p-value	(6) q-value	(7) q-value
	EB+OLS	Original EB+OLS	Bonferroni EB+OLS	Sidak EB+OLS	Westfall-Young EB+OLS	FDR EB+OLS	FDR Sharp EB+OLS
Time spent on household chores (hours)	-0.010	0.92	1.00	0.99	0.97	0.97	1.00
Fraction of waking hours spent on household chores	0.000	0.97	1.00	0.99	0.97	0.97	1.00

Panel E2. Subjective Well-being

Outcomes	(1) Coeficient	(2) p-value	(3) p-value	(4) p-value	(5) p-value	(6) q-value	(7) q-value
	EB+OLS	Original EB+OLS	Bonferroni EB+OLS	Sidak EB+OLS	Westfall-Young EB+OLS	FDR EB+OLS	FDR Sharp EB+OLS
Saving capacity in 2015 is better than in 2012	0.066	0.04	0.13	0.12	0.16	0.13	0.15
The economic situation in 2015 is better than in 2012	-0.006	0.86	0.89	0.86	0.85	0.86	1.00
Moderately/entirely satisfied with the household financial situation in 2015	-0.023	0.44	0.89	0.69	0.72	0.67	0.80

6 Conclusion

To the best of our knowledge, this is the first study to evaluate the effects of credit products offered by non-financial companies. It evaluates the impacts of acquiring the EPM-SOMOS card on financial inclusion, the probability of making home improvements and purchasing durable goods, and efficiency in the use of public services.

This card represents a non-bank option for accessing credit, especially for vulnerable or informally employed people who have no (or a poor) credit history. Any adult customer of EPM's public utilities with a proven history of paying their bills is eligible for the card.

Three major results emerge from our study. First, EPM beneficiaries were able to access credit on better terms and conditions than via informal channels. They were more likely to use credit cards, which increased their level of debt and expenses in credit repayments. Although there was no noticeable effect on the probability of accessing traditional bank products (e.g. savings account, loan, or credit card), having an EPM card reduced the likelihood of borrowing from family members. Second, obtaining the EPM card is associated with making home improvements, such as increasing the number of floors, kitchens, and bathrooms. It also increases the likelihood of purchasing certain expensive durable goods, such as washing machines. Third, with regard to subjective well-being, an improvement in saving capacity was found. This finding is important, as it indicates that cardholders are better able to plan their family economy, and that the new debt acquired may be manageable over time. This is also relevant since bankarization programs from both microfinance institutions and non-banking institutions have been criticized for charging excessive interest rates, and thus causing over-indebtedness among their customers.

Although the program does not seem to have an impact on access to credit from the traditional financial sector, it does fulfill a significant need in Colombia and LAC more broadly to increase access to home improvements and technologies. The credit card is a viable product from both the supply side – enterprises from the real sector – and the demand side – informal and/or vulnerable people unable to access financing for home improvements and durable goods. On the supply side, the card assignment scheme (scoring) and the low default rates show that these types of products are viable for businesses in the real sector that already have a relationship with these segments of the population and are able to use the information generated during previous interactions with them. On the demand side, the card represents a viable – and perhaps the only – option for families with no credit history that need to finance home improvements or purchase expensive electrical appliances.

Policy makers and other interested stakeholders can work with non-financial companies such as public utilities companies, retail stores, and other types of firms to replicate such projects in other regions and countries. This type of program is expected to work particularly well when two conditions are met: there is a qualitative housing deficit and/or the adoption rate of household technologies is low, and there are high transaction costs and information asymmetries in access to credit, as is often the case among low-income and unbanked populations.

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Appendix

A Annex 1

A.1 List of Stores and Products Available with the EPM-SOMOS Card

Table 4: List of Products that can be Purchased with the SOMOS Card

ELECTRICAL and GAS APPLIANCES	
Large Electrical appliances	***Food preparation***
Electric and/or gas refrigerator	Sandwich maker
Electric and/or gas stove	Electric and/or gas rice cooker
Electric and/or gas cooker	Electric squeezer
Extractor hood parts	Toaster
Electric and/or gas heater	Electric and/or gas coffee maker
Electric and/or gas oven	Kitchen pots and pans
Washing machine and/or tumble dryer	Whisk
Sunken electric and/or gas stove	Microwave oven
Sewing machines	Toaster oven
Freezers	Electric can opener
Dishwashers	Electric juicer
Electric water dispenser	Electric carving knife
Electric and/or gas fireplace	Electric food processor
Electric and/or gas cooler	Blender and parts
Electric and/or gas revolving display case	Juice squeezers
Burners	Frying pan
Electric and/or gas barbecue	Meat-cutting machine
Spares and parts for large electrical appliances	Bread maker
Large electrical appliance combos	Stand mixers
Personal care	Electric and/or gas fryers
Hair curling or straightening iron	Hot dog machine
Hair dryer	Cupcake machine
Electric shaver and depilation machine	Fondue maker
Electric body and face massage machine	Chocolate fountain
Hair clippers	Electric kettle
Electric exercise treadmill	Popcorn maker
Electric stationary bicycle	Raclette maker
Electric elliptical trainer	Grill
Electric stair climber	Waffle or panini maker
Vibration platform machine	Pressure cookers
Home vaporizer	Small electrical appliance combos
Personal care electrical appliance combos	***Home ventilation***
Household cleaning	Air conditioning or heating
Electric polisher	Fan
Electric vacuum cleaner	Air filter
Dehumidifiers	Air purifier
Electric irons	Home ventilation electrical appliances combos
Household cleaning electrical appliance combos	

AUDIO and VIDEO	
Audio and video	***Portable audio***
Televisions	Audio players
Speakers	Recorders
Sound systems' mini and micro components	Radios: electric or with rechargeable batteries
Video player	Portable audio goods combos
Home theater	
Chargers and battery chargers	
TV mounts	
Universal remote control	
TV antennas: over the air and peripheral	
Audio and video goods combos	
ENTERTAINMENT	
Video and digital cameras	***Video games***
Video cameras	Video consoles
Digital cameras	Remote control
Digital picture frames	Video games
Electric musical instruments	Batteries and rechargeable batteries
Electric musical instruments	
Accessories for electric instruments	
TECHNOLOGY	
Computers	***Telephone***
Desktop computers	Fixed telephones (landline)
Laptop computers – tablets for children	Fax
Tablets	Fixed telephones (cordless)
Voltage regulator	Call identifier
Cameras for PCs	Cell phones (all makes)
Hard disks	Extension telephone wiring
CD/DVD unit	Batteries for cell phones and telephones
Video projector	Radiotelephones
Projectors and back projectors	SIM card
Screens	***Network equipment***
Computer workstation	Switch
USB devices (cool pad - lights' memory sticks)	Access point or router
Internet modem	Network cards
GPS	Video or sound cards
Peripheral computing devices	Security video recording equipment
Printers, scanners, and multifunctionals	***Software***
Printers	Licenses and home software
Multifunctionals	
Cash register	
Scanner	
Toner cartridges	

HOME IMPROVEMENTS	
Bathrooms	***Floors and tiling***
Sinks	Floors
Sinks with cabinets	Skirting boards
Toilet paper holders	Decorative borders
Towel rings	Ceramic tiles
Soap dish holders	Adhesives and screeds for ceramic, porcelain and wooden floors
Showers	Grouts
Taps and mixers	Drains
Baths	Painting or building tools
Sanitary ware	Architraves
Porcelain sanitary ware combo	Cement, lime and plaster
Tubes and fittings	Sand
Drainage grates	Bricks
U-bends	Paint, additives, 'matagén' - aniline colors
WC elbow joints	Chippings
Flexible couplings for sanitary ware	Doors and rails
Flexible sink couplings	Rebars, 'piragua'
Faucet and mixer combinations	Silicone coating
Shower cabins	CARPEFIT roofing felt - waterproofing
Specialty recessed bathroom furniture	Polyester fabric
Glue / PVC adhesive/cement removers	Ceilings, wood boarding, tiles
Dry wall false ceilings	Windows and rails
Filters and accessories	Bathroom plumbing
Tools for the home	Floor sealants
Low-energy bulbs	***Laundry rooms***
Electric jigsaws	Laundry tubs
Electric polishers	Clothes washing sink
Electric blowtorches	Washing machines
Electric drill	***Kitchens***
Electric sanders	Kitchen worktops with cabinet
Electric grinders	Kitchen worktops
Electric tools and parts	Cooker - drawer unit combo
Home security alarms	Water and gas regulating valves
Lighting, light-diffusing sheets	Dishwater baskets
Dimmers	Stainless steel bucket
Electronic ballasts	Stainless steel dishwater
Doorbells, switches, circuit breakers, plugs	Gas ring burner
Junction boxes 2x4 and 4x4	Kitchen hood grease traps
Ports for television and cable	Iron gas burner top
Gas and water pipes	Gas diffusers
Christmas lights	Kitchen furniture - premium tower cooker
Electrical cables and wires	Kitchen taps and mixers
Etc.	Kitchen plumbing
TRANSPORT	
Electric transport	***NGV***
Electric vehicles	NGV conversion
Electric motorcycles	
Electric bicycles	
SERVICES	
Electrical appliances	***Audio, video, and ICT***
Extended warranties	Audio, video, and ICT installation
Electrical and/or gas appliance installation	
Home improvements	
Home improvement installations	
WATER TREATMENT	
Equipment	
Pumps	

Note: Based on information from the official website of the SOMOS recognition program (EPM GROUP, 2016).

Table 5: Stores Affiliated with the EPM-SOMOS Program

HYPERMARKETS	**SEWING MACHINES**
Almacenes Exito	Antioqueña de Máquinas
Easy Colombia	Casasinger
Home Center	Macoser Familiar E Industrial
Makro	Máquinas De Coser Janome
Panamericana	Para Coser
Tiendas Jumbo	Servitejer Y Coser
Tiendas Metro	**GAS APPLIANCES**
GENERAL ELECTRICAL APPLIANCES	Mundial De Gas Y Agua
Navarro Ospina	Cobretec
Cacharreria Mundial	Comercializadora Sumeco
Casamagna	Dimargas
Centro Oriental	Famigas
Vima	Gas Y Hogar
Credihogar	Idegas
Dispufil	J&s Distrihogares
Spe	Maxiservicios
Electrobello	Mercantil Supernova
Haceb	Super Gas 21
Hogar Y Moda	**NATURAL GAS VEHICLES**
Inversiones Bermejal	Auto Francia
Almacen Nápoles 3	Euro G.n.v
Luma	Gas Inyección
Multi San Pedro	Gasexpress Vehicular
Multigangas	Suragas Medellín
Multihogar	**ELECTRIC MUSICAL INSTRUMENTS**
COMPUTERS, AUDIO, and VIDEO	Yamaha Musical
Celcomp	**HOME IMPROVEMENTS and DEPOSITS**
Celular	Aeroprofiles
Circulo Digital	Agencia Central
Comercializadora Tecnisumer	Alfagres
Cyberia.com	Alhelí Kitchens Y Bathrooms
Nexcom	Almacences Corona
Sistemas God	Arte Y Design
Etc.	Artefino
MOTORBIKES and ELECTRIC BICYCLES	Bazar Americano
Energy Motion	*Etc.*

Note: Based on information from the official website of the SOMOS recognition program (EPM GROUP, 2016).

A.2 Stores Affiliated to the EPM-SOMOS Program

A.3 Information Required for the Credit Card Application Form

Table 6: Information Required for the Credit Card Application Form

Employee	• Copy of the national ID • Proof of payment of the most recent utility bill
Self-employed	• Copy of the national ID • Proof of payment of the most recent utility bill • One of the following documents: – Income certificate – Bank statements from previous three months – Certificate from an official accountant – Certificate from a provider – Certificate from the Chamber of Commerce or firm's legal ID
Retiree	• Copy of the national ID • Proof of payment of the most recent bill • One of the following documents: – Copy of the last pension payment received – Bank statement from previous three months that reflects the periodic payment of the pension – Pension's legal documents (Resolución de la pensión)
Housewife	• Copy of the national ID • Proof of payment of the most recent utility bill • One of the following documents: – Proof of real property tax – Vehicle ownership – Bank statements from previous three months or proof of remittances' receipt

Note: Based on information from the official website of the SOMOS recognition program (EPM GROUP, 2016).

B Descriptive Statistics

We find some statistically significant differences between the characteristics of the approved vs. rejected applicants. The approved applicants were, on average, older, better educated, and had higher incomes, and were more likely to be married, self-employed, to own their own business, to be homeowners, and to have their own vehicle, among other characteristics.

Table 7: Descriptive Statistics, EPM Administrative Data. All Applicants from September–December 2013

	> Approval score		**< Approval score**		**p-value (Mean diff=0)**
	Median	Sd	Median	Sd	
Demographic					
Treated: has EPM card	0.76	0.43	0.05	0.22	**0.00**
Age	43.96	13.48	25.58	5.25	**0.00**
Gender	0.44	0.5	0.42	0.49	0.41
Married/common law	0.56	0.5	0.62	0.48	**0.01**
Education					
Less than primary education	0.01	0.09	0	0.05	0.31
Completed primary education	0.19	0.39	0.02	0.14	**0.00**
Completed secondary education	0.46	0.5	0.54	0.5	**0.00**
Completed technical/technological	0.23	0.42	0.44	0.5	**0.00**
Completed university or higher	0.12	0.32	0	0.05	**0.00**
Employment					
Employee	0.55	0.5	0.98	0.13	**0.00**
Self-employed	0.2	0.4	0.02	0.13	**0.00**
Housewife	0.12	0.32	0	0	**0.00**
Pensioner	0.13	0.33	0	0	**0.00**
Has some kind of work contract	0.55	0.5	0.98	0.13	**0.00**
Business owner					
Has own business	0.05	0.22	0.01	0.09	**0.00**
Business is affiliated with the Chamber of Commerce	0.12	0.33	0.17	0.41	0.73
Applicant salaries, incomes, and expenses					
Log value of total income	14.3	0.68	14.05	0.49	**0.00**
Log value of income from main economic activity	13.92	0.65	13.54	0.29	**0.00**
Log value amount from other incomes received	13.18	0.82	12.63	0.79	**0.00**
Log value incomes received by spouse	13.75	0.63	13.64	0.53	**0.02**
Log value total expenses	12.95	0.85	12.41	0.55	**0.00**
Log value of monthly personal expenses	12.6	0.68	12.28	0.52	**0.00**
Log value of monthly expenses from financial expenses	12.29	0.85	11.75	0.68	**0.00**
Log value monthly expenses arising from economic activity	12.46	1.43	11.7	1	0.19
Socioeconomic characteristics of the household					
Homeowner	0.5	0.5	0.01	0.07	**0.00**
Log value commercial value of dwelling	18.03	0.75	18.07	0.67	0.89
Socioeconomic stratum	2.31	0.66	2.18	0.65	**0.00**
Household structure					
Number of dependents	1.68	0.88	1.61	0.73	**0.10**
Vehicle ownership					
Ownership of own vehicle	0.06	0.24	0	0	**0.00**
Ownership of motorcycle	0.08	0.27	0.15	0.36	**0.00**
Ownership of vehicle for public use	0.02	0.13	0	0	**0.01**
Public utilities					
Log value of energy consumption in Kwh	4.28	1.74	3.96	1.9	**0.00**
Log value of energy consumption	9.44	3.64	8.89	4.05	**0.01**
Log value of water consumption in m3	2.04	1.16	2.05	1.14	0.84
Log value of value of water consumption	7.5	3.89	7.6	3.83	0.63
Log value of sanitation services consumption in m3	1.98	1.19	1.98	1.17	0.99
Log value of value of sanitation services consumption	7.6	4.19	7.67	4.16	0.76
Log value of natural gas consumption in m3	1.25	1.37	1.08	1.33	**0.02**
Log value of value of natural gas consumption	4.54	4.72	3.95	4.67	**0.02**
Observations	**9,121**		**357**		

Note: statistics were constructed using administrative data provided by EPM. This data reflects information submitted and/or collected by EPM at the time individuals applied for the credit card from September–December 2013.