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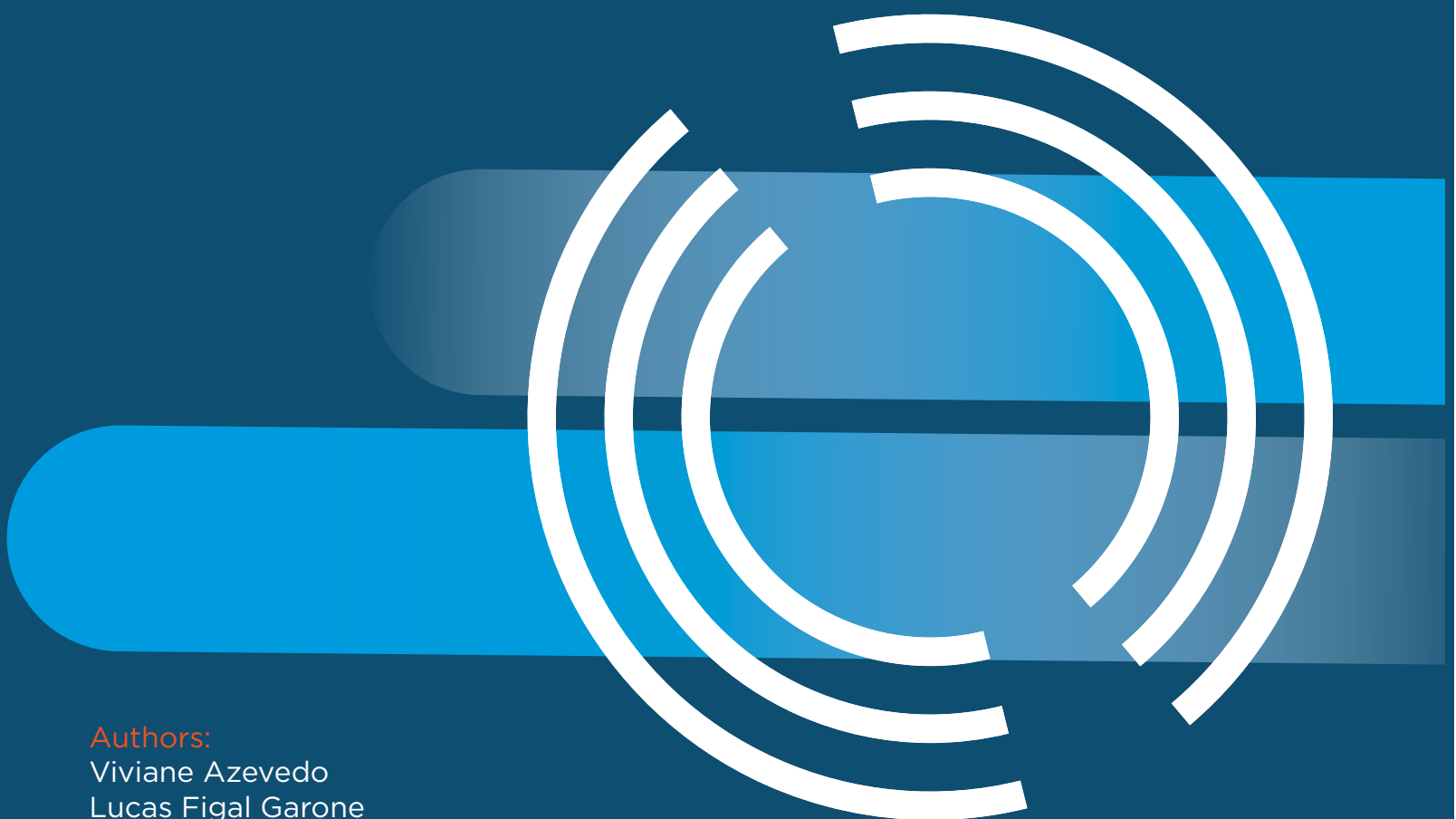
The Non-bank Credit Card: An Effective Tool for Financial Inclusion and Development?



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Abstract

This study evaluates the socio-economic impacts of a non-bank credit program offered by a public utilities company in Colombia. This program provides customers with a credit card that can only be used to purchase certain kinds of home and personal goods and/or fund home improvements in particular stores. The study uses administrative data alongside surveys at the individual level to estimate socio-economic impacts by comparing the group of approved applicants who accepted the card with those who were approved but declined it. We find that the program's beneficiaries used the credit card, implying that the program increases low-income people's access to credit on better terms and conditions. Although the program had no effect on accessing new loans from the traditional financial sector, it reduced the likelihood of borrowing from family members and increased the number of purchases and payments made by credit card. The results also show that acquiring the card increased the likelihood of making key home improvements, such as adding floors, kitchens, and bathrooms to the dwelling, and purchasing certain expensive durables, such as washing machines. Finally, the program increased the household's (self-reported) saving capacity, which may signal an increase in economic well-being and that debt repayment is manageable.

Key words: Non-bank credit, financial inclusion, development, impact evaluation, Colombia.

JEL Classification: D14, E51, G23, I30, O12.

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1 Introduction

Many interventions have been proposed to solve the most difficult development problems, particularly those related to reducing poverty. These interventions range from child nutrition programs designed to reduce disparities in future productivity and incomes, to programs to improve property rights or the functioning of markets. In recent decades, efforts to reduce poverty have focused on the potential transformative power of access to the financial system (Karlan et al., 2010).

Demirgüç-Kunt et al. (2008) describes the rationale for placing the financial system 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, which in turn generates higher growth, more opportunities, and more equitable income distribution -and therefore reduces poverty. Beck et al. (2007) find a strong correlation between the degree of a country's financial development and its achievements in reducing inequality. [1]

According to Arbeláez et al. (2007), the most obvious way to promote access to financial services is to strengthen the traditional financial sector. However, given the difficulties of doing so in developing countries[2], it is important to consider other alternatives. Non-bank institutions, for example, which are subject to lower transaction costs and less risk, are sometimes better able to provide financing to specific population niches.

Colombia is a typical example. The country's financial depth, approximated by the ratio of private credit to GDP, is far below that of high-income countries (52% vs. 147%). Financial inclusion[3] has improved dramatically over the past decade, increasing from 55.5% in 2008 to 76.4% in 2016[4] and nearly 50% of the adult population having

[1] The authors measure financial sector development as the value of the credit by financial intermediaries to the private sector as a proportion of GDP. In parallel, they measure inequality by the Gini coefficient.

[2] These challenges include a greater vulnerability to the influence of volatile capital flows, a lower capacity to devise and implement smart macro-prudential policies and regulations, and insufficient resources to build a physical banking infrastructure that is geographically accessible to all, or to invest in technology platforms with updated payment systems. Developing countries also typically have inadequate national personal identification systems, few consumer protection regulations, poverty, informal labor structures, poor financial literacy and capability, and a lack of financial products and services that respond to population's needs (Demirgüç-Kunt & Klapper, 2012; Grandolini, 2015; Shimada & Yang, 2011; Bank for International Settlements & World Bank Group, 2016).

[3] Defined as the percentage of adults with at least one financial product in a formal financial institution. For the case of 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 institutions overseen by Superintendencia de la Economía Solidaria (Colombian government agency in charge of overseeing institutions that are cooperative in nature such as cooperatives, employee funds, etc.).

[4] The indicator of financial inclusion for 2016 increases up to 77.3% when all financial entities are considered (credit establishments, cooperatives under the oversight of Supersolidaria and NGOs).

a credit card or consumer credit product[5] (Banca de las Oportunidades, 2016). Yet financial access is still very unequal: only 5.2% of the poorest 40% of the adult population reports having a credit card (Demirgüç-Kunt et al., 2015). Thus, the proliferation of non-bank credit is not surprising: this sector provides financing to around 18% of the population (Banca de las Oportunidades, 2014). The number of retail store credit cards issued nearly doubled between 2011 and 2016, from 3.8 million to 6.1 million (Euromonitor Internacional, 2016).

This study evaluates the impacts of acquiring the non-bank credit card "Tarjeta EPM-Somos", offered since 2009 by the Public Services Company of Medellín (Empresa de Servicios Publicos de Medellín, or EPM) (IDBG, 2009). Although the card is offered to all EPM customers, it was designed with the objective to reach low-income customers and/or those with no previous experience with banks or credit institutions (the "non-bankarized"population).

The program differs from traditional forms of credit in two main ways. The first is how the EPM screens and issues the card. 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 low) credit history. The second difference is the card's potential use. Individuals can use the card to purchase home and personal goods such as electrical and gas appliances, technology products, audio and video equipment, and materials for home improvement (floors, bathrooms, kitchens, and tools) from participating stores.

The program has the potential to generate positive impacts for both EPM customers and participating suppliers. In principle, obtaining the card allows customers to build a credit history and increase their access to financial services. In addition, acquiring durable goods helps to satisfy basic material household needs and offers a chance to own assets that could be sold, thus helping to smooth consumption. Suppliers, in turn, increase their access to customers, given the wider range of financing options, while reducing the incentives for smuggling (Arbeláez et al., 2007).

Despite the increasing popularity of non-bank credit programs, there is limited evidence on their effectiveness. Important questions remain: (i) Is the card effectively increasing and improving users' financial inclusion? (ii) Does it help users access traditional loans and/or financial products in the future? (iii) Does the restrictive nature of the card promote the purchase of specific types of goods? (iv) Is debt repayment manageable for newly bankarized individuals, or are they worse off? (v) Does the card help individuals save?

To explore these questions, we define a treatment group and a control group with a positive probability of participating in the EPM program. The treatment group is composed of approved applicants who opted to take the credit card. The control group

[5]This number was obtained by dividing the total number of adults with either consumer credit or credit card (16.4 million) by the adult population in the referenced year (33.25 million) reported in the report by Banca de las Oportunidades (2016).

consists of approved applicants but who opted not to take the card, which means they are not program participants. We estimate the impacts using the entropy balancing (EB) method on cross-sectional data. This strategy allows us to control for observable individual characteristics prior to their participation in the program that might influence their decision about whether to accept the card. We then check the robustness of the results combining EB with a differences-in-differences (DID) approach using retrospective data, which enables us to also control for unobservable characteristics that remain constant over time (i.e. fixed effects at the individual level).

We find three main effects of the EPM card. First, our results confirm that the EPM beneficiaries in fact do use the card, which means that they are accessing more (and better) financing. Although we found no increase in the probability of obtaining (traditional) bank loans and/or credit cards, the EPM program increases the likelihood of obtaining credit through credit cards (whether issued by EPM or another bank or non-bank source) as well as the amounts of credit and/or loan repayments, and decreases the probability of borrowing money from family members. Second, participation in the EPM program is associated with carrying out home improvements, for example to floors, kitchens, and bathrooms, and acquiring washing machines. Finally, we find positive impacts on subjective well-being: the program improves households' (self-reported) saving capacity.

This paper contributes to the existing literature in two important ways. First, to the best of our knowledge, this is the first study to evaluate the impacts of a non-bank credit program. It examines non-bank credit products, which have become extremely popular in the region: in the past five years the total number of approved retail store credit cards has increased by over 100 million, mainly in Brazil[6]. However, and despite their popularity, it is not known whether these programs are meeting their objectives. Second, the paper adds to the literature on the effects of access to credit for low-income and underbanked or unbanked people in developing countries.

The rest of the paper is organized as follows. Section 2 presents a discussion and literature review on financial access and economic development. Section 3 provides an overview of the EPM program. Section 4 describes the sample and the data-gathering process and offers descriptive statistics. Section 5 defines the identification strategy, while Section 6 presents the results. Section 7 explains the robustness tests, and the final section concludes.

2 Financial Inclusion and Economic Development

Although financial access is a broad concept that encompasses a variety of services such as savings accounts, insurance, and credit, the international literature has focused mainly on microcredit 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

[6]Ibid.

reduce poverty. 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.

The relationship between poverty and microcredit has its basis in economic theory, according to which imperfections in the financial system, such as information asymmetries and transaction costs, are particularly limiting for individuals with scant resources and for new microenterprises that are unable to provide collateral, a credit history, or references. They are thereby obliged to use their own resources to invest in education, start businesses, or leverage growth, which limits their opportunities and engenders poverty traps and inequality (Karlan et al., 2010)

Some empirical evidence from the previous decade supports these arguments. For instance, Bruhn & Love (2009) and Burgess & Pande (2005) report on non-experimental studies in Mexico and India, respectively, 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.

More recently, however, microcredit has been criticized for raising the level of unpayable debt among the poor, decreasing individual well-being, and increasing the number of suicides. Some critics even accuse the banks of reaping large profits at the expense of the poor, and of failing to offer a better alternative to informal moneylenders (Polgreen & Bajaj, 2010)

According to Banerjee et al. (2015), the empirical evidence on the effectiveness of microcredit is largely based on anecdotal evidence and stories about successful entrepreneurs or poor people indebted beyond their means. Thus until last decade it has not been possible to determine the causal effects of microcredit on the average applicant. Even if representative data about microcredit customers and non-customers were available, it would still be impossible to identify a causal effect because customers are fundamentally different from non-customers (i.e., they are more enterprising), and therefore the two cannot be compared. Nor is it possible to establish causal effects by comparing areas in which banks are offering microfinance products with those where they are not, because lenders typically do not decide where to locate at random.

Studies of the positive effects of microfinance, such as the one by Burgess & Pande (2005), have been criticized for failing to satisfactorily tackle the problem of causality mentioned above (Panagariya, 2006).Rigorous impact evaluations that address causality have only begun to emerge in the last decade - regarding Bosnia-Herzegovina (Augsburg et al., 2012); Ethiopia (Tarozzi et al., 2013); India (Banerjee et al., 2015); Mexico (Angelucci et al., 2013); Mongolia (Attanasio et al., 2014); and Morocco (Crépon et al., 2011). Although these studies were conducted in different contexts and do not always answer identical questions, they each come to the general conclusion that microcredit fails to live up to initial claims that it supports entrepreneurship, helps the poor leverage businesses, empowers women, and reduces poverty.

Banerjee et al. (2015) found that, despite the widespread belief that the demand for microcredit is universal, three years after the implementation of a program in which

some neighborhoods in Hyderabad (India) were randomly selected for opening a branch of a microfinance institution, only 38% of households sought a loan from the institution. Likewise, despite the findings of other studies of high marginal rates of return among microbusinesses (De Mel et al., 2008), most households in the Banerjee et al. (2015) study did not receive a rate of return that exceeded the bank's annual interest rate. Households that did seek microcredit for businesses did not increase their daily consumption (a proxy for well-being) in either the short or the long term. The profits of the businesses did not rise, except for those that were more prosperous beforehand. Nor were there any discernable effects on education, health, or women's empowerment. However, the households increased their consumption of durable goods and reduced their spending on luxury goods, parties, and holidays.

The empirical and circumstantial evidence on the impacts of microcredit has called into question the excessive attention given to microcredit at the expense of other financial products, and the great expectations of poverty reduction associated with it. According to Karlan et al. (2010), the financial needs of the poor go beyond microcredit, many of which are similar to those of higher-income households, such as mechanisms for managing their cash flow, accumulating assets over the short and long term, and risk management. Access to capital to start up or expand a business (the concept underlying microcredit) in principle has the potential to generate the income to meet these aforementioned needs. Nonetheless, 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 the poor are mainly influenced by a basic combination of needs (guaranteeing daily meals, managing illnesses, paying for school expenses, and taking advantage of investment opportunities) that far exceed creating, managing, or growing a small business. This discussion thus reveals that traditional microcredit is just one of the many possible poverty reduction mechanisms, and is not necessarily the most effective (Karlan et al., 2010). Furthermore, this discussion highlights the importance of considering other needs of the poor and vulnerable beyond poverty alleviation when thinking about financial inclusion mechanisms.

The poor often struggle to buy home goods or fund home-related improvements or construction. In developing countries, a far smaller segment of the population owns durable goods such as electrical appliances and modern technology equipment. For example, according to the National Quality of Life Survey (DANE, 2015) only 59 percent of households in Colombia report having a washing machine, compared with 83 percent in the United States[7]. Furthermore, while 100% of individuals in the 10th income decile in Colombia have a washing machine, only 19.4% in the top decile have one, a phenomenon that may be partially explained by their price and the difficulty of buying them in the second-hand market versus other appliances[8]. In the absence of traditional

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

[8]Data from Euromonitor International (2016) shows that the average retail price for a new washing machine is USD $332. This is in stark contrast with the minimum national wage for 2016 which was around USD $230. Although other home goods also appear as expensive (for example, the average

forms of financing for these types of investments, the real sector has responded by granting access to loans or credit, usually by issuing credit cards.

With these credit cards, clients may be able to buy household appliances and durable goods as well as receive other benefits such as discounts on everyday purchases. While formal financial entities require applicants to have a credit history and collateral in case they default (Figal Garone et al., 2018), non-bank 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.

Multiple empirical studies have demonstrated the importance of acquiring durables such as electrical appliances. Greenwood et al. (2005) argue that the technological progress associated with the household sector plays a fundamental role in liberating women from household chores and encourages them to enter the labor market. They find that introducing new and better technologies into the home can account for more than half of the observed increase in women's participation in the workforce. Similarly, Coen-Pirani et al. (2010) show that the acquisition of washing machines, dryers, and refrigerators explains 40% of the increase in female labor participation between 1960 and 1970.

García-Jimeno & Peña (2016) carried out a randomized experiment in which they provided washing machines to participating households in Bogotá. The results indicate that the time spent doing laundry decreased from 5.3 to 4.0 hours per week. Women used the time freed up to increase the hours dedicated to childcare.

Previous studies have found that replacing dirt floors with cement floors improves children's health by reducing parasitic infections, diarrhea, and anemia and enhances their cognitive development by 36-96% (Cattaneo et al., 2009). In addition, it significantly improves adults' well-being due to increased satisfaction with their dwelling and quality of life. In Colombia, the dwelling is the main asset of lower-income individuals. In Bogotá, a 1% increase in the home quality index (which may increase after conducting home improvements) produces a 1.6% increase in the value of the home and a correlated increase in possible rentals (IDBG, 2009).

In addition to funding the purchase of expensive durables or home improvements, non-bank cards can also serve as a pathway to financial inclusion. The evaluation of Codensa's Easy Credit for All program conducted by Arbeláez et al. (2007) found that 40% of cardholders have incomes below the national poverty line and 66% were not previously bankarized; of these, 45% obtained a different type of credit after acquiring Codensa's non-bank credit card.In the absence of a counterfactual, however, it is unclear

retail price for a new TV set is $559.4), is important to consider that the replacement cycles for major appliances, like washers, and consumer electronics (i.e television sets) are different. For instance, the replacement cycle for T.V's in 2016 was of approximately 6 years, while the expected lifespan for 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 necessary reflect the prices paid by low-income consumers for T.V's, as they may access these goods (including relatively newer models) at cheaper prices from second-hand markets.

whether the positive effects (bankarization, acquiring new loans, etc.) can be attributed to the card.

In this context, it is important to evaluate the effects of innovative financial access programs, such as the financing program implemented by EPM (hereafter referred to as "Social Financing Program"), in a developing country such as Colombia. Exploring the impact of such a program is relevant for the current literature for two reasons: first, in contrast to traditional microcredit, which is granted to entrepreneurs with the aim of reducing poverty, this type of microcredit is designed to help supply people's more basic needs, such as owning electrical appliances or improving the quality of their dwelling, while also functioning as a gateway to access the financial system. Second, as the credit is issued by a non-financial institution, it typically has fewer qualifying requirements, and can thus provide an alternative that addresses the market failures that occur when low-income households seek financing through the traditional financial sector (Arbeláez et al., 2007; Besley, 1995).

3 The EPM-UNE Social Financing Program

3.1 The Non-bank Credit Card Program

EPM is a 100% state-owned enterprise founded in 1955. In 1998, it became the State Industrial and Commercial Company (Empresa Industrial y Comercial del Estado) under the ownership of the Municipality of Medellín. As of 2017, EPM holds assets[9] of COP 43,043 billion (approximately US$14 billion) as a provider of household utilities such as electricity, natural gas, water, sewerage, and sanitation.

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 public household utilities supplier. It provides services to more than 13 million Colombians and nearly 7 million customers in other Central American countries.[10]

With the support of the IDB Group, EPM created the Social Financing Program in 2008 (IDBG, 2009).[11] The program provides revolving credit to allow EPM customers to purchase various home and personal goods (electrical appliances, audio and video equipment, etc.) and home improvement materials in establishments affiliated with the program (See Appendix A). EPM uses the billing information and utility payment records of millions of its customers, including low-income customers, to evaluate the credit card applications, and thus requires less additional information than traditional bank credit checks. The initiative benefits low-income borrowers who have less access to the formal banking system and helps them build a credit history. The application process is described in the following section.

[9]EPM Group (a). Cifras financieras principales. Retrieved from: https://www.epm.com.co/

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

[11]In October 2015, EPM's Social Financing Program was renamed the SOMOS Recognition Program; the EPM card was renamed the SOMOS card.

The EPM program has three main objectives. First, it aims to 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. Second, the program is expected to enhance beneficiaries' quality of life by providing access to financing for home improvements and to purchase new and more efficient electrical appliances, along with other goods and services. Home improvements have an immediate positive impact on health and well-being, and increase the value of beneficiaries' most important asset - their home. Finally, the program aims to boost energy-efficient consumption by giving beneficiaries the chance to replace outdated electrical appliances with more energy-efficient ones (IDBG, 2009).

To achieve these objectives, a beneficiary profile was created in 2009, which determined that approximately 190,000 Medellín families would benefit from the program during its first five years. It was estimated that 85% of the target clientele belonged to the lower-income segments of the population (strata 1, 2, and 3), which also have the least access to financial services, and are therefore most likely to resort to informal credit markets, which have much higher interest rates and often engage in predatory lending practices (IDBG, 2009). Starting in 2009, a differential interest rate[12] was established based on the borrowers' income strata.[13] 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 (33.5% as of June 2017) is now charged for all strata.[14]

More than 229 products and services can be purchased using the card, including electrical and gas appliances, audio and video, entertainment, technology, home improvements, 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). In 2009, it was agreed that establishments with large shopping areas would host an EPM customer service point and, in exchange, pay a lower sales commission (1.5%) to EPM. Specialized stores with a surface area of less than $640m^2$ would not have an EPM customer service point and would pay a 2% commission (Econ-Estudio., 2014)

[12]Individuals classified under income strata 1-4 were charged an interest rate of FTD (Fixed Term Deposits) +11 basis points, whereas individuals classified under income strata 5 and 6 were charged an interest 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).

[13]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.

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

3.2 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).[15]

Table 1: Conditions of Access

1	Be a customer of EPM (user of at least one of the public household utilities supplied by EPM).
2	The customer must be between 18 and 74 years old.
3	The customer must live in an area covered by EPM's services.
4	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.
5	The service must not have been cut off at the time of the credit request.

Source: official website of the SOMOS recognition program.[16]

Once this information has been verified, applicants 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 classifies applicants by non-payment risk.

Between 2008 and 2011, the Financial Information Center (Central de Information Financiera, or CIFIN), Asobancaria[17]'s credit bureau, was responsible for determining the applicants' credit status and setting the credit limit for approved applicants. However, this methodology only worked for applicants in the formal sector, whose salaries could be verified. For this reason, starting in November 2011, EPM decided to build its own scoring system, which enabled it to determine the relevant variables in the credit classification model as well as the weightings assigned to each (IDBG, 2009).

The scoring model was developed with the support of specialists and financed by the IDB Group's Multilateral Investment Fund. This model is practical for both workers in the formal sector, whose salaries can be verified, and for those who are self-employed or in the informal sector. This credit rating methodology is more appropriate for the program's pool of applicants, since it can be used to evaluate the creditworthiness of people with scant resources whose income cannot be easily verified (IDBG, 2009).

In 2013, the scoring model was updated to a logistic probability model in which the score is tabulated based on 15 variables.[18] Each of these variables has a differential

[15]According to the information provided on EPM's website, a negative report (clear report) in the credit bureaus is not a necessary condition to be eligible for the non-bank credit card. However, conditions specify that the applicant's estimated risk level must be above the threshold defined by EPM.

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

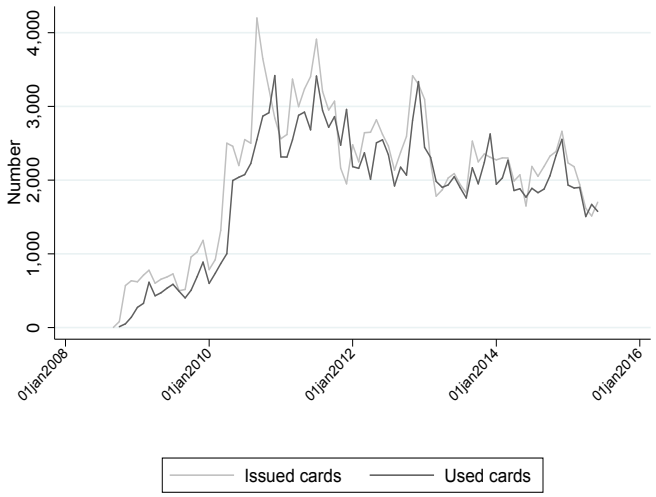
[17]Asobancaria is an association of all commercial national and international banks (public and private) which operate in Colombia, and the most important financial corporations and institutions.

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

whole score depending on their relative importance; for example, having an indefinite contract may represent 20 points whereas being married may represent 10 points.

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. 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 approximately 87% by 2014 (Figure 1).

Figure 1: Cards Issued and Cards Used



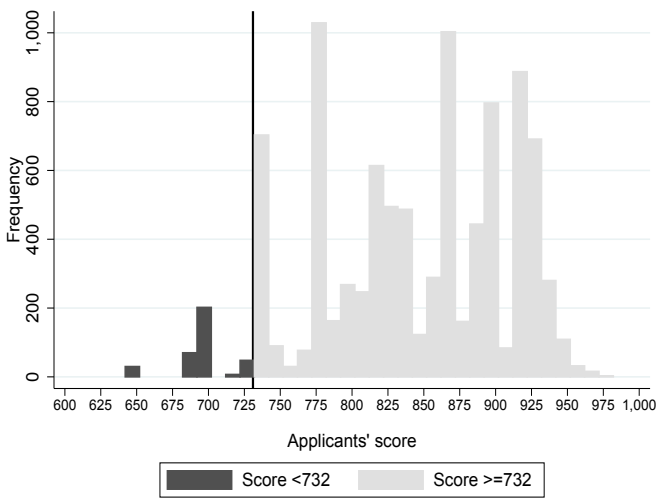
Note: Author's own calculations using data provided by EPM.

We also explored a dataset provided by EPM comprising information on 9,478 individuals[19] (5,293 men and 4,185 women) who applied for a card between September and December 2013. The scores ranged between 642 and 974; applications that scored over 732 (n = 9,121) were approved, while those scoring less were denied (n = 357).

Program take-up was high: 76.3% of those approved accepted the card. An additional 5.3% of those who were rejected received a card. Of those who accepted the card, 95% used it at least once, and used the card's credit lines up to 137% of their value. We found some 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 (Appendix B).

[19]Who reside in the municipalities of Barbosa, Bello, Caldas, Copacabana, Envigado, Girardota, Itagüí, La Estrella, Medellín and Sabaneta.

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



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

4 Identification Strategy

In general, it is difficult to measure the impact (causal effects) of a program since only what actually occurred can be observed. For example, we can observe whether a customer purchased more electrical appliances after obtaining the EPM card, but it is impossible to know how many he or she would have bought without the card. Therefore we built an appropriate comparison group to reproduce 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 could 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 seem to have scored below the threshold, and those appear to be outliers (see Appendix B). In other words, the assumptions to apply RDD are not met in this scenario. A priori, it would seem that most applicants were eligible unless their performance on the variables that comprise the scoring model was extremely negative. This pattern is found both in the September to December 2013 universe of applicants and in the sample we employ to estimate the potential impacts (described below).

To analyze the impact of the EPM card on the outcomes of interest, we therefore compare the group of approved applicants (score greater than or equal to 732) who accepted the card (participants or treatment group) with the group of approved appli-

cants (score greater than or equal to 732) who declined the card (non-participants or control group). Since both groups are comprised of approved applicants, they might a priori have similar observable and unobservable characteristics.

Nevertheless, some differences between the two groups may remain. We thus employ EB to identify program effects. This method uses information on observable individual characteristics to correct for potential biases by assuming that, by controlling for a set of variables that are observable by the evaluator, the potential results are independent of the status of the treatment (receiving the program or not). This assumption is known as the conditional independence assumption, unconfoundedness, or selection by observables. It means that after controlling for the observable variables (characteristics) of the individuals evaluated, the treatment is almost as good *as if it had been assigned at random*.

EB is a multivariate reweighting method proposed by Hainmueller (2012). The 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. EB 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[20]. EB helps to eliminate a potential source of bias since weighted non-beneficiaries are expected to be more similar to beneficiaries[21].

Thereafter, we use the weightings that emerge from EB to estimate the following equation using the ordinary least squares (OLS) method:

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

where T_i is the binary variable that indicates whether the 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

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

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

the effect of the program in the outcomes of interest or, in other words, the program's impact.

5 Sample and Descriptive Statistics

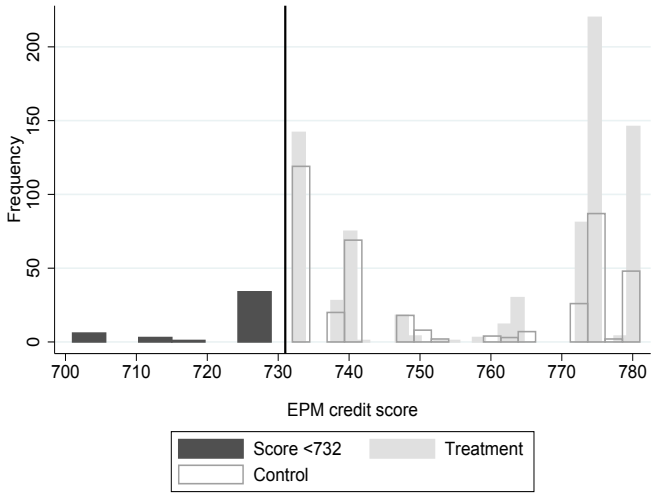
A unique survey designed to measure the EPM program's impacts on relevant outcomes was conducted from July to September 2015 in Medellín and its surrounding municipalities. The survey has 11 modules that yield information about applicant households in the following areas: housing (type of dwelling, homeownership, basic services, etc.), household goods (electrical appliances, audio and video equipment, etc.), household characteristics (size, ages, health, educational level, and so on), 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 surveyed individuals who were randomly surveyed from the pool of applicants from September to December 2013 whose credit score was near the approval score of 732 (range of 640-781). The fieldwork was completed in September 2015, having obtained a total of 1,400 completed surveys, comprising 221 observations below the threshold (out of 357 possible individuals below the threshold in the defined range) and 1,179 observations above the threshold (out of 1,929 possible individuals).

Of the 1,179 approved applicants surveyed, 65% accepted the card, and of the 221 rejected applicants surveyed, 4% managed to acquire the card anyway. As explained in Section 4, the treatment group was defined as approved applicants who accepted the card (766 individuals - solid dark bars in Figure 3), and the control group as approved applicants who declined the card (413 individuals - blank bars in Figure 3). The data collected from individuals below the threshold was used for descriptive statistics and some robustness checks.

Table 2, Column 1 shows the characteristics of the applicants for the baseline year 2013, when the application for the card was made, using retrospective questions from the survey. The approved applicants who accepted the card and those who declined it are relatively homogeneous except for homeownership, consumption of public utilities, and ownership of certain durable goods. The approved applicants with the card are more likely to be homeowners and to have Internet access, and they report higher levels of consumption of water and sanitation services. Additionally, the approved 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 according to the weightings that emerge from the EB analysis, which shows that the treatment and control groups are balanced in all baseline characteristics (Table 2, Column 2).

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



Note: The black line represents the approval score.

Table 2: Descriptive Statistics for EPM Card Applicants at Baseline (2013)
Approved Applicants with Card vs. Approved Applicants without Card

	1. Sample data				2. Entropy Balancing			
	Mean Has EPM card	Mean Does not have EPM card	Difference	P-value	Mean Has EPM card	Mean Does not have 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
Ageˆ2	1181.34	1123.63	57.71	0.10	1181.34	1181.48	-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 dependent people	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 for 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 for exclusive use	1.00	0.99	0.01	0.09	1.00	1.00	0.00	0.74

	1. Sample data				2. Entropy Balancing			
	Mean Has EPM card	Mean Does not have EPM card	Difference	P-value	Mean Has EPM card	Mean Does not have 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 for 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 non-bank credit card (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		

6 Results

Table 3 displays the OLS results after applying the EB methodology to determine whether the program's main objectives were met. The results were divided into four groups: financial inclusion (Panel A), home characteristics (Panel B), ownership of electrical appliances and other durable goods (Panel C), and spending on public utilities, time spent on household chores and subjective well-being (Panel D).

Financial inclusion (Panel A). The results show that the program increased beneficiaries' access to finance. Card users were less likely to borrow from family members, more likely to have ongoing credit card loans, and demonstrated an increase in credit and loan repayments. No effects were found regarding their access to new cards or the probability of borrowing from traditional banks. These findings reinforce the statistics presented in Section 3 that point out that most of the applicants who obtained an EPM card in fact used it.

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. However, they choose to use it to buy materials for key home improvements and a key durable good.

Public services, use of time and subjective well-being (Panel D). We find no effects regarding expenditures on public services. We also find no effects on the use of time. However, the results suggest that the program improves users' (self-reported) 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.

These results bolster the arguments put forward by Karlan et al. (2010), who find that specific financial products for vulnerable people can be an effective way of satisfying their needs, such as consumption smoothing, facilitating access to durable goods, improving saving capacity, obtaining loans for sporadic needs, and so on. 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 cited evidence, financial products targeted to poor and vulnerable segments of the population can be important for satisfying specific needs, but are insufficient to achieve ambitious development goals such as poverty reduction, entrepreneurship, and bankarization.

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

	Entropy Balancing + OLS
Has savings account	0.013
	(0.021)
Refused credit by banks/financial entities	-0.013
	(0.020)
Has bank credit card	0.037
	(0.027)
Has non-bank credit card (other than EPM)	0.025
	(0.021)
Has credit with banks	0.023
	(0.027)
Has credit with credit cards	0.066***
	(0.025)
Has credit with cooperatives	0.008
	(0.023)
Has credit with stores	0.011
	(0.028)
Has credit with compensation funds	-0.002
	(0.017)
Has credit from family members	-0.039**
	(0.015)
Has trickle credit	0.005
	(0.006)
Has credit from employer	-0.004
	(0.008)
Log value of total amount of debts	-0.071
	(0.104)
Log value of expenses/loan repayments	1.125***
	(0.349)
Observations	**1,179**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

Panel B. Characteristics of the Dwelling

	Entropy Balancing + OLS
Number of floors	0.049**
	(0.020)
Number of rooms	0.067
	(0.042)
Number of rooms for exclusive use	0.036
	(0.041)
Number of kitchens	0.007**
	(0.004)
Number of kitchens for exclusive use	0.006
	(0.005)
Number of bathrooms	0.045**
	(0.018)
Number of bathrooms for exclusive use	0.036**
	(0.018)
Presence of flush toilet and sewerage	0.004
	(0.005)
Roof finished	-0.002
	(0.010)
Living room/bedroom floors finished	0.004
	(0.024)
Living room/bedroom walls finished	-0.002
	(0.006)
Kitchen floors finished	-0.017
	(0.023)
Kitchen walls finished	-0.001
	(0.006)
Bathroom floors finished	-0.023
	(0.018)
Bathroom walls finished	-0.007
	(0.008)
Observations	**1,179**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

Panel C. Purchase of Durable Goods

	Entropy Balancing + OLS
Washing machine	0.059***
	(0.022)
Refrigerator	0.001
	(0.008)
Stove	0.001
	(0.009)
Oven	0.000
	(0.019)
Microwave oven	-0.037
	(0.029)
Water heater	0.009
	(0.025)
TV	-0.006
	(0.009)
DVD	0.023
	(0.025)
Sound system	0.017
	(0.027)
Digital player	0.022
	(0.018)
Video game console	0.011
	(0.025)
Electric motorcycle	-0.006
	(0.007)
Bicycle	-0.026
	(0.028)
Pay TV	-0.001
	(0.021)
Camera	-0.004
	(0.027)
PC	0.004
	(0.029)
Laptop	0.010
	(0.032)
Tablet	0.011
	(0.030)
Observations	**1,179**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

Panel D. Public Services, Use of Time, and Subjective Well-being

	Entropy Balancing + OLS
Public services	
Energy for cooking is natural gas/electricity	-0.020
	(0.022)
Internet service	0.032
	(0.027)
Log value telephone landline expenses	0.466
	(0.320)
Log value cable TV expenses	0.232
	(0.300)
Log value propane gas expenses	0.307
	(0.216)
Log value internet expenses	0.311
	(0.268)
Log value EPM utility bill expenses	0.034
	(0.039)
Log value internet+telephone+TV combo	-0.131
	(0.369)
Time spent on household chores (hours)	
Time spent on household chores	-0.065
	(0.133)
Fraction of waking hours spent on household chores	-0.001
	(0.008)
Subjective well-being	
Saving capacity in 2015 is better than in 2012	0.066**
	(0.033)
Beneficiaries report 'more restful sleep' in 2012 than in 2015	-0.018
	(0.030)
The economic situation in 2015 is better than in 2012	-0.006
	(0.032)
Moderately/entirely satisfied with the household financial situation in 2015	-0.023
	(0.031)
Observations	**1,179**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

7 Robustness Checks

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

As previously mentioned, 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 effectively 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 self-selection using EB.

Therefore, to test the robustness of our results, we combine EB with the fixed-effects (FE) methodology using retrospective data[22]. The FE methodology, moreover, allows us to control for unobservable heterogeneities that are constant over time. For this purpose, we estimate the following equation:

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

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

Table 4 confirms the previous results.[23] Having an EPM card is associated with an increase in the number of floors, kitchens, bathrooms, the probability of acquiring credit card debt, and a lower propensity to borrow from relatives. It was not possible to estimate the effects on use of time, subjective well-being, or spending on public utilities, as there is no retrospective data for these variables. In the case of washing machine ownership, the coefficient is practically the same, but it loses statistical significance. This might be attributable to a loss of efficiency in the estimation.

[22] A recent application of EB in combination with FE can be found in Figal Garone et al. (2015).

[23] The number of result variables differs between Table 3 and Section 6 because for some of these variables no retrospective data was available.

Table 4: Robustness Test
Panel A. Financial Inclusion and Public Utilities

	EB+FE
Financial inclusion	
Has savings account	0.012
	(0.031)
Refused credit by banks/financial entities	-0.013
	(0.027)
Has bank credit card	0.037
	(0.034)
Has non-bank credit card	0.024
	(0.024)
Has credit with banks	0.022
	(0.034)
Has credit with credit cards	0.066**
	(0.03)
Has credit with cooperatives	0.008
	(0.028)
Has credit with stores	0.010
	(0.038)
Has credit with compensation funds	-0.002
	(0.020)
Has credit with family members	-0.039**
	(0.017)
Has trickle credit	0.005
	(0.010)
Log value of total amount of debts	-0.051
	(0.190)
Log value of expenses/loan repayments	0.000
	(0.000)
Public utilities	
The energy for cooking is natural gas/electricity	-0.020
	(0.031)
The home has Internet service	0.032
	(0.037)
Observations	**2,358**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

Panel B. Characteristics of the Dwelling

	EB+FE
Number of floors	0.049**
	(0.025)
Number of rooms	0.067
	(0.052)
Number of rooms for exclusive use	0.035
	(0.050)
Number of kitchens	0.007*
	(0.004)
Number of kitchens for exclusive use	0.005
	(0.005)
Number of bathrooms	0.045*
	(0.023)
Number of bathrooms for exclusive use	0.036*
	(0.021)
Presence of flush toilet and mains sewerage	0.005
	(0.006)
Roof finished	-0.003
	(0.014)
Floors of rooms finished	0.004
	(0.030)
Walls of rooms finished	-0.002
	(0.009)
Kitchen floors finished	-0.017
	(0.032)
Kitchen walls finished	-0.001
	(0.010)
Bathroom floors finished	-0.023
	(0.027)
Bathroom walls finished	-0.007
	(0.011)
Observations	**2,358**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

Panel C. Purchase of Durable Goods

	EB+FE
Washing machine	0.058
	(0.036)
Refrigerator	0.001
	(0.017)
Stove	0.001
	(0.015)
Oven	0.000
	(0.021)
Microwave oven	-0.037
	(0.037)
Water heater	0.009
	(0.028)
TV	-0.007
	(0.018)
DVD	0.023
	(0.029)
Sound system	0.016
	(0.035)
Digital player	0.022
	(0.021)
Consoles	0.011
	(0.028)
Electric motorbike	-0.006
	(0.008)
Bicycle	-0.027
	(0.035)
Pay TV	-0.001
	(0.026)
Camera	-0.004
	(0.034)
PC	0.003
	(0.037)
Laptop	0.010
	(0.039)
Tablet	0.011
	(0.038)
Observations	**2,358**

Notes: (1) Standard errors in parenthesis. (2) ***,**, * statistically significant at 1%, 5%, and 10%.

8 Conclusion

To the best of our knowledge, this study is the first to evaluate the causal effects of non-banking credit products. In particular, it evaluates the impacts of acquiring the EPM-SOMOS card on financial inclusion, the probability of making home improvements, and increasing ownership of durable and energy-efficient goods.

This card represents a non-bank option for accessing credit, especially for vulnerable or informally employed people who lack a credit history. Any adult customer of EPM's public utilities with a proven history of paying their bills is eligible to acquire the card. The card is assigned according to a scoring model that takes into account socio-demographic and labor aspects, among others.

The card's impacts were estimated by employing the EB method. The robustness of the results was tested using a combination of EB and DID methods using retrospective data. Three major results emerge from the estimates. First, EPM beneficiaries actually use the card, which implies that they are able to access credit on better terms and conditions than via informal channels. Although there was no noticeable effect on the probability of having a savings account, a bank loan or credit cards, having the card reduced the likelihood of borrowing from family members. There was also a noticeable increase in credit card debt and loan repayments. Second, obtaining the EPM-SOMOS 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, albeit self-reported, was found. This is important, as it indicates that cardholders are able to manage, control, and plan their family economy, and that the new debt acquired is manageable over time. This is relevant as 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.

To summarize, the card continues to be a successful business model for EPM after eight years, as customers repay their loans on time. Although the program does not seem to have a major impact on access to credit from the traditional financial sector, it does meet a significant need in Colombia and Latin America more broadly with regard to access to home technologies (washing machines) and home improvements. This is important, because the presence of such technologies has asymmetrical effects on men and women with regard to their use of time, responsibility sharing, and labor characteristics. Out of all the appliances and other personal goods that customers could purchase using the card, we only found impacts on the purchase of washing machines. This is interesting because, unlike laptops and TVs, washing machines are less heavily advertised by EPM, as they are probably not considered an attractive purchase. However, our results suggest that the credit card is successfully closing a financing gap with regard to washing machines, which are one of the most expensive home appliances in Colombia; few families can afford them.

Overall, the 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 durable goods and home improvements). On the supply side, the card assignment scheme (scoring), alongside the low rates of default, 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. Public service enterprises and other private enterprises could replicate such projects one in other areas of the country and the region, where the adoption rate of household technologies is low, information asymmetries persist, and the traditional banking sector lacks mechanisms to mitigate these risks.

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Appendix

A Annex 1

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

Table 5: 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 hob	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	Waffles 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-component	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
Tablet	Fixed telephones (cordless)
Voltage regulator	Call identifier
Cameras for PCs	Mobile phones (all makes)
Hard disks	Extension telephone wiring
CD/DVD unit	Batteries for mobile 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 cabinet	Skirting boards
Toilet roll holder	Decorative borders
Towel ring	Ceramic tiles
Soap dish holder	Adhesives and screeds for ceramic, porcelain and wooden floors
Shower	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 joint	Chippings
Flexible couplings for sanitary ware	Doors and rails
Flexible sink couplings	Rebars, 'piragua'
Taps and mixers combination	Silicone coating
Shower cabins	CARPEFIT roofing felt - waterproofing
Specialty recessed bathroom furniture	Polyester fabric
Glue / PVC adhesive/cement remover	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 jigsaw	Laundry tubs
Electric polisher	Clothes washing sink
Electric blowtorch	Washing machines
Electric drill	***Kitchens***
Electric sander	Kitchen worktops with cabinet
Electric grinder	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 trap
Tomas of 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 warranty	Audio, video and ICT installation
Electrical and/or gas appliance installation	
Home improvements	
Home improvement installation	
WATER TREATMENT	
Equipment	
Pumps	

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

A.2 Stores Affiliated to the SOMOS Program

Table 6: Stores Affiliated to the SOMOS Program

HYPERMARKETS	**SEWING MACHINES**
Almacenes Exitó	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**
ELECTRICAL APPLIANCES in GENERAL	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	**ELECTIC 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.*

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

A.3 Information Required for the Credit Card Application Form

Table 7: Information Required for the Credit Card Application Form

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

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

B Descriptive Statistics

Table 8: 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 to 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**		