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Abstract[*]

This paper explores the role played by policy instruments in access to housing finance by low-income households. It also analyzes the impact of housing credit and subsidies on both the quality of life and the quality of dwelling of the beneficiaries. Using the Quality of Life Surveys conducted in Colombia in 2003 and 2008, the study finds that policy instruments aimed at easing access of low-income households to affordable housing such as subsidies and loan guarantees have played a modest role in increasing the use of mortgages as a source of funding. Despite this, subsidies were found to have had a significant impact on both the quality of dwelling and the quality of life. Therefore, this paper suggests promoting the use of both instruments by improving their design and targeting.

JEL Classification: D61, H81, I30, I31, I32, I38, O17, R20, R28, R31, R38
Keywords: Low-income housing, Housing finance, Housing subsidies, Quality of life, Quality of dwelling, Low-income housing mortgage market

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Executive Summary

This study focuses on access to housing credit by the low-income population. The main objective is to determine the role of housing subsidies and partial credit guarantees in access to mortgages by low-income households. Additionally, the study analyzes the impact of housing credit and subsidies on the quality of life and the quality of dwelling of their beneficiaries.

In Colombia, the housing deficit remains high (36.4 percent) and approximately 97 percent of the households facing this deficit belong to the lowest income segments. The housing deficit is mainly qualitative (23.8 percent), and the most widespread problem among the poorest families is lack of access to sewerage, followed by lack of access to proper drinking water networks. This situation is associated with low levels of housing finance. The mortgage portfolio in Colombia amounts to around 3 percent of GDP, while the Latin American average is close to 5 percent.

The literature on housing finance in Colombia suggests that the main obstacles to increasing access to housing loans are related to low income, lack of information on borrowers' ability to pay, high costs of recovering collateral, mortgage interest rate rigidities, and judicial insecurity.

The main policy instruments addressing these obstacles are low-income housing subsidies and partial credit guarantees. The low-income housing subsidy, created in 1991, has been one of the main instruments of the low-income housing policy. It is a one-time direct subsidy to partially fund the purchase of affordable housing. The partial credit guarantees to low-income housing loans, implemented in 2004, address the obstacles of lack of collateral and costly collateral recovery.

In this paper the beneficiaries of both housing subsidies and credit are characterized using data from the Quality of Life Surveys from 2003 and 2008 (QLS). From 2003 to 2008, the percentage of subsidy beneficiaries belonging to the three lowest income quintiles increased from 65 percent to 80 percent. However, in 2008 only a third of the subsidy beneficiaries were classified as poor according to the Index of Unmet Basic Needs (UBN). Credit access for the poorest segments of the population is even more difficult. More than 60 percent of the holders of housing loans belong to the two highest income quintiles, and only 11.8 percent are classified as poor by the UBN.

The impact of housing subsidies and credit on the quality of dwelling and quality of life are estimated through the method of propensity score matching, using data from the QLS. The

determinants of access to housing subsidies and housing loans are estimated following the two-step simultaneous estimation model of Maddala (1993).

The results suggest that the low-income housing subsidy and housing credit improve the quality of dwelling and the quality of life among its beneficiaries, and is mainly allocated to low-income populations. However, the subsidy fails to facilitate access to credit and has insufficient coverage among the poorest segments of the population, in part because they lack complementary funding. Evidence confirms the importance of collateral and income as determinants of access to credit.

The partial credit guarantees program is focused on backing low-income housing credits, but its use by financial intermediaries is very limited. The determinants of holding a partial mortgage guarantee were estimated through a probit model, using data from a private bank. Results show that there is a significant relationship between the likelihood of holding a guarantee and having low income levels and low education levels.

1. Introduction

The housing deficit in Colombia remains high (36.2 percent[1]) despite the recovery of the sector after the crisis of the late 1990s. The literature suggests that formal housing in Colombia is constrained, among other factors, by land markets failures, lengthy and costly procedures for obtaining building permits, and low access to credit.

Housing finance in Colombia is small compared to Latin American standards. Mortgage loans ranged from 3.0 percent to 3.5 percent of GDP during the last five years, while the regional average is around 5 percent.[2] After the financial crisis of the late 1990s, which lasted from 1998 to 2001, the Colombian mortgage market recovery has been weak. While the ratio of total loans increased from 23.8 percent of GDP in 2001 to 46.2 percent in 2008, mortgage credit dropped from 6.2 percent of GDP in 2001 to 3.5 percent in 2008.

Mortgage lending in Colombia funds less than a third of total housing, while the rest is financed by informal lenders or self-funded. Mortgage lending is concentrated in the formally employed segment, leaving out 70 percent of low-income housing demand,[3] comprising households that earn their living from informal activities.[4] The problem of labor informality, which reaches almost 65 percent in Colombia, is behind the housing deficit and the lack of credit, because standard financial instruments do not suit the particular needs of this population.

The Colombian literature has identified two main constraints to access to credit, especially by low-income people. First, even though poor families usually manage to accumulate a significant amount of capital over the years by participating in self-help housing construction, they may not have access to credit because loan providers perceive a high risk of default from borrowers with low and volatile incomes (Galindo and Lora, 2005). In the same vein, Galindo and Hofstetter (2006) found that at the microeconomic level, interest rates are high due to the high credit risk assumed by lenders. Second, the supply of low-income housing credit is also constrained by the lack of collateral owing to deficiencies in deed registration and the high costs and length of time needed to recover collateral (Cárdenas and Badel, 2003).

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[1] According to the National Department of Statistics (DANE), in 1993 the effective housing deficit was 53.7 percent, dropping to 36.2 percent in 2005.
[2] Warnock and Warnock (2008).
[3] "Ciudades Amables" in National Planning Department (2005).
[4] Rocha, Sánchez, and Tovar (2007), estimate that a formal employee has a higher probability of accessing housing credit than an informal employee.

To promote the provision of low-income housing in Colombia, the government has implemented a number of instruments, including tax exemptions, partial credit guarantees, direct subsidies, and rediscount credits. However, the scope and effectiveness of these instruments have been limited. Access to housing by the poorest segments of the population is still significantly low. The program of subsidies for low-income housing, which provides direct, one-time subsidies to homebuyers, is the most important. The subsidy is expected to facilitate access to credit. Another instrument aimed at increasing access to credit is partial credit guarantee for low-income housing credit, which addresses the obstacles related to lack of collateral and costly collateral recovery.

This study focuses on access to housing credit by the low-income population. Its main objective is to determine the impact of public policies designed to stimulate low-income housing. Emphasis is placed on the effect of housing subsidies and partial credit guarantees on access to mortgages by low-income households and on the impact of subsidies on the quality of life and the quality of dwellings.

The document is organized as follows. Section 2 presents a brief literature review of housing credit in Colombia. Section 3 illustrates the main features of the low-income housing market in Colombia, as well as further details of the program of housing subsidies. Section 4 focuses on the characteristics of housing policy instruments and regulation. Section 5 discusses the impact of subsidies and credit on the quality of life and the quality of housing. Section 6 provides a summary of the characteristics of the loan guarantee program and its effect on easing access to credit. Finally, the main conclusions are drawn in Section 7.

2. Literature Review

The housing sector in Colombia has been widely studied, with papers focusing on the mortgage markets and particularly on low-income housing finance.

Rocha, Sánchez, and Tovar (2007) suggest that informality, low income and lack of information on borrower's ability to pay are the main barriers to access to credit by the low-income population. According to the authors, the probability of getting a mortgage loan increases when households have been granted a subsidy, have high income, work in the formal sector, and have programmed savings accounts. They also point out that loan providers perceive that the income instability of informal workers leads to a high risk of nonpayment and, therefore, limit

their exposure to this population. They recommend promoting appropriate mechanisms of information sharing, such as programmed savings, which signal the capacity of making regular payments to the financial system. Similarly, Murcia et al. (2007) use the Quality of Life Survey of 2003 to analyze the socioeconomic determinants of access to mortgage loans and credit cards and find that the probability of having a mortgage loan increases by 11.7 percent for households in the higher quintile of the income distribution. This probability also rises if the household has a housing subsidy or if it is located in an urban area.

Cárdenas and Badel (2003) suggest that the high cost of recovering collateral and judicial insecurity work against access to credit in Colombia. They also point out that the financial crisis of the late 1990s in Colombia was a consequence of the drop in housing prices and a significant increase in the value of indebtedness by households, which deteriorated the loan-to-value ratio in the market.

According to Jaramillo and Cuervo (2009), the interest rate ceiling for housing loans is a costly rigidity for the mortgage markets. Loan providers have low incentives to supply low-income housing loans at the regulated rate, since these loans are risky and small and their administrative costs are high.

Among the studies focused on policy instruments for promoting the low-income housing market, Cuellar (2006) presents a thorough analysis of the evolution of the regulatory framework and its influence on the development of housing finance.

The National Planning Department of Colombia (2007) evaluates the Urban Low-Income Housing Subsidies Program. The evidence shows that assets ownership, education level, and access to information determine access to the program. According to this study, the program has a positive and significant impact on the house and neighborhood physical conditions, as well as on the beneficiary households' expenditure and savings. However, it does not estimate the effect of the subsidy on the access to housing finance.

Finally, Marulanda, Paredes, and Fajury (2006) calculate the fiscal cost of the partial credit guarantees on mortgages, as well as the fiscal cost of tax exemptions designed to promote low-income housing supply. The authors indicate that these policy instruments are dispersed and lack a results-based orientation, limiting their impact.

3. The Low-Income Housing Market in Colombia

3.1 Description of the Housing Deficit

The housing deficit in Colombia was 36.1 percent in 2005, of which 12.4 percent was quantitative—that is, the lack of housing—and 23.8 percent was qualitative—that is, living in inadequate housing.[5] According to the Quality of Life Survey (QLS) of 2008, the housing deficit slightly decreased, to 34.6 percent (3.9 million households). Among these households, 68.0 percent belong to the first two income quintiles and their household heads are male (77.0 percent), with no education or only primary education (72.5 percent), are informal workers (78.0 percent) and live in cohabitation (45.8 percent).

In regard to the quality of dwellings, among the poorest households the most widespread problem is the lack of access to sewerage: 61.8 percent of households in the first income quintile and 43.7 percent of households in the second income quintile do not have indoor plumbing. Next in importance is the lack of access to water networks: 40.4 percent and 28.8 percent, in the first and second income quintile respectively, lack this service (Table 1). In addition, according to information provided by QLS on flooring and wall materials, among the poorest households the most common materials are bricks and cement. However, as Table 1 also shows, some houses in the first income quintile are still built out of adobe, zinc, cloth, cardboard, and other disposable materials (6.2 percent) and have dirt floors (19.7 percent).

3.2 Evolution of Housing Construction

During the last ten years construction of priority housing has increased, but the total low-income housing stock has decreased, especially in the recent economic downturn.

During the crisis of 1999, construction dropped to an annual average of 56,000 units, 43.4 percent below the figure observed in the early 1990s. This reduction was mainly due to the fall in non-low-income housing construction, which decreased from an average of 67,000 units in 1990-94 to 10,000 in 1998-2001, while low-income housing construction remained relatively constant and priority housing construction even rose from an average of 2,000 units to an average of 16,000 units. Construction of all types of housing recovered during the period 2002-05, reaching

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[5] The 2005 figure corresponds to the National Census published by DANE (National Department of Statistics in Colombia).

an average of 106,000 units. During the recent economic downturn, new construction projects declined to 71,000 units on average in 2008-09, due to the fall in low-income and priority housing construction, which fell by half. In contrast to the crisis of the 1990s, this time non-low-income housing only decreased by 17 percent (see Figure 1).

Figure 1. New Housing Units under Construction
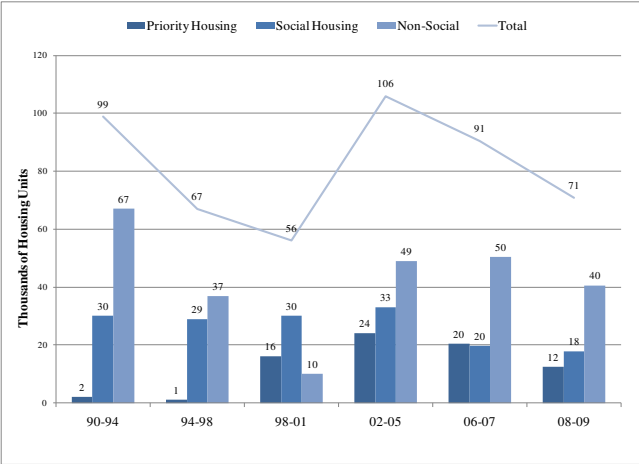
Source: DANE (Construction Census, 2009) and Cuellar (2006).

3.3 Main Characteristics of the Low-income Housing Mortgage Market

Housing finance in Colombia is small compared to other Latin American countries. Mortgage loans ranged from 2.9 percent to 3.2 percent of GDP during the last five years, while the regional average is around 5 percent.[6] After the financial crisis of the late 1990s, which lasted from 1998 to 2001, the Colombian mortgage market recovery has been weak even with respect to total credit: while the ratio of total loans of GDP increased from 22.2 percent in 2001 to 28.5 percent in 2009, mortgage credit decreased from 5.8 percent of GDP in 2001 to 3.2 percent of GDP in 2008.

Mortgage disbursements declined by 78.0 percent between 1996 and 2000, where non-low-income housing disbursements registered the largest reduction (85.3 percent), while low-income housing disbursements fell by 37.5 percent (Figure 2). This trend reversed after 2001 and mortgage disbursements grew steadily until 2008, but decreased in 2009 owing to the recent

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[6] Warnock and Warnock (2008).

economic downturn. Total disbursements reached a maximum in 2008, although they were only equivalent to 80 percent of the figure registered back in 1996. The recovery has been especially weak for non-low-income housing disbursements, equivalent in 2008 only to 73 percent of the figure observed in 1996. Disbursements for low-income housing performed better, rising in 2008 above the 1996 level by 24 percent. In line with the recent growth of low-income mortgage disbursements, the share of the low-income housing credit portfolio grew from 32.1 percent in 2002 to 44.0 percent in 2009, while non-low-income housing credit fell from 67.9 percent in 2002 to 56.0 percent in 2009.[7]

Figure 2. Mortgage Disbursements
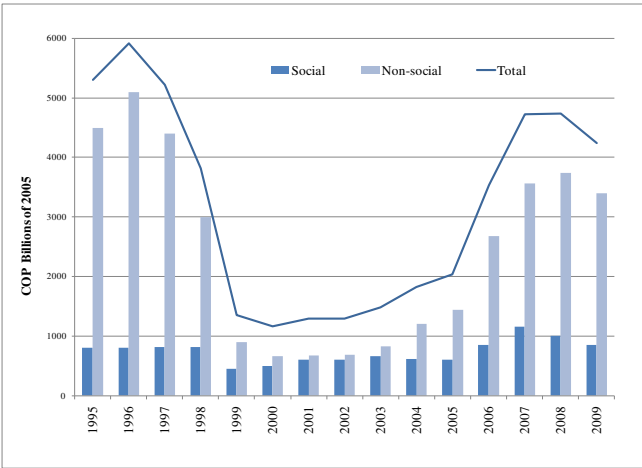
Source: Financial Superintendency and Cuellar (2006).

4. Housing Policy Instruments and Regulation in Colombia

4.1 Subsidies

4.1.1 Background of Subsidy Programs

The Low-income Housing Subsidy was created in 1991 as the main instrument of a new demand-oriented low-income housing policy. Since its inception, the subsidy has had several modifications, but the general characteristics remain unchanged. It is a one-time direct subsidy intended to facilitate access to housing by the poorest households.

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[7] Data published by the Financial Superintendency of Colombia.

Since 1991, the subsidy has been managed and granted by four institutions: i) the National Housing Fund (FONVIVIENDA), a government agency serving families of workers in the informal sector (which replaced the former INURBE in 2003[8]); ii) the Family Welfare Agencies[9] (FWA) serving families of workers in the formal sector; iii) the Military Housing Promotion Agency (MHPA); and iv) the Public Agricultural Bank (*Banco Agrario*), operating in rural areas.

FONVIVIENDA and the FWA manage the main share of resources available for the housing subsidy. These two entities allocated 72 percent of the subsidies from 1991 to 2009, while the MHPA and the Public Agricultural Bank allocated 15.7 percent and 12.2 percent of the subsidies, respectively, during the same period.[10] The subsidy is financed by the national budget and by payroll taxes collected and managed by the FWA.[11]

Beneficiaries are selected according to two criteria: they earn less than four monthly minimum[12] legal wages as a family, and their living conditions rank among the lowest according to the SISBEN[13] classification. Subsidies are allocated by a scoring methodology[14] that ranks applicant households according to their saving behavior (savings balances with respect to housing value or income and saving time) and socio-economic characteristics (household size,

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[8] In 2003, the government carried out an institutional reform of the housing sector. The responsibility for housing policy design and coordination was delegated to a new branch of the Ministry of Environment, Housing, and Land Development Branch, creating the Ministry of Environment, Housing, and Territorial Development (MAVDT, for its acronym in Spanish). INURBE was liquidated due to inefficiency and lack of transparency and was replaced by the National Housing Fund (FONVIVIENDA). Some of the tasks formerly carried out by INURBE were delegated to third parties. Under the new system, the Family Welfare Agencies are in charge of the application process for the subsidies, FINDETER (a public rediscount bank) evaluates and authorizes social housing construction projects, and FONVIVIENDA allocates subsidies to families of informal workers.

[9] The Family Welfare Agencies (FWA), or *Cajas de Compensación Familiar,* are private non-profit entities that provide a range of social services, including low-income housing.

[10] Data published by the Ministry of Environment, Housing, and Territorial Development.

[11] In Colombia private enterprises pay payroll taxes equivalent to 14 percent of wages, from which 4 percentage points are managed by FWA.

[12] In 2010, four monthly minimum wages were equivalent to COP$2,060,000 (US$1,084).

[13] SISBEN is an indicator of households' economic well-being, which serves as an instrument to target social programs. The index comprises a set of variables related to the consumption of durable goods, human capital endowment, and current income. The Social Housing Subsidy is targeted to households ranked in the two lowest SISBEN levels. Family income level is also used to target the program.

[14] This methodology was introduced in 1991, when beneficiaries were chosen by their highest score in the following criteria: previous savings, availability of complementary resources, construction materials and labor availability, and membership in a popular housing organization. The scoring criteria have had some minor modifications over the years (see Table 2). In 1993, the following factors were added: previous savings, Basic Unsatisfied Needs Index, housing solution type and value, population size in the municipality, and individual or collective application to subsidy.

female-headed household, and the presence of disabled or senior citizens in the household). Additionally, housing subject to the subsidy should have a maximum price of 135 minimum wages (70 minimum monthly wages for priority housing),[15] and the highest value of the subsidy is inversely related to the household's monthly income or the value of the house. The value of the subsidy granted by FONVIVIENDA was inversely related to the value of the house from 1993 to 2007.[16] To better focus the subsidies among households belonging to lower income ranges, the maximum value of the subsidy decreased from 1999 to 2007, especially for the purchase of housing worth more than 70 minimum wages. The real value of the subsidy decreased by 5.4 percent for priority housing and dropped by more than 35 percent for the purchase of higher value houses. From 2008 onwards[17] the maximum value of the FONVIVIENDA subsidy was set to vary according to the beneficiaries' income, allocating higher subsidies to families in lower income ranges. Additionally, the subsidy was restricted to priority housing.[18]

4.1.2 FONVIVIENDA's Budget Distribution

Subsidies managed by FONVIVIENDA are of special interest because they serve informal workers. The resources managed by FONVIVIENDA, which amount to more than a third[19] of the total resources for housing subsidies allocated in Colombia, are distributed through various independent competition schemes, which have increased from two initial competitions in 2000 to 10 in 2010. These competition schemes are designed to support different types of housing solutions and benefit population segments living in particular socioeconomic conditions, but in

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[15] In 2010, 135 and 70 monthly minimum wages were equivalent to COP $69.5 million and $36.0 million, respectively (US$36,592 and $18,974).

[16] From 1991 to 1993, the value of the subsidy was delinked from the value of the house. Law 49 of 1990 established a maximum value of the subsidy of 15 minimum wages for housing obtained in collective processes (where housing units should cost less than 50 minimum wages) and 12 minimum wages for housing obtained individually. Decree 2154 of 1993 set the maximum value of the subsidy granted by INURBE as follows: 20 mw for housing valued under 70 mw, 15 mw for housing valued between 93 mw, and 12 mw for housing valued between 96 mw and 135 mw. For deed registration or land purchase the value of the subsidy was 13 mw, while for housing improvement it was 16 mw. This same decree set the maximum value of the subsidy granted by Family Welfare Agencies as follows: 23 monthly wages for households earning less than 2 mw, 15 mw for households earning between 2 and 3 mw, and 12 mw for households earning between 3 and 4 mw.

[17] See Decree 4466 of 2007 and Law 1151 of 2007 (Art. 86).

[18] This does not apply to Family Welfare Agencies as they are ruled by private law.

[19] On average 38.1 percent.

general all of them follow a similar methodology to rank beneficiaries according to the criteria described in the previous section.

The competition known as *Regular* was the first scheme created to allocated subsidies to purchase new housing units directly from the market, invest in housing improvement, or build self-help housing. The second scheme put in place was the *Territorial Effort*, in response to the lack of housing supply in municipalities with populations below 50,000 inhabitants. This subsidy is allocated among housing projects carried out by local governments and is matched by infrastructure projects and/or land provided by local governments and by the *Regular Subsidy* obtained individually by households.[20] The combined resources cover a large percentage of the cost of housing, helping families[21] with little access to the credit market and no previous savings to buy priority housing.

In 2004, three additional competition schemes were created. The first was the competition for *Special Population*, aimed at assisting families displaced by violence and victims of natural disasters or terrorist acts,[22] all of which have increased in recent years. Under this scheme, previous savings are not required and the subsidy may be used to finance the purchase of existing homes, rent, self-help housing construction, or home improvement. Currently, the maximum value of the subsidy is equivalent to 25 minimum wages, compared to 22 minimum wages for the rest of the population.[23] The second is the *National* competition, which promotes priority housing construction in municipalities with more than 50,000 inhabitants as well as macro-projects, and complements the *Regular Subsidy*. Third, the *Deed Registration* competition, which allows de facto tenants of low-income housing located on lands owned by the government to legalize their ownership if they meet certain eligibility criteria.[24] Under this scheme, the government provides the transfer of ownership and/or partial financing of the cost of registration.

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[20] The projects with the highest funding offered by the local government obtain higher scores in the competition. Under this scheme, each department has a budget quota and the competition is conducted among applicants from the same department (See the website https://sites.google.com/site/socialhousingcolombia/ to obtain the formula used to distribute resources among departments).

[21] This subsidy is targeted to families earning less than two minimum monthly wages who apply to buy priority housing (housing worth less than 70 minimum wages).

[22] The last two groups were included in 2006.

[23] In 2010, 22 and 25 monthly minimum wages were equivalent to COP $11.3 and COP $12.9 million (US$5,963 and US$6,776, respectively).

[24] See https://sites.google.com/site/socialhousingcolombia/ for detailed information.

Between 2006 and 2008, five more competitions were established: two of them aimed at subsidizing housing improvement and two at subsidizing the purchase of housing by households with members working in recycling-related activities and by city councilors living in municipalities under 50,000 people.

Finally, the *Saving with Favorable Credit Evaluation,* created in 2009, is directed at households with previous savings and a certification of favorable credit evaluation. The distribution of FONVIVIENDA's budget among these five competitions has determined the targeting of the low-income housing subsidy.

As shown in Figure 3, total allocated subsidies registered an annual value of $916 billion pesos[25] on average from 1991 to 1997. From 1998 to 2000, this average dropped by half, due to the reduction in the public budget for investment and social spending during the economic crisis. From 2001 to 2009, the allocation of subsidies recovered, rising to an average equivalent of 86.5 percent of the level observed during the early 1990s. Of the total number of subsidies allocated in Colombia since 1991, 37.4 percent were allocated by FONVIVIENDA and 34.1 percent by the Family Welfare Agencies.[26]

Figure 3. Allocated Subsidies, 1991-2009
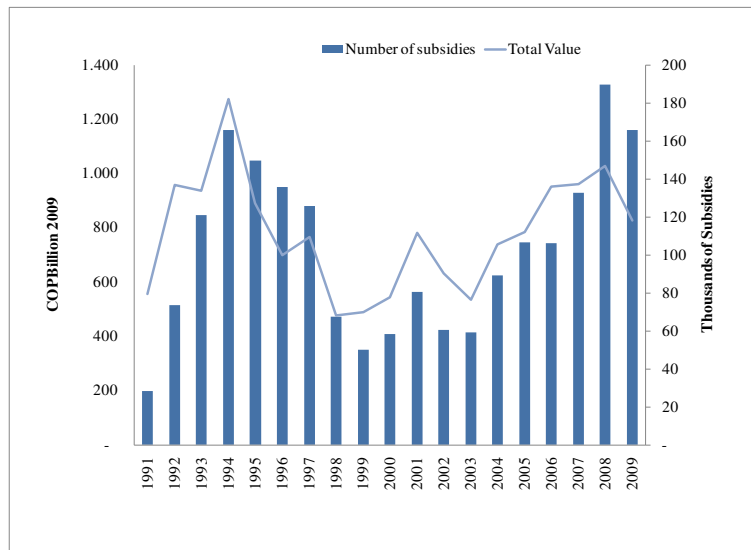
Source: Ministry of Environment, Housing and Regional Development (MAVDT)

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[25] Approximately, US$482 million.
[26] See https://sites.google.com/site/socialhousingcolombia/ for more information on the execution of the subsidy by Family Welfare Agencies.

The number of households that benefited from housing subsidies registered its highest level from 1993 to 1997 (140,000 households on average) due to the greater number of subsidies allocated for housing improvement, which have a lower cost.[27] The coverage of the program reached its lowest values from 1998 to 2000. From 2001 to 2008, the number of beneficiaries began increasing again due to the continuous reduction in the value of the subsidy, the introduction of new competition schemes with lower average costs, such as the housing improvement and deed registration subsidy, and the over-allocation strategy adopted in 2002.[28]

The average value of the subsidy surpassed COP $16.3 million (in 2009 pesos)[29] in the period 1991-1992. From 1994 to 1998, the average value of the subsidy was relatively low (COP $6.4 million in 2009 pesos), due to the emphasis placed on housing improvement. Then, from 1999 to 2003 it increased to COP $9.6 million and declined to an average of COP $7.0 million between 2004 and 2009.

The subsidies managed by FONVIVIENDA's competition schemes which were allocated to the internally displaced population[30] has grown to more than 50 percent of the total value since 2007, when the National Development Plan (2006-2010) prioritized this population. Since the total amount of resources available for the housing subsidy is fixed by law, the rise in the budget for the displaced population has resulted in fewer resources for the rest of the population. In particular, subsidies allocated by the Territorial Effort competition fell from 38.6 percent in 2003 to 10.2 percent in 2009, and the allocations of the Regular subsidy dropped from 39.1 percent in 2003 to 0.3 percent in 2009.

From 2003 to 2009, most of the subsidies allocated were used to purchase homes (82.5 percent). The share of subsidies allocated for self-help housing construction recorded an average of 7.5 percent, while the use of subsidies for housing improvement grew from 0.2 percent in 2003 to 8.6 percent in 2009, mainly due to the creation of two competition schemes specializing in improvement. The share of subsidies allocated for renting varied over the period and had an average of 6.2 percent (Table 3).

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[27] Cuellar (2006) and Chiappe (1999) explain how from 1994 to 1997 the housing subsidy focused on improvement projects. According to Chiappe (1999), 38.5 percent of total housing subsidies were allocated to improvement projects.
[28] This strategy was implemented to ensure a larger disbursement ratio.
[29] Equivalent to US$7,560.
[30] In 2009, the total internally displaced population was 3.3 million (7.0 percent of the country's population).

4.2 National Guarantee Fund (NGF)

Partial mortgage guarantees, established in 2004, are provided by the National Guarantee Fund[31] (NGF) to financial intermediaries holding mortgage portfolios. They are previously evaluated according to a risk assessment. A "maximum portfolio value to be guaranteed" (MPV) is assigned to each financial intermediary and, independently, they evaluate and approve guaranteed loans within the limits of the MPV. The guarantee becomes active when the arrear portfolio surpasses 18 months or when the financed housing unit is given as loan payment.

The NGF relies on the risk assessment made by intermediaries to final borrowers. This reduces operating costs and optimizes the information advantage that intermediaries have over the NGF. Intermediaries' delinquency rates are constantly monitored. If an intermediary shows an excessive increase in its delinquency rates, its MPV is reduced in order to mitigate moral hazard.

The NGF guarantees the non-payment risk of loans for low-income housing. Loans subject to guarantees should not exceed 108 minimum wages[32] or 80 percent of the housing unit value and should finance housing purchase, improvement, or self-help construction. The guarantee covers up to 70 percent of the expected loss[33] for individual loans with financial intermediaries or up to 50 percent of the outstanding debt for rediscount portfolio. The guarantee covers a period of seven years or less, and its monthly cost is 0.0943 percent plus VAT of the outstanding debt (COP $1,045 for each COP $1 million borrowed); see Table 4 for a detailed description of the mortgage guarantees offered by the Fund.

4.3 Programmed Savings

Programmed savings accounts complement the subsidy and facilitate access to credit by signaling payment habits and the ability to pay. From 1991 to 1993, having previous savings was a prerequisite for applying for a housing subsidy.[34] Since most applicants could not satisfy this

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[31] The National Guarantee Fund (*Fondo Nacional de Garantías*), supervised by the Financial Superintendency, was created in 1982 as a mixed-economy entity to provide partial credit guarantees. Its stakeholders are the Ministry of Finance (60 percent), the Ministry of Trade, Industry, and Tourism (20 percent), Bancoldex (12 percent), Findeter (7.2 percent) and the SMEs Union (ACOPI) (0.8 percent).

[32] In 2010, 108 monthly minimum wages were equivalent to COP $55.6 million (US$29,274).

[33] This expected cost includes outstanding debt, non-paid insurance fees, non-paid interest, and collateral recovery expenses minus the value of the housing unit received as payment.

[34] Decree 599 of 1991.

prerequisite,in 1994 it was eliminated and became one of the scoring criteria for selecting recipients.[35]

Law 812 of 2003 and Decree 975 of 2004 re-introduced previous savings as a prerequisite to apply for the subsidy, but with no requirements on saving history and with a broader definition that included statutory guarantee payments (severances or *cesantías*), investment in land, progress in self-help housing construction, and savings in financial accounts that do not require regular deposits (*aportes periódicos de ahorro*). These requirements do not necessarily signal the borrower's capacity to make regular payments to the financial system. Programmed saving accounts for low-income housing grew from January 2000 to April 2003 and stagnated from 2003 to 2008, which may be associated with the relaxation of the saving prerequisite.

The last competition scheme, introduced by FONVIVIENDA in 2009, known as *Saving with Favorable Credit Evaluation*, seeks to encourage the use of programmed saving programs and increase access to credit. The coverage of this scheme is still low (4.7 percent of the total subsidies). However, the outstanding balance of the programmed saving accounts started increasing in 2009, which may be associated with the introduction of this new scheme. Subsidies in this scheme were allocated mainly to families earning between two and three monthly minimum wages (73.2 percent) and 18.1 percent to families earning between three and four minimum wages. The remaining 8.7 percent was allocated to families earning less than one monthly minimum wage.

5. Housing Subsidies, Housing Finance and Quality of Life

5.1 Impact of Subsidies and Credit on Quality of Life

Access to housing credit and housing subsidies is limited in Colombia. According to the most recent national census (2005), only 6 percent of the homeowners had a mortgage. The Quality of Life Surveys (QLS) of 2003 and 2008 showed similar figures (5.19 percent and 5.24 percent, respectively).

According to the QLS of 2003, between 1997 and 2002 only 13.54 percent of the 759,658 homebuyers funded their purchase with a mortgage, a percentage that was higher in the

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[35] Decree 2154 of 1993. According to Law 633 of 2000 (Art. 69), families earning less than two monthly wages apply to the subsidy with no previous savings, as long as they have sufficient resources to match the subsidy. Decree 975 of 2004 also eliminated the previous saving prerequisite for the special population, i.e., violently displaced persons or victims of natural disasters or terrorism.

QLS of 2008. Between 2002 and 2007, there were 1 million homebuyers, of whom 22.1 percent funded their purchase with mortgages (Table 5). The QLS surveys show that the main sources of funds to buy a house are savings, mortgages, and informal credit from friends or relatives. Low-income households mostly use informal credit and savings, while high-income households rely mainly on mortgages and severance payments.

Access to housing subsidies is even more limited than access to mortgages. According to the QLS survey of 2003, between 1997 and 2002 only 8.2 percent of homebuyers obtained a subsidy. The QLS Survey of 2008 does not provide the percentage of homebuyers that had a subsidy, but it shows that only 1.2 percent of the households had a housing subsidy between 2007 and 2008 (Table 6).[36]

5.1.1 Housing Loan Borrowers and Housing Subsidy Beneficiaries

Most households with access to credit share the following characteristics: they are located in urban[37] areas, they fall within the highest income quintile, and they are headed by a male who has more than 12 years of schooling, works in the informal sector, and is between 35 and 49 years old. Most of the households that benefited from housing subsidies are also located in urban areas and are headed by a male who works in the informal sector and is between 35 and 49 years of age. However, in contrast to those with access to credit, the beneficiaries of the subsidy belong to the lowest income quintiles and their heads of household are less educated (less than 5 years of schooling).

5.1.2 Incidence and Targeting

To analyze access by the poorest families to housing subsidies and mortgages we measured poverty using the Index of Unmet Basic Needs (UBN).[38] In 2008, 24.1 percent of Colombian households were poor (24.2 percent in 2003). The percentage of poor families who benefited

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[36] In 2003, the Quality of Life Survey asked for the funding sources of houses purchased between 1997 and 2002, including the housing subsidy as a possible source. In 2008, the QLS only asked whether a household had obtained a housing subsidy in the last 12 months, but the question was not related to the purchase of a house. The subsidy could have been already used or just allocated.

[37] Urban: Main Area of a Municipality=1, Rest=0.

[38] The Index of Unmet Basic Needs (UBN) is a measure of structural poverty based on the minimum level of physical and human capital necessary for the satisfaction of basic needs. The criteria for identifying a household as having an Unmet Basic Need are summarized as follows: 1) inadequate housing, 2) no access to utilities, 3) crowding, 4) school attendance, and 5) economic dependency. A person or a household is classified as poor if one of these basic needs is unmet.

from the housing subsidy was 23.0 in 2003 and in 30.6 in 2008. The percentage of mortgage borrowers classified as poor was even lower, only 15.8 in 2003 and 11.8 in 2008.

Most of the poor families who benefited from housing subsidies and/or mortgages were headed by males who worked in the informal sector, were wage earners, married or cohabiting, with little schooling, and living in urban areas. Most of the borrowers classified as poor belonged to the 3rd and 2nd income quintiles, while most of the subsidy beneficiaries classified as poor belonged to the 2nd and 1st quintiles.

The distribution of housing subsidy outlays by income level saw a slight improvement from 2003 to 2008. Families from the lowest four income deciles received 52 of the total subsidy outlays in 2003, while this percentage rose to 60 percent in 2008. Additionally, in 2008 some households belonging to the 7th to 9th income deciles had partially lost their participation as beneficiaries of the housing subsidy in comparison to 2003. However, it is not clear why non-targeted households (i.e., households living on more than 4 minimum wages or monthly income above the 7th decile) were receiving the subsidy.

5.1.3 Quality of Housing Solutions

This section analyzes whether credit and subsidies have improved the quality of housing among the beneficiaries. The effect of housing credit and subsidies on quality of housing is measured by Propensity Score Matching techniques, using as outcome variable an indicator of the quality of housing and two binary treatments: access to housing credit and access to housing subsidy.

The Quality of Dwelling (QoD) index is measured by a Principal Components Analysis (PCA), which includes indicators such as access to potable water, sewerage, electricity, and trash collection services, as well as the construction materials of walls and floors and the availability of an independent room for cooking.

The Propensity Score Matching (PSM) attempts to calculate the impact of the treatment variables by creating a comparison group that would have been affected by treatment variables in a similar fashion to the treated group. The change in the outcome attributable to the subsidy or credit is therefore calculated as the difference in average values of the treated and comparison groups.

The first step to perform PSM is to estimate Logit models in which the dependent variables are treatment dummies (housing subsidy and housing credit). The models are then used

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to estimate the propensity score of being treated, given a vector of individual characteristics. All the models control for demographic and economic characteristics at the household level.[39] The models also include interaction terms between each variable and region dummies to increase the goodness of fit, but this set of coefficients is not reported. Another criterion used to determine the final correlates for the logit models was the Balancing Hypothesis (or CIA), which states that there should be no statistical difference between treated and non-treated individuals with similar propensity scores in the mean of all the correlates used in the model.[40]

The second step is the matching based on the propensity score. One approach to match participants and nonparticipants is the Local Linear Matching (LLM), a nonparametric estimator that uses a weighted average of all nonparticipants to construct the counterfactual match for each participant. LLM estimates a nonparametric locally weighted regression of the comparison group outcome, in the neighborhood of each treatment observation (Heckman, Ichimura and Todd, 1997). Under this approach we will match credit borrowers (subsidy beneficiaries) with other households that share similar characteristics but do not have housing loans (subsidies). Once the matching is made we will be able to compute the effect of housing credit (subsidies) on the quality of dwelling index.

To construct the QoD index using the PCA, we take the first principal component since it summarizes the higher proportion of the total variance of the set of variables used in the analysis. In our case, the first component summarizes 29.7 percent and 22.2 percent of the total variance for the 2003 and 2008 quality of life surveys, respectively.[41] The features of high-quality buildings are access to utilities, the use of bricks and prefabricated materials for the walls, floors made of marble, parquet, vinyl, or tiles, and having proper places for cooking. Table 7 shows the results of the Quality of Dwelling index (QoD), the outcome variable for the PSM.

We estimate the Average Treatment Effect on the Treated (ATET) for 2003 and 2008. Results show a positive and significant ATET in 2003 (Table 8), which means that housing loans

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[39] The control variables include: household head's age, gender, education level, marital status and work status, as well as household size, income, and residence location (urban or rural).

[40] If the Balancing Hypothesis is assured, then treated and control observations used in the matching process are very close to one another, at least in the set of observable characteristics used to predict the propensity score.

[41] In our case, all variables are discrete. Therefore, the PCA is applied on the basis of a tetra choric correlation matrix that explicitly takes account of the discrete nature of our variables. Hamill (2009) provides evidence on the importance of applying PCA to discrete data by calculating an appropriate correlation matrix to reduce biases in the covariance structure and avoid underestimations of the proportions of the explained variance.

and housing subsidies account for a positive and statistically significant difference in the quality of dwellings[42] between the matched treated (households that had a credit correspond to the first treatment, and households that had housing subsidy to the second treatment) and control groups. In 2008 we do not observe any effect of housing subsidies on quality of dwelling, although a significant and positive effect on quality of dwelling is observed for households that acquired a house between 2002 and 2007 and used housing loans as a source of funding.

5.1.4 Quality of Life

This section analyses whether credit and subsidies have improved living conditions among the beneficiary population. The effect of housing credit and subsidies on quality of life is quantified by Propensity Score Matching techniques, using as outcome variables a household-level measure of quality of life and two binary treatments: housing credit and housing subsidy access. First we explain some characteristics of the methodology used to construct the quality of life index and analyze the quality of life among the beneficiaries of subsidies and mortgages. Then, we explain the methodology and results of the estimation of the effect of housing credit and subsidies on the quality of life.

The Quality of Life index (QoL) is measured through a Principal Components Analysis (PCA). This analysis includes indicators such as education level, children attending school, access to health services, economic dependency, crowding, housing conditions, assets, and subjective assessment of life conditions. To construct the QoL index we use the first principal component, which accounts for 30.5 percent and 21.4 percent of the total variance for the 2003 and 2008 QLS, respectively.[43]

Table 9 displays the coefficients of each variable for the first principal component. The sign of each coefficient shows the relationship of each variable to the QoL index. All signs are consistent with economic intuition. For example, if the household head is more educated and has access to health services, then the quality of life is positively affected. The index increases with better housing conditions, such as access to utilities, appropriate places for cooking, better wall

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[42] These are dwellings in the low-income housing group, according to the household income criterion of the low-income housing program in Colombia.

[43] In our case, all variables are discrete. In this case, the PCA is applied on the basis of a tetra choric correlation matrix that explicitly takes account of the discrete nature of our variables. Hamill (2009) provides evidence on the importance of applying PCA to discrete data by calculating an appropriate correlation matrix to reduce biases in the covariance structure and avoid underestimations of the proportions of the explained variance.

and floor materials, and investments in durable goods. Subjective opinions about poverty and living conditions also have an impact on the quality of life. When households believe that they have better living conditions, their quality of life is considerably higher.

To determine whether a household is poor, according to the QoL index, we established a threshold based on prior information of the percentage of poor households, according to the UBN definition of poverty (24.0 percent). Households whose QoL index is below 1.69 and 1.71 (the 24th percentiles) in 2003 and 2008, respectively, are classified as poor.

Beneficiaries of housing credit and mortgages differ in their quality of life conditions. The second panel of Figure 4 shows the distribution of the QoL index for mortgage borrowers in 2003, which is concentrated in the higher values of the distribution. In contrast, the distribution of this index for the beneficiaries of the subsidy is less concentrated in the higher values of the distribution.

Considering the QoL poverty threshold, we observe that few loans are made to poor households, whereas housing subsidies are likely to be allocated equally to poor and non-poor households. The results do not change dramatically in 2008 despite the fact that during that year a larger segment of the poor population benefited from housing subsidies (third panel of Figure 5).

To determine whether credit and subsidies are improving the living conditions of their beneficiaries, we use Propensity Score Matching (PSM). Housing credit and housing subsidy could be considered treatments, while quality of life is the outcome. To estimate the outcome effect of these treatments, the major concern should be the selection bias created by the rule of selection into treatment. Given our data, we consider that the best empirical strategy is to estimate the Average Treatment effect on the Treated (ATT) using PSM.

Figure 4. Distribution of the Quality of Life Index, 2003

(a) All Households

(b) Housing Credit Borrowers

(c) Housing Subsidy Beneficiaries
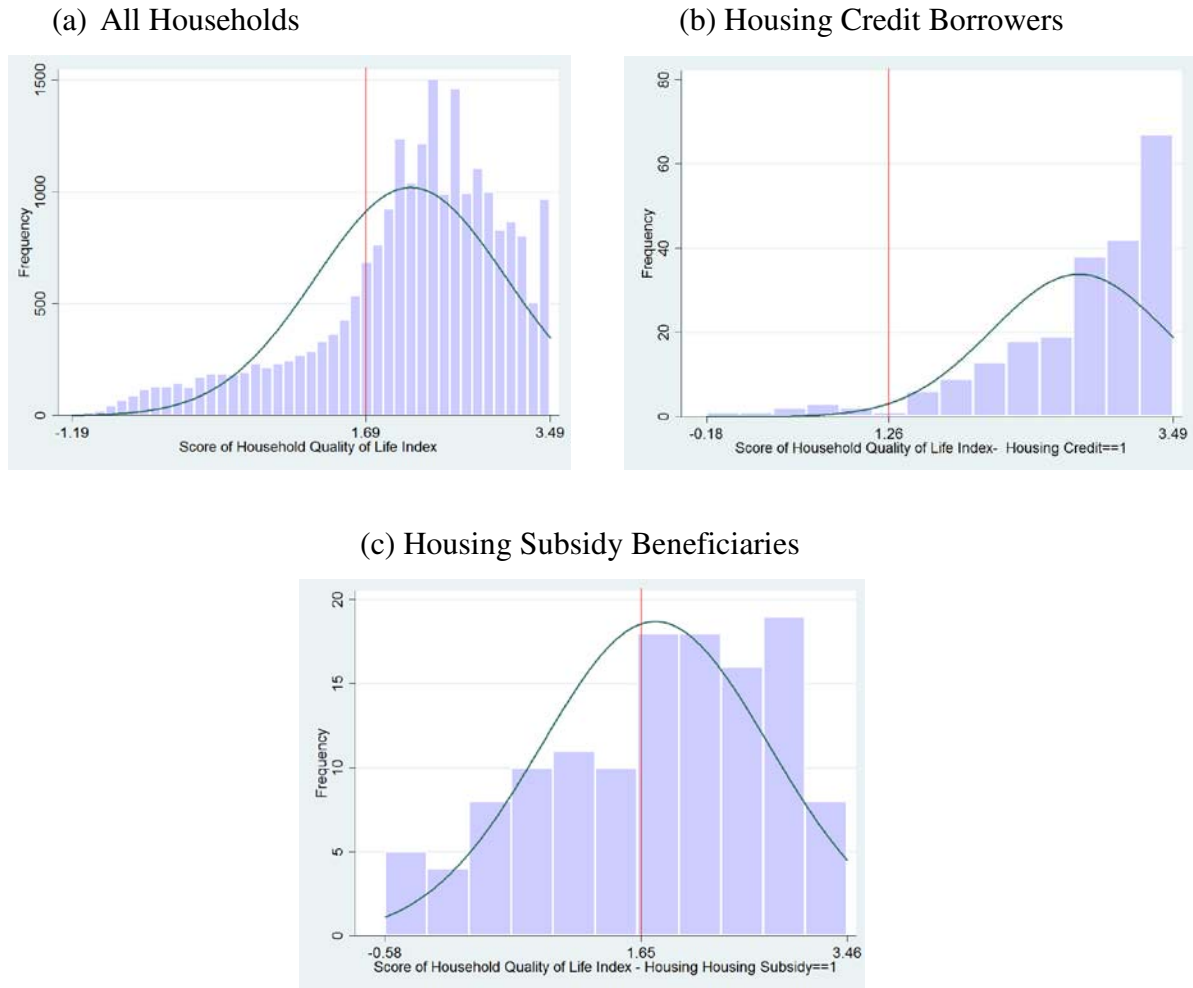
Source: Authors' calculations based on 2003 Quality of Life Surveys (DANE)

The estimation of the propensity score for treated and non-treated households, based on logit models, follows the same methodology as the one used in Section 5.1.2. Focusing on the local linear regression matching estimations, we find a positive and significant effect on quality of life as shown in Table 10, with the exception of housing subsidy in 2008.

Figure 5. Distribution of the Quality of Life Index, 2008

(a) All Households

(b) Housing Credit Borrowers

(c) Housing Subsidy Beneficiaries

Source: Authors' calculations based on 2008 Quality of Life Surveys (DANE)

5.2 Determinants of Access to Housing Subsidies and Housing Loans

Subsidies could facilitate access to a mortgage by low-income households. However, Colombia's housing subsidy program requires a declaration of the amount of money needed to acquire a dwelling before receiving the cash transfer.[44] Since credit is a source of complementary

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[44] This is the case for every housing subsidy granted by the Family Welfare Agencies and for five out of the 10 types of subsidies managed by FONVIVIENDA (the Regular Subsidy and the Saving with Favorable Credit Evaluation Subsidy, as well as subsidies for Deed Registration, Recyclers, and City Councilors require complementary

resources, we identify a source of reverse causality between housing subsidies and housing loans, which leads to biased estimators if this is not controlled for.

5.2.1 The Two-Equation Simultaneous System for Access to Low-Income Housing Credit and Access to Housing Subsidy

While a dual relationship may exist between housing credit and housing subsidy, it is likely that access to a housing subsidy plays a more important role in explaining access to housing credit than vice versa, as households are able to prove additional sources of funding other than credit. We specify the following equations for credit access and subsidy:

$$Credit_i{}^* = \beta_0 + \beta_1 X_i + \beta_2 Subsidy_i{}^* + u_i{}^* \qquad (1)$$

$$Subsidy_i{}^* = \theta_0 + \theta_1 X_i + \theta_2 Z_i + \theta_3 Credit_i{}^* + \varepsilon_i \qquad (2)$$

where, $Credit_i{}^*$ and $Subsidy_i{}^*$ are the continuous, latent random variables that represent, respectively, access to housing credit and to a housing subsidy. Within this framework, $Credit_i{}^*$ and $Subsidy_i{}^*$ are non-observable variables. However, the discrete dependent variables $Credit_i$ and $Subsidy_i$ are observable, such that:

$$Credit_i = 1(Credit_i{}^* > 0) = 1(\beta_0 + \beta_1 X_i + \beta_2 Subsidy_i + u_i > 0) \qquad (3)$$

$$Subsidy_i = 1(Subsidy_i{}^* > 0) = 1(\theta_0 + \theta_1 X_i + \theta_2 Z_i + \theta_3 Credit_i + \varepsilon_i > 0) \qquad (4)$$

$Credit_i = 1$ if household has a housing loan, and 0 otherwise; $Subsidy_i = 1$ if household has a housing subsidy, and 0 otherwise. X_i, is a vector of exogenous household socioeconomic characteristics such as household's head gender, marital status, age, education level, and working conditions (formal/informal), as well as the number of household members and, an assets index[45] used as a proxy for wealth. Finally, to ensure that each coefficient in the system of equations is identified, certain variables are included in the housing subsidy equation and excluded from the credit equation and vice versa. In our model, Z_i are two variables: a) a dummy variable of having programmed saving accounts or not, and b) an indicator of housing crowding, which are variables excluded from the credit equation.

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funding). In particular the Regular subsidy accounted for 39.1 percent of the subsidies allocated in 2003 (See Section 4.1.1.3).

[45] This index is calculated with PCA using variables of durable goods such as television, refrigerator, washing machine, automobile and computer.

The model is estimated using a sample of 750 households that acquired a new house between 1998 and 2002 and belong to the first seven deciles of the income distribution (i.e., low-income housing). Each of the two-stage models consists of an equation for the probability of accessing a housing credit and another equation for the probability of accessing a housing subsidy. Recall that the first stage equations, which include all of the exogenous variables, are estimated for housing credit and housing subsidy. In the second stage, whether the household has a credit card is excluded from the housing subsidy equation. Similarly, variables that control for inadequate housing and inadequate access to utilities are excluded from the housing credit equation.

Throughout this section, marginal effects are calculated as follows: the first-stage estimation creates predicted values for access to credit (Predicted Value: Housing Credit) and access to subsidy (Predicted Value: Housing Subsidy) that are continuous variables ranging from positive to negative values. An individual has access to credit if the predicted value is positive. Then, the weighted means of the predicted values are used to calculate the marginal effects.

The results in the first column of Table 11 show that, after controlling for household and regional characteristics, a housing subsidy significantly increases the likelihood that a household has access to housing credit when the reverse causality is not accounted for. The second column of Table 11 presents the results from the second-stage probit model for the low-income housing credit equation. The results show that access to a subsidy does not increase the likelihood for a household to have access to credit, as was first estimated. Thus, not controlling for this source of endogeneity provides misleading results.

In Table 11 we also observe the first and second stage estimation results of the housing subsidy equation. In particular, we obtain that programmed saving accounts is a significant explanatory variable that increases the probability of access to subsidies once the endogeneity with housing credit has been controlled for (see column 4).

We do not find a significant effect of the probability of having a credit on the probability of having access to a subsidy, despite the design of the program, which in many cases requires having complementary funding. However, this is plausible given that most of the households use their own savings or informal sources of credit to buy their house.

5.2.2 The Two-Equation Simultaneous System for Low-Income Housing Credit Access and Housing Subsidy Access Using a Private Bank Dataset

The effect of access to subsidy on access to housing credit is also estimated using data from a Colombian private mortgage bank (one of the most important in the mortgage market). The dataset has 33,689 housing loans, out of which 71.09 percent are low-income housing loans. About 54 percent of mortgage borrowers are households belonging to the 1st and 2nd income quintiles. 11.27 percent of the low-income housing loans are subsidized, and around 78 percent of borrowers who had a subsidy belong to the 1st and 2nd income quintiles.

The effect of access to a subsidy on access to low-income housing credit is estimated using the two-stage Maddala estimation procedure. Results displayed in the first two columns of Table 12 show a positive and significant effect of housing subsidy on housing credit, as well as variables such as the type of job contract (temporary workers are more likely to have access to credit than retired people) and using the loan to acquire a new house rather than a pre-existing one. The higher probability of having a housing subsidy positively affects the probability of access to housing loans in this bank. In particular, for low values of housing solutions, the subsidy might represent a considerable amount of such housing, values which in turn reduces the amount of money lent to low-income people.

The credit score is the variable excluded from the subsidy equation. A higher credit score is related to a lower probability of default. It is observable by the bank and it is taken into consideration when approving a loan. The credit score has no relation to the allocation of subsidies. Additionally, we should account for some economic characteristics of low-income housing borrowers. These individuals usually have limited access to financial services and do not have credit histories. However, despite not having the best credit scores, they are likely to gain access to credit because of the availability of instruments such as the loan guarantee provided by the National Guarantee Fund.

The probit model results in Table 12 also show that after controlling for the reverse causality with housing credit, the probability of having a credit does not affect the probability of having access to a subsidy. However, as was to be expected, people belonging to the lowest income strata are gaining access to the subsidy.

6. Housing Loan Guarantee Policy

The Colombian government aims to help low-income households obtain affordable housing through a guaranteed mortgage loan program available through financial intermediaries. The National Guarantee Fund[46] (NGF) guarantees the non-payment risk of low-income housing loans. The guarantee covers up to 70 percent of the expected loss. These guarantees are provided to financial intermediaries holding a mortgage portfolio, but the final beneficiaries are the borrowers.

6.1 Analysis of Implementation of the Guarantee Program

The guaranteed loans administered by the NGF have different characteristics depending on the intermediary participating in the program. The most important intermediaries are banks which disbursed more than 80 percent of the total guaranteed loans between 2006 and 2009. The Family Welfare Agencies and the National Savings Fund participated with 13 percent and 2 percent, respectively. The average Loan-To-Value (LTV, a ratio of the amount of a first mortgage to the total appraised value of real property) also differs across intermediaries. As shown in the left panel of Figure 6, the National Savings Fund lent, on average, at higher LTV ratios than Banks and Family Welfare Agencies and, therefore, assumes a higher risk of default. The figure's right panel shows that the National Savings Fund is also providing the longest-term guaranteed loans (average duration of 15 years) followed by banks (average duration of 13 years), Family Welfare Agencies (10 years) and cooperatives (9 years).

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[46] The National Guarantee Fund (*Fondo Nacional de Garantías*), supervised by the Financial Superintendency, was created in 1982 as a mixed-economy entity to provide partial credit guarantees. Its stakeholders are the Ministry of Finance (60 percent), the Ministry of Trade, Industry and Tourism (20 percent), Bancoldex (12 percent), Findeter (7.2 percent) and the SMEs Union (ACOPI) (0.8 percent).

Figure 6. Average LTV and Duration of Guaranteed Loans by Type of Intermediary (percent of total)
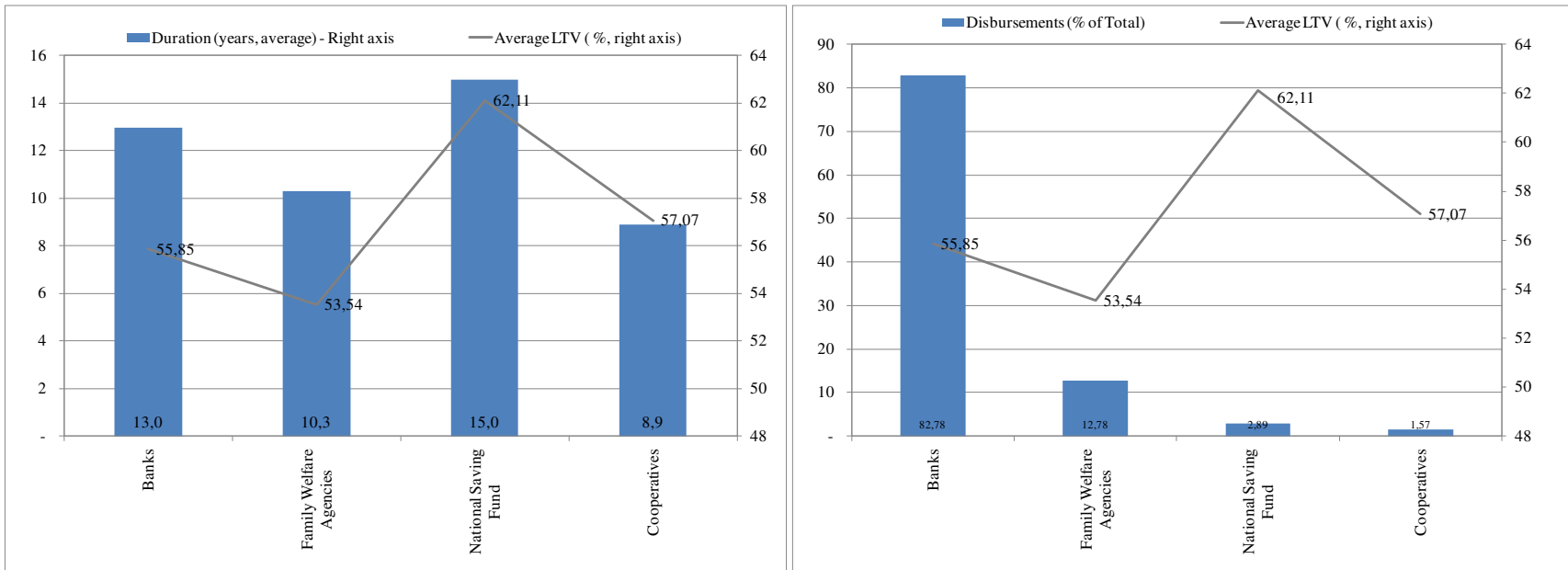
Source: Authors' calculations based on private lender dataset.

However, the NGF does not select its program beneficiaries, as this is a task performed by the institutions that provide housing loans. Nor does the NGF have access to the profile of the guarantee beneficiaries. Despite this, we obtained data from the most important private lender participating in the program (we named this one "Intermediary 5"), so we are able to characterize the socioeconomic profile of the guarantee beneficiaries. We have information on 33,689 mortgages of which 71 percent are low-income housing loans, 8.6 percent are subsidized and 17 percent are guaranteed by the NFG. Of the total of low-income housing loans, 24 percent are guaranteed by the NGF.

The typical NGF beneficiary of Intermediary 5 is a male, between 35 and 49 years of age, single, with a full-time job, a secondary education, and falling within the 1st or 2nd income quintiles. This profile is consistent with the profile of individuals who are less likely to have proper collateral to support their loan applications. Given that housing subsidies and loan guarantees are not mutually exclusive programs, around 13 percent of NGF beneficiaries also have a housing subsidy.

Going further on the Intermediary 5 dataset, we also estimate a probit model to identify those features that make an applicant more likely to have an NGF loan guarantee. Results in Table 13 show that a high credit score[47] (i.e., a lower probability of default) reduces the probability of having a guaranteed loan with this bank. This makes sense if such borrowers with poor credit history cannot provide any asset as collateral, other than their house. Individuals with no education have a higher probability of obtaining a guaranteed loan, as compared to individuals with higher levels of education. Regarding marital status, single borrowers are more likely to have a guaranteed loan than other borrowers. Loans for acquisition of new housing and for families with a higher number of dependents are more likely to have a guaranteed loan. Finally, the probability of having a guaranteed loan is lower as the household's income increases.

The scope of the NGF program is low in terms of regional and portfolio coverage. The NGF program is still concentrated in some regions of Colombia. Bogota, Valle, and Antioquia account for more than 75 percent of the total guaranteed loans. Additionally, the percentage of low-income housing loans backed by the NGF was only 18 percent from 2006 to 2008.

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[47] The credit score is a score calculated by private banks based on some of the socio-economic characteristics of housing loan applicants. However, we do not have access to the information used in the calculation of this variable.

The regional coverage of the program reflects the limited access to financing in non-urban areas of the country. Additionally, not many non-bank intermediaries, such as cooperatives, which have a larger presence in rural areas and low income segments, participate in the program. This might be also the result of different strategies followed by each region to promote the program. Finally, despite the obvious benefit from guarantees, some financial intermediaries do not make use of them. This may be related to the operational procedures required to participate in the program and to specific policies followed by each intermediary in their selection of borrowers.

6.2 Credit Performance of Guaranteed Loans

From 2006 to 2009, four financial institutions, which were among the biggest mortgage banks in Colombia, granted 69.3 percent of the total guaranteed loans. The performance of these loans differed among institutions. The second most important lender of guaranteed low-income housing loans (by size of its guaranteed loans disbursements) had 48 percent of the system's guaranteed low-income housing portfolio in default. One plausible explanation for this has to do with the beneficiary selection criteria used by this lender. It is possible that this lender only offered guaranteed loans to bad payers. However, the lack of data prevents us from doing a proper assessment of this statement. As mentioned in the previous section, the NGF program is concentrated in the capital and two departments in the country. Therefore, these regions account for almost 80 percent of the total defaulted loans.

We also used the Intermediary 5 database to analyze the explanatory factors of the default probability in housing loans. We ran two regressions: one for each type of housing loans and only for low-income housing loans. In the first case the odds of default increased when the housing loan was a low-income housing loan, when borrowers have lower levels of education, and when households have a larger number of dependents. However, when the loan is used to acquire a new house, a lower probability of default is estimated. It is possible that buyers of new housing are more averse to losing their homes, make a greater effort to preserve these assets, and are more committed to repaying their loans (see column 1 of Table 14). When we run the regression only for the sample of low-income housing loans we find similar results. Borrowers with characteristics such as having secondary education (as compared to higher education),

having more dependent household members, and higher income are more likely to default (see column 2 of Table 14).

We also estimated the probability of default when the loan is guaranteed by the NGF. In the second column of Table 14, we observe that guaranteed loans are more likely to default than those which are not guaranteed. This is an interesting result as it suggests the loan guarantees schemes are not devoid of *moral hazard* and *adverse selection* problems. We also observe that using mortgages to buy new housing reduces the odds of default, as compared to using them to buy pre-existing housing.

6.3 Estimation of the Impact of Loan Guarantees on Access to Housing Credit

There are some limitations when assessing the impact of the NGF program on access to housing credit, such as the lack of data to build an appropriate control group and to identify those factors that determine the selection of beneficiaries by the financial intermediary. However, it is still possible to evaluate the effect of having loan guarantees on the number of new housing credits.

The database provided by the NGF provides the number of guarantees by municipality from 2006 to 2008. We also have the number of new housing credits by municipality and by financial intermediary, annually, from statistics provided by the Association of Banking and Financial Institutions of Colombia (*Asobancaria*). Our sample has 62 municipalities across 14 regions in Colombia. For each municipality we use annual data of regional GDP and for each region we use the regional unemployment rate. Another control variable used in our study is the proportion of regional savings accounts for each year of the period 2006-2008. This variable is used to approximate the level of access to financial services in each region.

Given our data restrictions, we follow Cárdenas and Rozo (2007), who suggest evaluating the program taking into consideration its operation at different points in time. The NGF program was applied in each municipality at different points during the period of study, so we are able to estimate the effect of the program as the coefficient of a dummy variable with a value of one, from the year when the program started operations in each municipality and on. The municipalities in our sample are also comparable in terms of size (regional GDP), labor market variables (regional employment and unemployment rates), and financial variables (size of

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regional mortgages and regional access to financial services as a proportion of savings accounts).[48]

The effect of housing loan guarantees is estimated with a panel approach at municipality-level for the period 2006-2008:

$$\log(Y_{it}) = \beta_0 + c_i + T_t + P_r + M_m + \beta_1 NFG_{it} + \beta_2 W_{it} + \varepsilon_{it}$$

(5)

where, i denotes city and t year, Y_{it} is the number of disbursed loans by city per year; T_t is the year fixed effect; P_r is the regional fixed effect; M_m is the municipal fixed effect; NFG_{it} is a dummy variable =1 from the year the NGF started operations in certain municipality and 0 otherwise; and W_{it} are control variables (regional per capita GDP, regional unemployment rate, and access to financial services in the region).

The estimation results are displayed in Table 15. We did not find a significant effect of the NGF program on the number of housing loans. One plausible explanation is the limited scope of the program, as described in Section 6.1.

7. Conclusions

This paper presented the results of a study of the characteristics and evolution of low-income housing in Colombia. The housing deficit in Colombia is still high, both in qualitative and quantitative terms, and mainly affects low-income people. Access to credit, which could help improve housing conditions, is especially limited among the poorest households. Only 15.8 percent of borrowers in 2003 were poor, a figure that decreased to 11.8 percent in 2008. Public policies, such as subsidies and the NGF program, have played an important role in improving housing conditions for the poorest, but have been insufficient to meet their needs. According to 2003 and 2008 Quality of Life Surveys, only 4 percent of home-owning households had a mortgage and only 8 percent had access to subsidies.

Subsidies are concentrated among low-income households, while most of the credit reaches only higher-income households. According to the UBN index, 23 percent of the households that benefited from subsidies were classified as poor in 2003, and this percentage increased to 30.6 percent in 2008. However, there is room for improvement in the targeting of

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[48] Therefore, cities such as Bogota, Medellin, and Cali were excluded from our sample.

the subsidy. Households from the first decile (poorest people) have a lower participation in the subsidy than households from the third decile. This may be related to the fact that the poorest families face considerable difficulties in accessing complementary funding, and the scope of the subsidy programs that do not require this type of funding is limited. Additionally our data suggest problems in the design and execution in the subsidy, because some of its beneficiaries belong to high-income deciles (seventh and ninth deciles).

The propensity score matching estimators show that, in 2003, housing credit and subsidies had a positive impact on the quality of housing solutions and the quality of life. Results from 2008 were not significant because the available data was not suitable to design a proper control group.

According to the estimation of the simultaneous model, using the 2003 Quality of Life Survey, having assets that can serve as collateral strongly increases the probability of obtaining housing credit. This probability is also positively affected by having a programmed savings account. The estimation of this simultaneous model using the private bank dataset showed that access to low-income housing credit is negatively affected by the borrower's income level and positively affected by the household's size and by having a housing subsidy. The probability of having access to housing subsidies is not affected by having access to housing credits, even though the opposite is significant and positive.

Regarding loan guarantees from the NGF, we found that the program is focused on backing low-income housing credits, easing access to loans. However, credits backed with guarantees from the NGF are more prone to be in default, suggesting moral hazard and adverse selection problems. We did not find evidence of any effect of the NGF program on access to credit, which may be related to the fact that the coverage of the program is very limited.

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Appendix Tables

Table 1 Access to Public Utilities and Physical Characteristics of Housing Units
Households in the First Two Income Quintiles

	Q1	Q2
Sewerage		
No access	61,8%	43,7%
Access	38,2%	56,3%
Rubbish Collection		
No access	21,0%	14,1%
Access	79,0%	85,9%
Wall Materials		
Bricks	66,5%	81,3%
Wood	9,3%	6,6%
Disposable materials and Adobe	6,2%	3,4%
Other	18,0%	8,7%
Water		
No access	40,4%	28,8%
Access	59,6%	71,2%
Electricity		
No access	20,1%	13,6%
Access	79,9%	86,4%
Floor Materials		
Cement	52,9%	49,3%
Vinyl, tiles, bricks	22,2%	37,1%
Dirt	19,7%	8,6%
Other	5,2%	5,0%

Source: 2008 Quality of Life Survey (DANE)

Table 2 Beneficiaries Ranking Criteria for Social Housing Subsidy, 1990-2010

	Decree 2154/93	Decree 824/99	Decree 2488/02	Decree 4466/07
Socio-economic conditions				
SISBEN Level or Score[1]		+	+	+
Basic Unsatisfied Index	+			
Household size		+	+	+
Women headed household		+		
Women headed household, handicapped or senior citizen in the household			+	
Single-parent headed household, handicapped or senior citizens in the household				+
Housing unit value	-	-	-	n.a.
Effort				
Saving/Housing unit value		+	+	
Monthly Saving/Monthly Income	+			
Saving/SISBEN Level or Score[6]				+
Saving time	+	+	+	+
Number of previous applications		+	+	+

Source: Ministry of Environment, Housing and Regional Development (MAVDT)

[6]Income level if the granting institution is a Family Welfare Agency

Table 3 Assigned Subsidies by Type of Solution

(As a % of total value assigned)

	Purchase		Self-construction		Improvement		Renting	
	Part.	Real Growth	Part.	Real Growth	Part.	Real Growth	Part.	Real Growth
2003	79,1	n.a.	20,6	n.a.	0,2	n.a.	-	n.a.
2004	74,8	191,3	7,3	9,5	0,2	180,8	17,6	n.a.
2005	88,7	13,3	8,2	7	0,3	54	2,7	-85,4
2006	93,3	26,1	5	-26,8	0,5	79,2	1,2	-47,1
2007	82,4	-3,3	3,2	-29,5	3,7	684,8	10,6	884,5
2008	75,8	-5	1,5	-51,3	13,2	267,7	9,4	-8,3
2009	83,1	-2,8	6,6	285,2	8,6	-42,3	1,7	-84
03-09*	82,5	36,6	7,5	32,4	3,8	204	6,2	131,9

Source: Ministry of Environment, Housing and Regional Development (MAVDT)

Notes: *Average; n.a: not available

Table 4 Partial Credit Guarantees for Social Housing

National Guarantee Fund

	Estimated Loss - Findeter	Rediscount - Findeter	Agreement Govt - Intermediaries	Improvement
Maximum Loan Value	108 mw	108 mw	54 mw	60 mw
Loan Purpose	Purchase, Improvement or Self-construction	Purchase, Improvement or Self-construction	Purchase	Improvement
Coverage	70% of the expected loss	50% of the outstanding debt	70% of the expected loss	50% to 70% of the outstanding debt
Housing Maximum Value	135 mw	135 mw	70 mw	Any type of housing
Monthly Fee Charge	0.0943% + VAT	0.0943%+VAT	Covered by the Government	0.1% plus VAT

Source: National Guarantee Fund

Table 5 Housing Credit in Colombia (% of households)

	2003 Quality of Life Survey *		2008 Quality of Life Survey **	
Housing Credit	No. Households	%	No. Households	%
No	656.792	86,46	780.037	77,89
Yes	102.866	13,54	221.404	22,11
Total	759.658	100	1.001.441	100

Sources: 2003 Quality of Life Survey (DANE), 2008 Quality of Life Survey (DANE)

Notes: * The survey provides credit information on dwellings acquired between 1998 and 2002.

  ** The survey provides credit information on dwellings acquired between 2003 and 2007.

Table 6 Housing Subsidy in Colombia (% of households)

Housing Subsidy	2003 Quality of Life Survey *		2008 Quality of Life Survey **	
	No. Households	%	No. Households	%
No	697.273	91,79	11.090.020	98,81
Yes	62.384	8,21	133.054	1,19
Total	759.658	100	11.223.074	100

Sources: 2003 Quality of Life Survey (DANE), 2008 Quality of Life Survey (DANE)

Notes: * The survey provides credit information on dwellings acquired between 1998 and 2002.

    ** Information on subsidies is provided for the previous 12 months before the survey was conducted.

Table 7 Results of the Quality of Dwelling Index

	Component 1	
	2003	2008
House Conditions		
Access to water	0,3167	0,3229
Access to sewerage	0,3464	0,3443
Access to electricity	0,3238	0,3208
Access to toilet services	0,342	0,3518
Access to rubbish collection services	0,3474	0,3028
Walls made of Bricks	0,2983	0,2174
Walls made of Adobe	-0,0698	0,0266
Walls made of Wattle	-0,0923	-0,064
Walls made of Wattle and daub	-0,1421	-0,1149
Walls made of Wood	-0,1644	-0,1898
Walls made of Prefabricated Material	0,0292	0,1577
Walls made of Bamboo, cane, another plant	-0,1251	-0,1529
Walls made of Zinc, Cloth	-0,1007	-0,1125
Floors made of Parquet, marble	0,1648	0,2214
Floors made of Carpet	0,2195	0,1725
Floors made of Vinyl, tiles, bricks	0,1857	0,1704
Floors made of Wood, Other plant	-0,1421	-0,1234
Floors made of Cement	-0,0762	-0,103
Floors made of Dirt	-0,2348	-0,2412
Cooking in kitchen	0,1514	0,2091
Cooking in bedroom	-0,0682	-0,1099
Cooking in livingroom with sink	0,0451	0,0115
Cooking in livingroom without sink	-0,0546	-0,1323
Coooking in courtyard/corridor/outdoors	-0,1935	-0,165
No place for cooking	-0,0022	-0,0618

Source: Author's calculations based on 2003 Quality of Life
Survey (DANE) and 2008 Quality of Life Survey (DANE)

Table 8 Average Treatment Effects on Quality of Dwelling
Social housing (1st to 7th income deciles)

| Treatment | 2003[a] | | | 2008[b] | |
	ATT	P-Value	Bootstrap Std Error	P-Value	Bootstrap Std Error
Housing Credit	0.178**	0,035	0,084	0,028	0,065
Housing Subsidy	0.356***	0	0,086	0,582	0,07

Source: Author's calculations based on 2003 Quality of Life Survey (DANE) and 2008

Note: a. The survey provides credit and subsidy information on dwellings acquired

b. The survey provides credit information on dwellings acquired between 2003 and 2007.

provided during the previous 12 months before the survey was conducted.

Coefficient significant at ***1% level, ** 5% level, *10% level

Table 9 Results of the Quality of Life Index

| | Component 1 | | | | Component 1 | |
	2003	2008			2003	2008
				Physical capital		
Human Capital				Washing machine	0,22	0,21
No education	-0,14	-0,12		Refrigerator	0,21	0,21
Primary Education	-0,10	-0,09		Stove	0,22	0,17
Secondary Education	0,07	0,04		Computer	0,22	0,25
High Education	0,17	0,18		Vehicle	0,16	0,18
Children 7 to 11 not attending school	-0,13	-0,09		Television	0,22	0,21
Access to health services	0,12	0,08				
				Subjective conditions		
Socio-demographic variables				Subjective poor	-0,18	-0,18
High economic dependency	-0,13	-0,12		Excellent life conditions (subjective)	0,12	0,15
Crowding	-0,14	-0,16		Good life conditions (subjective)	0,08	0,09
				Acceptable life conditions (subjective)	-0,09	-0,12
House Conditions				Bad life conditions (subjective)	-0,08	-0,14
Access to water	0,21	0,18				
Access to sewerage	0,23	0,21				
Access to electricity	0,22	0,19				
Access to toilet services	0,24	0,24				
Access to rubbish collection services	0,24	0,19				
Walls made of Bricks	0,20	0,17				
Walls made of Adobe	-0,06	0,00				
Walls made of Wattle and daub	-0,07	-0,05				
Walls made of Wattle	-0,11	-0,10				
Walls made of Wood	-0,12	-0,13				
Walls made of Prefabricated Material	0,02	0,06				
Walls made of Bamboo, cane, another plant	-0,11	-0,12				
Walls made of Zinc, Cloth	-0,10	-0,09				
Floors made of Parquet, marble	0,11	0,17				
Floors made of Carpet	0,16	0,15				
Floors made of Vinyl, tiles, bricks	0,12	0,14				
Floors made of Wood, Other plant	-0,09	-0,08				
Floors made of Cement	-0,08	-0,12				
Floors made of Dirt	-0,17	-0,19				
Cooking in kitchen	0,12	0,16				
Cooking in bedroom	-0,07	-0,10				
Cooking in livingroom with sink	0,03	0,00				
Cooking in livingroom without sink	-0,04	-0,09				
Coooking in courtyard/corridor/outdoors	-0,14	-0,14				
No place for cooking	-0,02	-0,05				
Availability of bathroom	0,24	0,23				

Source: Author's calculations based on 2003 Quality of Life Survey (DANE) and 2008 Quality of Life Survey (DANE)

Table 10 Average Treatment Effects on Quality of Life
Social housing (1st to 7th income deciles)

Treatment	2003[a]			2008[b]		
	ATT	P-Value	Bootstrap Std Error	ATT	P-Value	Bootstrap Std Error
Housing Credit	0.169*	0,091	0,1	0.161*	0,093	0,096
Housing Subsidy	0.379**	0,034	0,179	-0,059	0,667	0,137

Source: Author's calculations based on 2003 Quality of Life Survey (DANE) and 2008

Note: a. The survey provides credit and subsidy information on dwellings acquired

b. The survey provides credit information on dwellings acquired between 2003 and 2007.

 provided during the previous 12 months before the survey was conducted.

Coefficient significant at ***1% level, ** 5% level, *10% level

Table 11 Marginal Effects of the Housing Credit Equation and Housing Subsidy Equation, 2003
Social housing (1st to 7th income deciles)

	Housing Credit		Housing Subsidy	
	Probit Model	Maddala Adjustment	Probit Model	Maddala Adjustment
Housing Subsidy	0.117***			
	(0,251)			
Predicted Value: Housing Subsidy		-0,033		
		(1,737)		
Housing Credit			0.149***	
			(0,211)	
Predicted Value: Housing Credit				0,152
				(0,000)
Age of Head	0,008	0,01	0.008*	0.015*
	(0,054)	(0,056)	(0,029)	(0,049)
Age of head (squared)	0,000	0,000	0,000	-0.000*
	(0,001)	(0,001)	(0,000)	(0,001)
Female	-0.055**	-0.050*	0.064**	0.084**
	(0,284)	(0,290)	(0,147)	(0,192)
Household size	-0,006	-0,006		
	(0,056)	(0,053)		
Informal Worker	0,005	-0,001	-0,036	-0,046
	(0,176)	(0,174)	(0,160)	(0,168)
Assets Index	0.047**	0.050**	-0,006	-0,003
	(0,182)	(0,198)	(0,143)	(0,191)
Income quintile 1	0,004	0,016	0,062	0,081
	(0,271)	(0,268)	(0,244)	(0,336)
Income quintile 2	-0,038	-0,031	0,062	0,082
	(0,266)	(0,319)	(0,247)	(0,342)
Income quintile 3	-0,010	0,001	0,061	0,068
	(0,153)	(0,221)	(0,220)	(0,305)
Primary Education	-0.139***	-0.150***		
	(0,280)	(0,310)		
Secondary Education	-0.062***	-0.069**		
	(0,252)	(0,291)		
Married Head / Cohabiting couple	-0,002	0,000		
	(1,044)	(0,357)		
Divorced/Widowed Head	-0,027	-0,022		
	(1,179)	(0,418)		
Urban	0,014	0,004	-0.080***	-0.077**
	(0,229)	(0,211)	(0,170)	(0,189)
Head has a credit card	0,031	0,026		
	(0,491)	(0,485)		
Head has a programmed savings account			0.350***	0.244**
			(0,297)	(0,354)
Crowding			-0,008	-0,034
			(0,170)	(0,211)
Observations	660	641	814	624
Pseudo R	0,206	0,179	0,127	0,103

Source: Author's calculations based on 2003 Quality of Life Survey (DANE)

Bootstrap standard errors in parentheses. Regional dummies not reported.

Coefficient significant at ***1% level, ** 5% level, *10% level

Table 12 Marginal Effects of the Housing Credit Equation and Housing Subsidy Equation, 2007 Social housing (1st to 7th income deciles)

	Housing Credit		Housing Subsidy	
	Probit Model	Maddala Adjustment	Probit Model	Maddala Adjustment
Housing Subsidy	0.069***			
	(0,075)			
Predicted Value: Housing Subsidy		0.144***		
		(0,327)		
Housing Credit			0.018***	
			(0,000)	
Predicted Value: Housing Credit				-0,036
				(0,260)
Credit Score	-0.000045***	-0.000048***		
	(0,000)	(0,000)		
Temporary Job Contract	0.030**	0.032**		
	(0,092)	(0,092)		
Permanent Job Contract	0,017	0,020		
	(0,089)	(0,089)		
Age of Head	-0.006***	-0.006***	-0.002***	-0.002*
	(0,012)	(0,012)	(0,010)	(0,011)
Age of Head	0.000***	0.000**	0,000	0,000
	(0,000)	(0,000)	(0,000)	(0,000)
Primary Education	0,099	0.101***	0,000	-0,004
	(1,801)	(1,741)	(1,635)	(1,574)
Secondary Education	0,178	0,18	-0,001	-0,009
	(1,802)	(1,739)	(1,630)	(1,575)
High Education	0,157	0,157	0,006	-0,009
	(1,799)	(1,739)	(1,630)	(1,575)
Married head / Cohabiting couple	-0.017***	-0.017***	-0.004**	-0,006
	(0,034)	(0,034)	(0,029)	(0,035)
Widowed head / Divorced head	0,009	0,009	-0,003	-0,001
	(0,060)	(0,061)	(0,062)	(0,076)
Male	0,007	0,006	0,000	-0,004
	(0,032)	(0,032)	(0,029)	(0,033)
Loan used to acquired a new house	0.040***	0.034***	0.059***	0.092***
	(0,031)	(0,038)	(0,043)	(0,045)
Log of household income	-0.249***	-0.246***	-0.019***	-0.057***
	(0,033)	(0,034)	(0,029)	(0,052)
1st income quintile			0.063***	0.146***
			(0,064)	(0,208)
2nd income quintile			0.039***	0.112***
			(0,064)	(0,204)
3rd income quintile			0.014***	0.064**
			(0,067)	(0,181)
4th income quintile			0,006	0.029*
			(0,068)	(0,132)
No. of dependent household members	0.018***	0.018***	0.002***	0.005***
	(0,017)	(0,017)	(0,015)	(0,017)
Observations	18.976	18.537	28.388	18.252
Pseudo R	0,486	0,487	0,322	0,292

Source: Author's calculations based on private bank dataset

Bootstrap standard errors in parentheses. Regional dummies not reported.

Coefficient significant at ***1% level, ** 5% level, *10% level

Table 13 Marginal Effects of the Loan Guarantee Equation

Dependent variable: Loan Guarantee	Only Social Housing Loans
Credit Score	-0.000*
	(0,000)
Permanent Job Contract	0,01
	(0,090)
Temporary Job Contract	0,016
	(0,092)
Age	0
	(0,009)
Age squared	0
	(0,000)
Primary Education	-0,087
	(0,345)
Secondary Education	-0,114
	(0,343)
High Education	-0.173**
	(0,344)
Married head / Cohabiting couple	-0.042***
	(0,027)
Widowed head / Divorced head	-0,019
	(0,056)
Male	0.012*
	(0,026)
Loan used to acquired a new house	0.035***
	(0,027)
Log of household income	-0.183***
	(0,022)
No. of dependent household members	0.027***
	(0,013)
Observations	18.974
Pseudo R	0,163

Source: Author's calculations based on private lender dataset

Robust standard errors in parentheses. Regional dummies not reported.

Coefficient significant at ***1% level, ** 5% level, *10% level

Table 14 Marginal Effects of the Default Equation

Dependent variable: Default	(1) All Housing Loans	(2) Only Social Housing Loans
Social housing loan	0.035***	
	(0,076)	
Loan guarantee		0.014***
		(0,042)
Permanent Job Contract	0,013	0,011
	(0,154)	(0,162)
Temporary Job Contract	0,014	0,01
	(0,156)	(0,165)
Age	0,000	0,000
	(0,013)	(0,014)
Age squared	0,000	0,000
	(0,000)	(0,000)
Primary Education	-0,005	-0,007
	(0,079)	(0,081)
Secondary Education	0.009***	0.012***
	(0,043)	(0,044)
Married head / Cohabiting couple	0,004	0,005
	(0,043)	(0,045)
Widowed head / Divorced head	-0,003	-0,008
	(0,091)	(0,098)
Male	0,003	0,004
	(0,040)	(0,042)
Loan used to acquired a new house	-0.008***	-0.011***
	(0,039)	(0,041)
Log of household income	0,003	0.010**
	(0,036)	(0,041)
No. of dependent household members	0.004***	0.005***
	(0,019)	(0,020)
Observations	18.907	14.722
Pseudo R	0,048	0,025

Source: Author's calculations based on private lender dataset

Robust standard errors in parentheses. Regional dummies not reported.

Coefficient significant at ***1% level, ** 5% level, *10% level

Table 15 Marginal Effects of the effect of loan guarantees on housing loans

Dependent variable: Housing Loans	R.E. Model	Dependent variable: Housing Loans
NFG loan guarantees program (dummy)	-0,197	META
	(0,314)	
Regional GDP per capita (logs)	-2,299	NARIÑO
	(1,981)	
Regional unemployment rate	-11.408***	NORTE DE SANTANDER
	(5,734)	
Bankarization of the region [a]	-63,062	RISARALDA
	(83,746)	
2006	-0.897***	SANTANDER
	(0,302)	
2008	-1,413	SUCRE
	(0,893)	
BOLÍVAR	-2,58	
	(2,268)	Constant
CALDAS	-8.330***	
	(2,176)	
CAQUETA	-7.469***	
	(3,657)	
CESAR	-3,8	
	(2,951)	
CÓRDOBA	-8.494***	
	(2,945)	
CUNDINAMARCA	-2.529***	
	(0,662)	
HUILA	-5.842***	
	(2,559)	
MAGDALENA	-4,72	
	(2,954)	
Observations	186	
Number of municipalities	62	

Source: Author's calculations based on

NFG dataset, DANE, and Asobancaria

a. proportion of regional savings accounts

to the total national