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## **Housing Finance in Mexico:**

### **Current State and Future Sustainability**

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**November 2011**

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## Abstract<sup>1</sup>

In 2001, Mexico introduced a comprehensive federal housing policy package. The results have been quantitatively impressive; however, there are qualitative concerns. It is also uncertain whether current subsidy programs have negative financial implications for participating mortgage issuers, as poorer applicants with lower job stability are injected into the pool of borrowers. This paper addresses that question by analyzing a large database provided by INFONAVIT, Mexico's principal mortgage issuer, which contains information on borrowers' repayment behavior. It is found that borrowers who received subsidies do not show higher default rates than borrowers who received no financial assistance. Borrowers receiving subsidies actually take longer to show their first default than borrowers not receiving subsidies. Therefore, current subsidy programs do not seem to have negative financial implications for participating mortgage institutions.

**JEL classifications:** G18, G21, G28, H81, R31, R38, R51

**Keywords:** Mexico, Housing, Housing finance, Financial sector, Access to credit, Market failures, Public Policy, Policy adequacy, Mortgage insurance

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## Executive Summary

Housing Finance has boomed in Mexico over the last decade, due—at least partially—to a policy package introduced by the Mexican Federal Government. The Government’s efforts, which began in 2001, have included a financial and operational overhaul at INFONAVIT, the largest public mortgage bank; the creation of a specialized organization (*Comisión Nacional de la Vivienda* CONAVI) to coordinate housing-sector efforts; the implementation of a large scale subsidy program for low-income families to purchase housing (*Esta es Tu Casa*); the development of co-financing products and a secondary (mortgage-backed securities) market; and the creation of a guarantee program, operated by a second-tier development bank. The results have been quantitatively impressive: the number of mortgages issued in the country increased by 126 percent over the 2000-2008 period.

However, the qualitative side of the story shows troublesome issues. Regulation is inconsistent and inadequate. Consumer satisfaction with the quality of housing, developers and financial intermediaries’ services is far from what it should be. Developers, moreover, might be running out of suitable land. Investment protection can be significantly improved, as foreclosure procedures can take two or even three years in some states. Participants in the market have relied heavily on new housing as the most appropriate way to satisfy demand, failing to take advantage of a large existing used housing stock. Moreover, current subsidy programs could have negative financial implications for participating mortgage issuers, as poorer applicants—who have lower job stability—are injected into the pool of borrowers. This last issue is highly relevant considering access to mortgage credit has expanded significantly

On this last subject, the authors analyze a large database provided by the main mortgage issuer in the country, which contains information on the repayment behavior of borrowers. We find that borrowers who received upfront subsidies do not show higher default rates than similar borrowers who did not receive assistance. Borrowers receiving subsidies actually take longer to show their first default than borrowers not receiving subsidies.

Therefore, we conclude that current subsidy programs do not seem to have negative financial implications for participant mortgage institutions. However, the program’s current cut-off point seems to be inefficient in targeting benefits only workers who would not otherwise be able to purchase a house; the cut-off point should therefore be revised.

## 1. Introduction

Housing finance and construction seem to enjoy a privileged position in the mind of policymakers throughout the world. Such is certainly the case of Mexico: the country's 2007-2012 National Development Plan (Gobierno Federal, 2007) states “promoting the development of the housing and construction sectors is a central element of the Administration's strategy.”<sup>2</sup>

Such prominence seems to derive from the notion that housing construction, finance and ownership imply large private benefits and positive public externalities. A quality house is said to enable families to increase their capabilities and thus enlarge their wealth, both for its current members and for future generations (Gobierno Federal, 2007;<sup>3</sup> US Department of Housing, 2010;<sup>4</sup> Boehm and Schlottmann, 2004<sup>5</sup>). Housing construction is considered an important engine for job creation and a key to promoting a strong domestic economy (Gobierno Federal, 2007;<sup>6</sup> CONAVI, 2008<sup>7</sup>). Moreover, housing ownership is believed to promote citizenship and community participation (CONAVI, 2008<sup>8</sup>).

In this context of public discourse context, the 2000-2006 Mexican Federal Administration launched a comprehensive policy package geared towards promoting housing finance, construction and ownership, which has been maintained by the 2007-2012 Administration. The package includes operational, planning and financial adjustments at the

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<sup>2</sup> *Programa Nacional de Desarrollo 2007-2012*, Gobierno Federal, 2007 (Section 2.13) states “Una vivienda de calidad, con certidumbre jurídica sobre su propiedad, permite a las familias generar mayor riqueza, tanto para las generaciones actuales, como para las futuras.”

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<sup>4</sup> U.S. Department of Housing and Urban Development(<http://portal.hud.gov/portal/page/portal/HUD/about/mission>), states, “HUD is working to (...) utilize housing as a platform for improving quality of life.”

<sup>5</sup> Boehm and Schlottmann, 2004; *Wealth Accumulation and Homeownership: Evidence for Low-Income Households*. The authors state “[...] Over the nine year period of the study, owned housing is an important means of wealth accumulation. Indeed, the results may be broadly interpreted for lower income households as implying that housing wealth is total wealth. [...] These results tend to support public policies aimed at both increasing homeownership opportunities in general and those policies that focus on homeownership for lower income households.”

<sup>6</sup> *Programa Nacional de Desarrollo 2007-2012*, Gobierno Federal, 2007 (Section 2.13): “La construcción y la vivienda son sectores altamente generadores de empleos y que tienen el potencial de constituirse en motores del crecimiento de la demanda interna, reduciendo la sensibilidad ante fluctuaciones en la economía internacional”

<sup>7</sup> *Programa Nacional de Vivienda 2008-2012*, CONAVI, 2008: “Poner al alcance de las familias mexicanas la vivienda que requieren, no sólo satisface una demanda social, sino también impulsa el crecimiento de la economía y del empleo y derrama recursos que —cerrando un círculo virtuoso— permiten a la familia hacerse de una casa.”

<sup>8</sup> Presentation on the *Programa Nacional de Vivienda 2008-2012*, CONAVI, 2008: “La vivienda es el espacio en el que la familia encuentra estabilidad, seguridad, consolidación patrimonial, sentido de pertenencia y el entorno necesarios para el desarrollo integral del ciudadano, de la pareja y de los hijos.”

largest public-sector mortgage bank (which enabled it to boost mortgage issuance); the encouragement of new private-sector mortgage issuers; the establishment of a mortgage-backed securities market, and the implementation of a large-scale grant program for the acquisition of affordable housing, focused on low-income families.

The results have been quantitatively impressive. The number of housing mortgages issued each year almost tripled from 2000 to 2009. Yearly grants for the purchase of affordable housing reached 340,475 units in 2009. Financial institutions have issued mortgage backed securities for seven years now. The four largest housing developers are now traded in the stock market.

However, the qualitative side of the story is mixed and shows some troublesome issues. Consumer satisfaction with housing quality is far from what it should be. Regulation is inadequate and inconsistent among all three executive-branch levels of government. Developers might be running out of suitable land, as cities' limits reach formerly rural, *ejido*-owned property, which requires cumbersome procedures for the land to be cultivated. Investment protection needs to be significantly improved, as foreclosure procedures can take two or even three years in some Mexican states. Market participants have relied heavily on new housing as the most appropriate way to satisfy demand, with insufficient efforts to take advantage of a large existing used housing stock. A large informal sector implies a limited pool of potential customers with easily-verifiable creditworthiness information. No public institution collects nor publishes significant information for the healthy development of a housing market, such as housing starts, issuance of property titles, or units built.

Moreover, the current large subsidy programs—which have been a key element of housing policy—could present significant financial costs to mortgage banks. Up-front grant programs are explicitly designed to enable relatively poor applicants to obtain a mortgage and purchase a house; since poorer workers show lower job stability, they could show higher default rates, and therefore present higher servicing costs, than previous, higher-income customers. However, the largest mortgage issuer in the country currently offers lower rather than higher interest rates as an applicant's income decreases.

Despite its potential relevance—in a context in which access to credit is being substantially increased—this last issue has not yet been analyzed in existing academic or policy-oriented literature; our paper seeks to contribute to the understanding of the topic. We analyze a database containing information on INFONAVIT's mortgage operations over the last few years

and try to identify whether borrowers who received subsidies show a different repayment behavior than comparable borrowers who did not.

The paper is structured as follows. We begin by reviewing previous work on the Mexican housing finance market in Section 2. The current state of the housing finance system is examined in Section 3: we discuss market trends, identify the main participants currently active in the market, and discuss the problems that the housing finance market currently faces. In Section 4 we describe the empirical analysis we performed on the repayment behavior of borrowers. The final chapter contains our conclusions.

## **2. Literature Review**

Existing papers have thoroughly examined the state of the Mexican housing finance system. The majority of existing literature dates back to the 1990s and 2000s. Some of the findings have lost relevance due to various changes made by the housing policy package introduced since 2001, although other findings remain applicable.

The most recurrent topic in literature (e.g., Giugale, Lafourcade and Ngyen, 2001; Zanforlin and Espinosa, 2008) is the fact that the Mexican housing finance system has traditionally relied too heavily on public mortgage banks. As will be discussed further in Section 3.2.1.1, two public mortgage institutions (INFONAVIT and Fondo para la Vivienda del Instituto de Seguridad y Servicios Sociales para los Trabajadores del Estado FOVISSSTE) hold about 82 percent of the primary mortgage market. They are both provident funds, financed by employers' mandated contributions; funds that are not used by a worker towards housing purchase are returned to him or her upon retirement. They have also been quite active in the mortgage-backed security market. Thus, it is argued, INFONAVIT and FOVISSSTE have a crowding-out effect on private participation in both pensions and mortgage finance. Giugale, Lafourcade and Ngyen (2001) go on to argue that "from a purely economic perspective, in a modern, globally integrated Mexican economy, it is hard to argue for the continued existence of an institution such as INFONAVIT."<sup>9</sup>

In a recent paper, Carballo-Huerta and González-Ibarra (2009) provide an interesting assessment of developments in the Mexican housing finance market. They find that recent

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<sup>9</sup> Giugale, Lafourcade and Nguyen (2001, p. 264).

macroeconomic stability and fiscal policies support higher financial resource availability for the private sector. They argue that public and private financial intermediaries have increased the supply of housing finance through innovation in funding sources and credit mortgage products, enabling a housing finance expansion that had no negative effects on commercial banks’ solvency and credit coverage. They also find that the Mexican mortgage market is still conservative and small compared to other emerging market economies, and that securitization of mortgage-backed assets is not a common practice in Mexico.

In regards to the effects of subsidies on repayment behavior—which is the focus of this paper’s empirical analysis chapter—the authors are not aware of any existing study on Mexico. Ruprah and Marcano (2007) evaluate the effect of subsidies on delinquency rates in Chile; their methodological approach is very similar to the one used in this paper. They find that borrowers, who received a government-sponsored, subsidized loan, do not show a different delinquency rate than borrowers who received private-party mortgages.

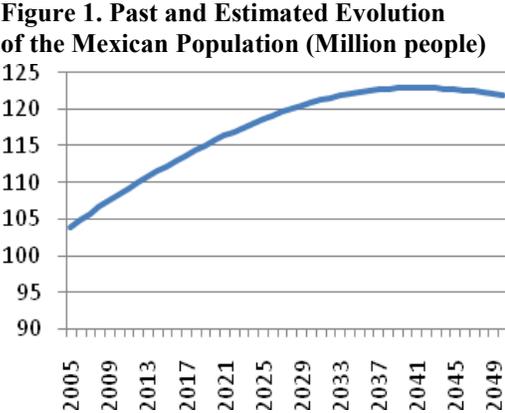
**3. State of the Housing Finance System**

**3.1. Housing Trends**

This section describes the evolution of both demographic and economic factors in Mexico, as a context of the Mexican housing finance market. It also shows the evolution for housing outcomes and elaborates on the efficiency of the housing and housing-related markets.

*3.1.1. Demographic and Economic Factors*

Over the last few decades, demographic and economic factors have combined to increase the need for housing in Mexico. As shown in Figure 1, the country’s population is expected to continue growing—though at reduced rates—until it peaks at about 122 million people in the year 2040. The number of households has increased correspondingly: it is expected that by the end of 2010 there will be 2.9 million households more than in 2005. This demographic phenomenon, along with

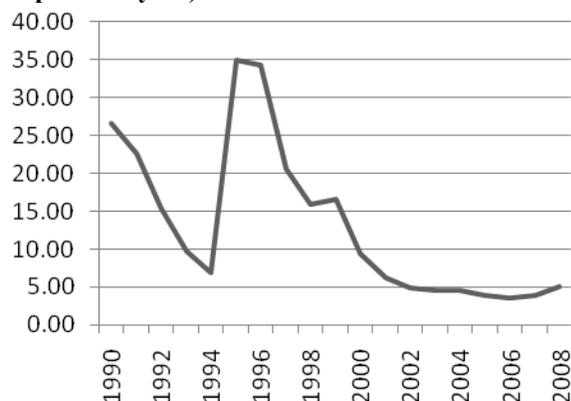


Source: Author’s compilation with data from CONAPO (2010).

previous backlog (i.e., previously-generated demand that met no supply) has led the Mexican Federal Government to estimate the demand for new housing at 7 million units for the 2008-2013 period (CIDOC and SHF, 2008, page 42).

Moreover, in the last decade Mexico has come substantially closer to achieving economic stability. Since the 1995 “Tequila Crisis,” GDP growth has averaged 3.6 percent a year (World

**Figure 2. Inflation Rate (Consumer Prices, percent vs. previous year)**



Source: World Development Indicators and Global Development Finance

Bank). Inflation has been below 10 percent since the year 2000 (see Figure 2).

The aforementioned growth has not been enough to put the country on a sustained path to closing the gap with rich nations; however, it has enabled the country to sustain a favorable trend in poverty reduction. The number of non-poor households increased by almost 20 million from 1992 to 2006 (see Figures 3-6).<sup>10</sup>

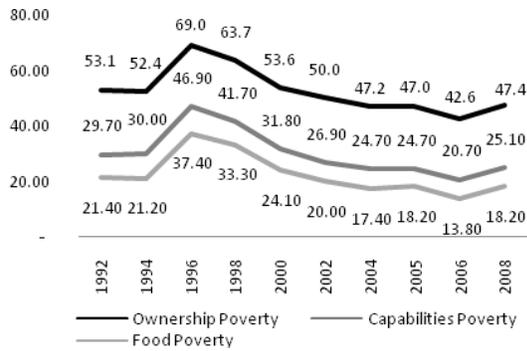
<sup>10</sup> The Social Development Law, which came into effect on January 2004, entrusts the National Council for Social Policy Evaluation (Consejo Nacional de Evaluación de la Política Social, CONEVAL) with defining and measuring poverty. Until November 2009, CONEVAL used an income-based methodology for measuring poverty, with three poverty lines:

- Food poverty: An income level insufficient to cover the cost of a basic food basket, even if the household devoted its entire income to its purchase.
- Capabilities poverty: An income level insufficient to cover the costs of a basic food basket, plus health and education expenses even if the household devoted its entire income to the purchase of said items.
- Ownership poverty: An income level insufficient to cover the costs of a basic food basket, plus health, education, transportation, housing and clothing expenses even if the household were to devote its entire income to the purchase of said items.

In December 2009, CONEVAL formalized a new methodology, which measures poverty along several dimensions of well being.

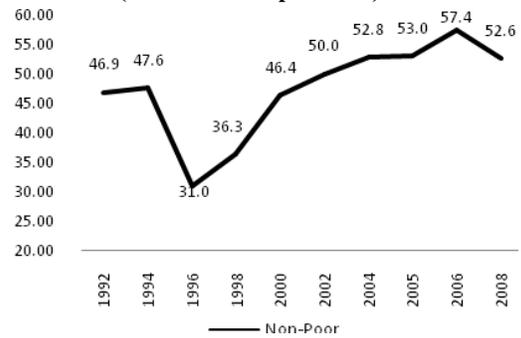
This paper uses the first methodology, because results for the second one are only available for 2008 (but not for previous years).

**Figure 3. Evolution of Poverty in Mexico, 1992-2008 (Percent of Population)**



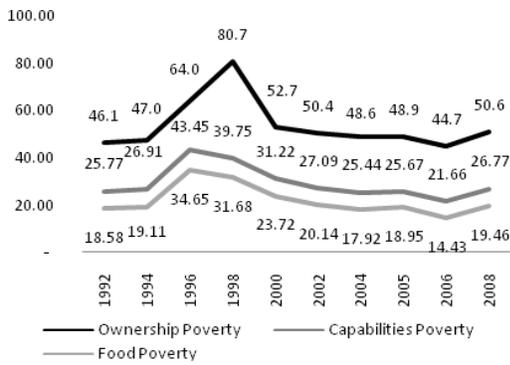
Source: Authors' compilation, with data from CONEVAL.

**Figure 4. Evolution of the Non-poor in Mexico, 1992-2008 (Percent of Population)**



Source: Authors' compilation, with data from CONEVAL.

**Figure 5. Evolution of Poverty in Mexico, 1992-2008 (Millions of people)**



Source: Authors' compilation, with data from CONEVAL.

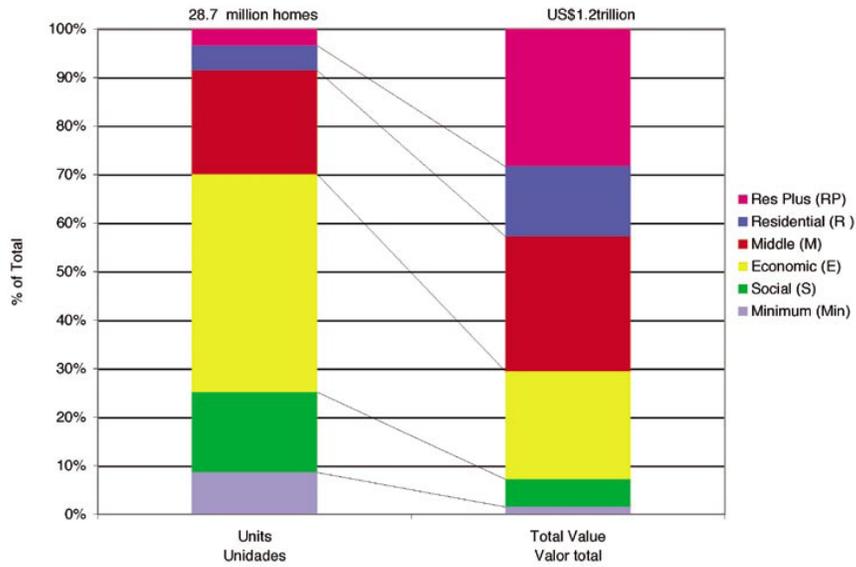
**Figure 6. Evolution of the Non-poor in Mexico, 1992-2008 (Millions of people)**



Source: Authors' compilation, with data from CONEVAL.

### 3.1.2. Housing Stock and Ownership

**Figure 7. Stock of Housing, 2007**



Source: Softec (2008)

The stock of housing in Mexico is estimated to be somewhere between 28 and 30 million units. Seventy percent of existing housing units are estimated to be affordable housing (the rest being middle, residential or residential-plus).

No public institution in the housing market seems to collect information from municipalities regarding housing starts.

Home ownership is comparatively high in Mexico: almost 80 percent of households own their home, which is substantially higher than most Latin American countries.

**Table 1. Rental vs. Ownership, Selected Countries (2009)**

	Own	Rent		Own	Rent
Hungary	92%	8%	Peru	69%	31%
Spain	87%	13%	USA	69%	31%
Venezuela	81%	19%	Ecuador	68%	32%
<b>Mexico</b>	<b>80%</b>	<b>20%</b>	Uruguay	68%	32%
Panama	78%	22%	Sweden	67%	33%
Nicaragua	78%	22%	Guatemala	62%	38%
Norway	78%	23%	Finland	61%	39%
Italy	76%	24%	Czech Republic	61%	39%
Poland	76%	25%	France	57%	43%
Costa Rica	75%	25%	Colombia	53%	48%
Brazil	74%	26%	Denmark	51%	49%
Chile	72%	28%	Germany	45%	55%
United Kingdom	70%	30%	Switzerland	35%	65%
El Salvador	70%	30%			

Source: INFONAVIT, with information from McKinsey and Co.

**Table 2. Ownership Rates by Income Percentile, 2008**

Income Decile (1= lowest)	Rents	Owns	Borrows	Other
1	8%	77%	14%	1%
2	15%	67%	15%	3%
3	17%	63%	16%	4%
4	16%	62%	17%	5%
5	15%	64%	15%	6%
6	16%	64%	13%	8%
7	15%	65%	11%	9%
8	13%	65%	11%	10%
9	13%	67%	8%	12%
10	11%	73%	5%	10%

Source: Authors' compilation using ENIGH, 2008.

House ownership, as can be expected, varies with income level. Interestingly, it is highest for the lowest-income decile; decreases as income increases for deciles 2 to 4, and then increases again for deciles 5 and higher. Housing ownership also differs by state: it ranges from about 64 percent (Quintana Roo) to 85 percent (Oaxaca). The number of households choosing rental as a housing option has been increasing for

the past 15 years, from 11.6 percent in 1992 to 14.3 percent in 2006.

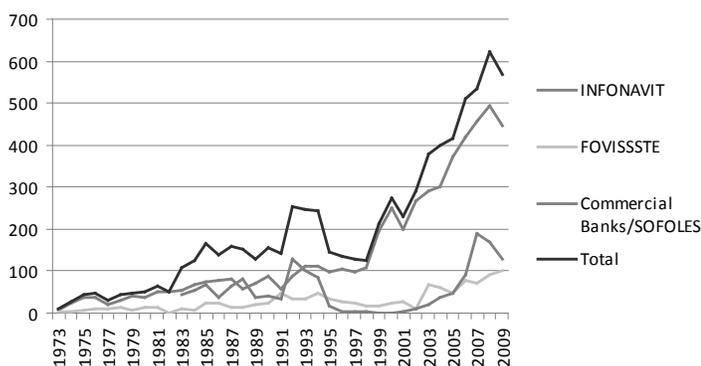
### 3.1.3. Housing Outcomes

Over the last decade, the Mexican housing finance market has been characterized by a significant expansion: the total number of mortgage loans originated since 1997 has increased at a yearly average rate of 29 percent (see Figure 8).

This impressive growth is correlated with a comprehensive policy package rolled out in 2001. The package included a financial

and operational overhaul at INFONAVIT, the largest public mortgage bank; the creation of CONAVI, a specialized organization that coordinates housing-sector efforts; the creation of a large subsidy program for low-income families to purchase a house (*Esta es Tu Casa*); the development of co-financing products and a secondary (mortgage-backed securities) market; and the creation of a guarantee program, operated by a second-tier development bank, Sociedad Hipotecaria Federal (SHF).

**Figure 8. Evolution of Loan Origination by Main Participants (number of loans)**



Total corrected for co-financed loans.

Source: Authors' with information from: López, Marco and Paulina Campos (2007) and BBVA Bancomer, Situación Inmobiliaria México (January 2010)

### 3.1.4. Efficiency of Housing and Housing-related Markets

The housing market faces important challenges in terms of efficiency. For instance, no housing-related institution collects information on housing starts or on title issuance from municipal or state governments. Therefore, no official information is available on the unsold stock of new housing in different segments and localities.

Moreover, up until late 2009, there were no publicly-available indexes that summarized how the market functions. In September 2009, SHF presented a Housing Price Index (*Índice SHF de Precios de la Vivienda en México*), which estimates the evolution of housing prices, as a composite across all housing segments. No detailed information is available yet for each separate segment, or for new and used housing separately.

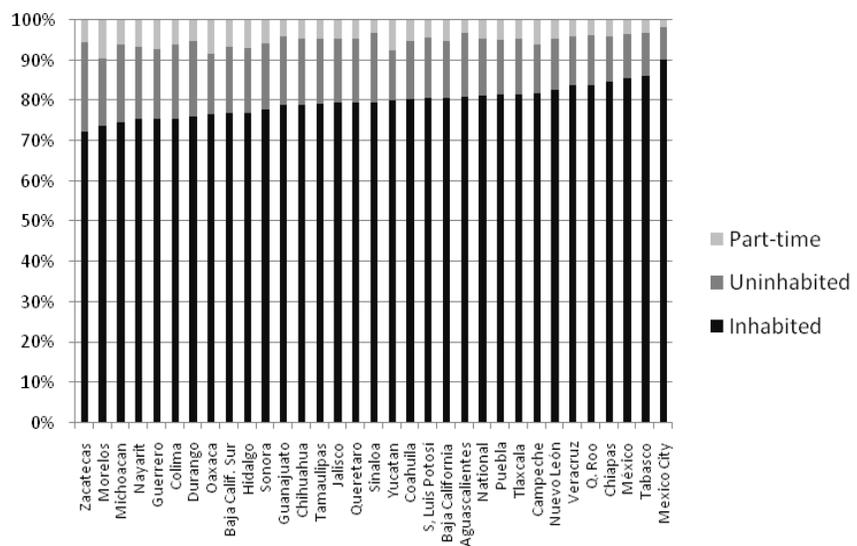
The lack of relevant information is an obstacle for appropriate planning at both the public (urban development) and private (housing finance and investment) levels. It helps explain why some regions in the country have systematically suffered from under-supply and others from over-supply.

An additional challenge is how to better utilize used housing: the market seems to be relying too heavily on new housing to meet demand. The latest available data (National Institute of Statistics, INEGI) show that by 2005, 14.2 percent

of the country's 30 million houses were uninhabited, up from 2000's 11.6 percent. The figure is widely expected to have increased again by 2010.<sup>11</sup>

The distribution of uninhabited housing is heterogeneous across states, ranging from 22 percent in

**Figure 9. State Distribution of Uninhabited Housing**



Source: INEGI (2005).

<sup>11</sup> Results of the 2010 Census are still not publicly available.

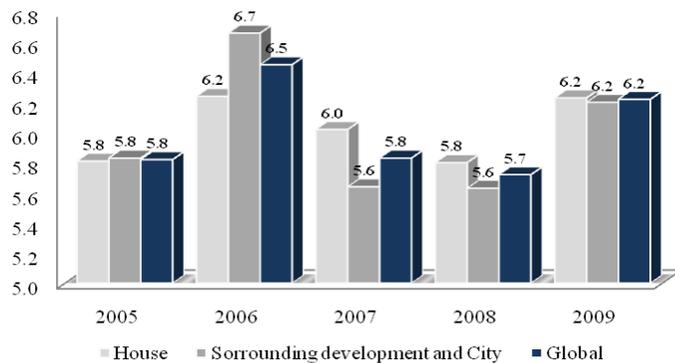
Zacatecas to 8 percent in Mexico City.

Another major challenge is promoting a better quality of life for those buying new homes, especially those living in large housing developments. In recent years, the fast growth of the housing construction industry and the lack of proper regulation and urban planning have created problems in the creation of conditions for a sustainable quality of life. Since 2005, SHF has been estimating a Global Index of Residential Satisfaction. The Index measures satisfaction along two dimensions:

- The house itself (e.g., its physical characteristics and functionality); and
- The surrounding development and city (e.g., convenience of location, quality of services, public facilities).

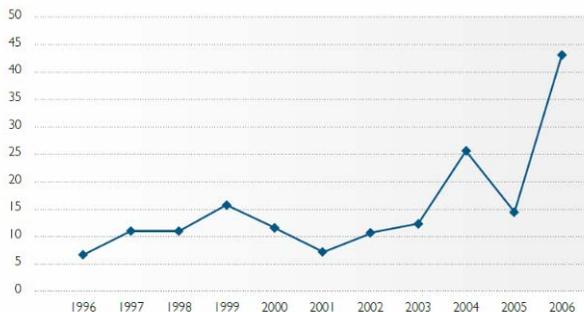
Respondents for the 2009 edition of the Index rated their overall satisfaction at a mediocre 6.22 out of 10 possible points. Previous satisfaction levels have been between 5.72 and 6.45 (see Figure 10). In the housing dimension the average score for 2009 was 6.23 points, while satisfaction with the city/town and the development where their homes are located received a score of 6.2. Respondents seem to be particularly dissatisfied with urbanization/services, and location.

**Figure 10. Global Index of Residential Satisfaction**



Source: Residential Satisfaction Research 2008, 2009 and 2010, [www.shf.gob.mx](http://www.shf.gob.mx)

**Figure 11. Average Distance Between Urban Center and New Housing Developments (Kilometers)**



Source: Sedesol, 2008.

In fact, the distance between most new, large-scale housing developments and the cities' centers and job locations has been growing steadily in recent years (See Figure 11). As can be expected, bad location affects the daily lives of new-housing inhabitants.

The Federal Social Development Ministry (SEDESOL) is expected to issue specific guidelines regarding infrastructure, public facilities and

adequate linkage to the urban environment. These guidelines would have to be complied by all land or housing developments financed with federal funding (say, federal subsidies), or with funding from federal housing institutions (such as INFONAVIT or FOVISSSTE). Since INFONAVIT and FOVISSSTE provide eight out of every 10 mortgage loans in the country, SEDESOL's guidelines are expected to be mandatory for almost every single development in the country. These guidelines are also expected to promote gradual homogeneity in local urban development regulation. There are, however, concerns regarding the possible impact of these guidelines on housing costs, and therefore, in housing supply and finance.

Another related problem is the increasing difficulty in finding legally-ready, suitable land for housing development. Constant expansion of cities requires availability of vast tracts of land adjacent to currently developed areas, and Mexican cities are surrounded by land held under a social scheme of property which is not easily transacted.

Mexico has two basic schemes of land property. The first is private property, which accounts for more than a third of the territory. The second scheme is social property, which accounts for more than half of Mexican territory. The remaining Mexico territory (10 percent) is federal land, which includes national parks and waterways (see Table 3).

Social property can be classified into two types: *ejidos* (83 percent of social-property land) or *comunidades agrarias* (the remaining 17 percent). Both kinds of agrarian regimes, *ejidos* and *comunidades agrarias*, have in common that the beneficiaries of land reform have the right to use the land, but do not have full ownership. *Ejidos* are areas with individual parcels granted to *ejidatarios* and may or may not include areas of common-use land. In *comunidades agrarias*, parceling is prohibited by law. All land is supposed to be used communally by agrarian subjects—called *comuneros*—living in the same community. In practice, there is informal parceling, as members of the community reach an agreement about land allocation.

From 1917 to 1992, neither *ejidos* nor *comunidades agrarias* could sell their land. In 1992, Mexican law was modified to allow *ejidatarios* to transfer their land to private property (and therefore be able to sell it). However, the procedure set forth is long and cumbersome: it first involves measuring and parceling out any common-resource land (i.e., allotting parcels to individual *ejidatarios*); then converting the “parcel rights” into private property rights (which must be approved by a majority of the *ejido*’s *ejidatarios*); subsequently, confirming that no *ejidatario* family member objects to the transfer or is interested in buying the land (because they have a legal right of preference). Only then can owners sell to a potential buyer. This situation imposes important obstacles to developers looking for suitable land.

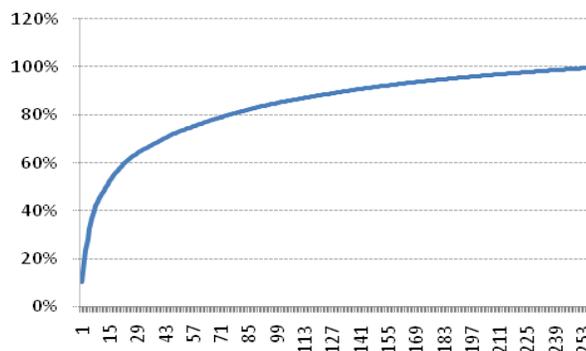
The development market, for its part, seems to be consolidating. As we can see in Figure 12, 60 percent of new houses mortgaged by INFONAVIT in 2009 were built by 25 companies. Today, the largest players are Homex, Geo, Urbi, Ara, Sare, Consorcio Hogar, Sadasi and Ruba. The

**Table 3. Land Property Regimes in Mexico**

Property regime	Total area (sq. km.)	% of total land
Social Property	1,016,221	53%
Private Property	719,217	37%
Federal land, waterways	187,602	10%
<b>Total</b>	<b>1,923,040</b>	

Source: INEGI (2005).

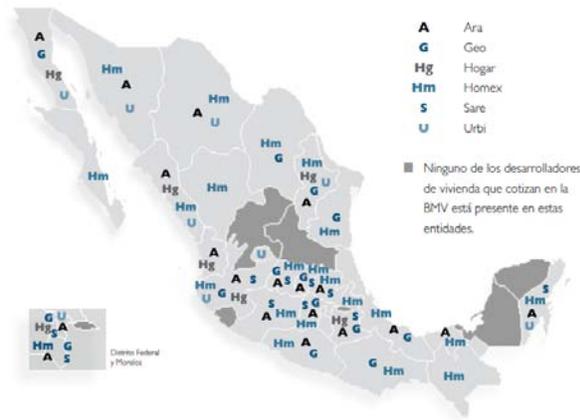
**Figure 12. Density of Housing Developers in INFONAVIT’s Mortgages (2009)**



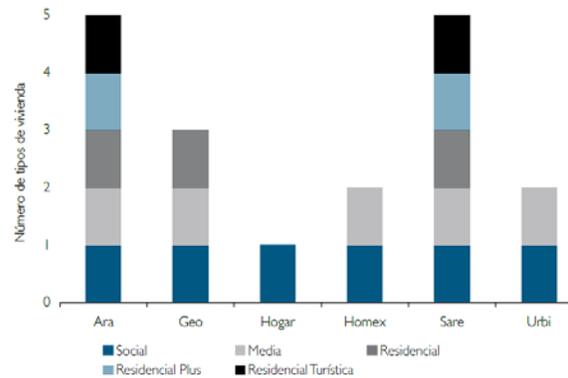
Source: SH –Mexican Housing Day 2010.

four largest among these are publicly traded. The next two figures show the distribution of activities of the main developers, geographically and in terms of submarkets.

**Figure 13. Geographical Activity of Main Private Developers**



**Figure 14. Type of Housing Markets Catered by the Largest Developers**



Source: Estado Actual de la Vivienda en México, 2009 (SHCP-SEDESOL).

Additionally, all 32 Mexican States (including Distrito Federal) have housing institutes which carry out low-cost housing construction projects. Most finance a substantial part of their activities from federal programs such as “Tu Casa” Fideicomiso Fondo Nacional de Habitaciones Populares (FONHAPO). There are also a few non-governmental, non-profit organizations throughout the country that carry out housing projects for poor and non-income families.

### 3.2. Housing Finance Structure

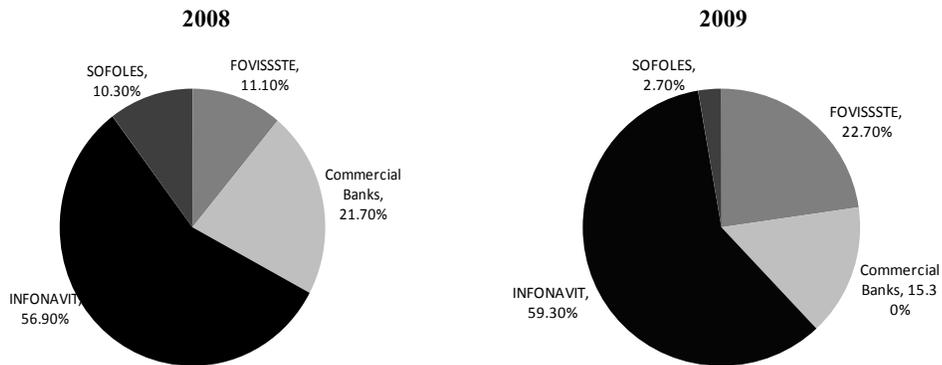
This section explains how the market for housing finance is structured in Mexico, identifies the main players, and describes applicable regulation. Problems associated with each topic are also discussed.

#### 3.2.1. Primary Market

##### 3.2.1.1. Mortgage Issuers

Historically, Mexico’s market for primary housing finance has been dominated by two public institutions: INFONAVIT and FOVISSSTE. According to the most recent figures, in 2009 these two organizations held about 82 percent of the market for new mortgages. The rest was divided between private commercial banks (about 15 percent) and SOFOLEs (private non-bank financial institutions, with a 3 percent market share).

**Figure 15. Share in New Housing Mortgage Loans**



Figures corrected for co-financed loans (i.e., granted by more than one institution, for instance by INFONAVIT and a commercial bank). *Source:* BBVA Bancomer (October 2009).

The next two figures show the outcome evolution of the primary mortgage market, both in relative (market share) and absolute terms (number of mortgages issued annually). Two observable issues are worth commenting on. First, commercial banks have been active in the market, but have withdrawn during crisis periods (including the current one). Second, the present boom has been led by a significant expansion of INFONAVIT’s mortgage issuance; however, during that same period, private issuers increased their mortgages substantially. In fact, the number of mortgages issued by commercial banks and SOFOLEs during 2007 almost doubled the previous (1992) peak. Their market share also increased substantially from 2000 to 2008.

**Figure 16. Evolution in the Share of Loan Origination, by Main Participants**

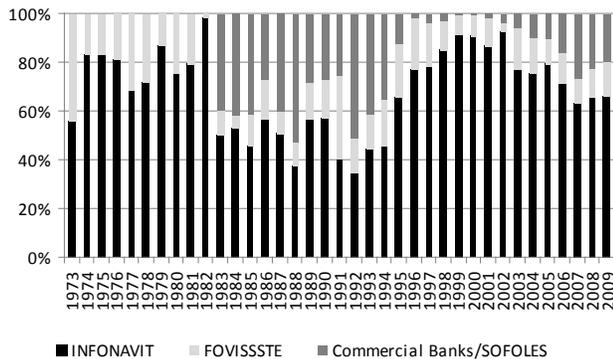
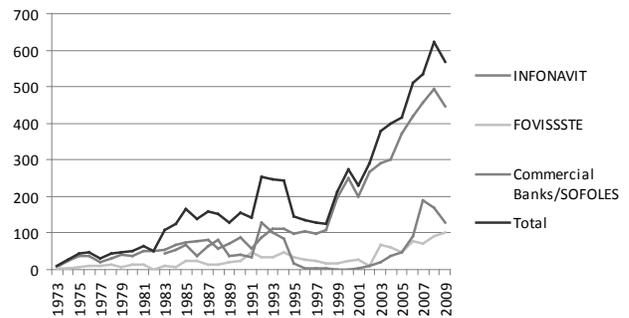


Figure not corrected for co-financed loans (i.e., granted by more than one institution, for instance INFONAVIT and a commercial bank)

*Source:* Authors’ compilation with information from: López, Marco and Paulina Campos (2007) and BBVA Bancomer, Situación Inmobiliaria México, (Jan 2010).

**Figure 17. Evolution of Loan Origination, by Main Participants (number of loans)**



Total corrected for co-financed loans.

*Source:* Authors’ compilation with information from: López, and Campos (2007) and BBVA Bancomer, Situación Inmobiliaria México (January 2010).

The aforementioned may imply that some previous characteristics of the market, that hindered a healthy development of the private mortgage sector (a highly unstable economy, for instance, or an inability to co-finance loans with INFONAVIT) have eased somewhat. If such is the case, we should observe a continued pick-up in private issuers' market share over the next years.

#### **i. INFONAVIT<sup>12</sup>**

The history of the Mexican housing market is closely tied to that of the main player, *Instituto del Fondo Nacional de la Vivienda para los Trabajadores*, commonly referred to as “INFONAVIT.” The Institute was created in 1972, to provide a way for private employers to comply with an obligation, stated since 1917 in Article 123 of the Mexican Constitution, to “provide comfortable and hygienic quarters to their employees.”<sup>13</sup> According to the labor law, employers must make deposits to their workers' accounts at INFONAVIT, equal to five percent of the workers' wages. INFONAVIT uses the funds to provide mortgages; funds that are not used by a worker during his/her career are given to him/her upon retirement.

The organization has faced significant challenges since its creation. For instance, at the time of its foundation, the institute found that no large-scale housing developers existed in the country; developers were relatively small and their operations were limited to specific geographic regions. Therefore, for several decades INFONAVIT had no option but to directly take charge of the housing supply: the institute calculated housing needs in the most important Mexican cities; bought land, designed housing developments, obtained urban and construction authorizations from municipalities, set construction standards and procedures; contracted out and supervised construction activities; and issued mortgages to workers. As decades went by, large-scale, professional private developers arose, and INFONAVIT gradually returned its focus to mortgage issuance, and left development and construction activities to private developers.

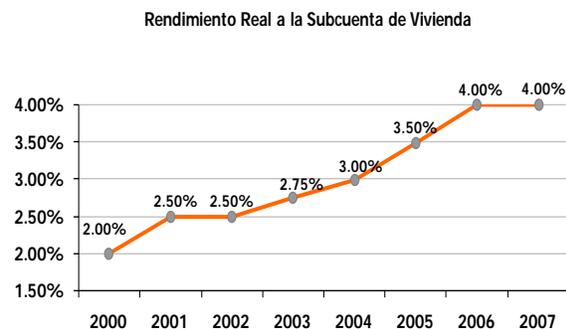
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<sup>12</sup> This section is based on and draws upon López and Campos (2007).

<sup>13</sup> Chamber of Representatives, Original text of the 1917 Mexican Constitution, available at [http://www.diputados.gob.mx/LeyesBiblio/refcns/dof/CPEUM\\_orig\\_05feb1917.pdf](http://www.diputados.gob.mx/LeyesBiblio/refcns/dof/CPEUM_orig_05feb1917.pdf)

A different challenge was financial sustainability. From 1972 to 1987, the Institute's loans were arranged in nominal pesos, with an annual interest rate set at 4 percent. During that same period, annual inflation rates were higher than 40 percent, implying that INFONAVIT's mortgage loans carried a large real subsidy. According to the institute's estimations, by 1987 loans that were granted in 1972 had lost 99.9 percent of their real value.<sup>14</sup> Furthermore, since many people considered its loans to be gifts from the government and not real financial obligations, INFONAVIT's defaulted loan rate was higher than 40 percent.<sup>15</sup>

**Figure 18. Recent Evolution of Yearly Real Return on INFONAVIT's Funds**



Source: INFONAVIT.

In 1987, INFONAVIT overhauled the entire loan system. Since that year, INFONAVIT's loans are now denominated in "Times the Minimum Wage" (TMW), which track the rate of inflation closely.<sup>16</sup> Interest rates range from 4 to 10 percent, depending on the worker's income,<sup>17</sup> and accrue on the TMW balance. In 1992, Congress modified the INFONAVIT Law, requiring the institute to pay returns on workers' funds at rates higher than inflation. As the reader can see in Figure 18, the real rate of return hit 4 percent in 2007.

The most comprehensive changes in INFONAVIT's history, however, occurred in 2001 to a key part of the housing policy package, which was initially implemented by the Fox

<sup>14</sup> When a worker gets a loan, INFONAVIT hands him/her the current balance of his/her account so that it can be used as a partial payment on the house. Workers who never receive a loan get their money back at retirement. Because INFONAVIT had no obligation to pay any real interest on those funds, it paid nominal values to workers who retired. Those nominal values implied negative real rates of return.

<sup>15</sup> As long as a worker stays employed in the formal economy, his employer has the obligation to deduct mortgage payments from the worker's paycheck and deliver the money to INFONAVIT. Mandatory deposits made by the employer to the worker's account after a loan is granted, are directed towards paying the loan. However, workers must make the payments directly if they become unemployed or are employed in the informal sector.

<sup>16</sup> When INFONAVIT originates a loan, it divides the nominal value of the loan by the going value of the minimum wage (and thus converts it to TMW). Whenever the minimum wage increases in the country, the loan balance increases as well.

<sup>17</sup> INFONAVIT offers lower interest rates to lower-income workers. Interest rates start at 4 percent (for workers with incomes up to 1.5 TMW) and slide up to 10 percent (for workers with incomes higher than 10.1 TMW). See: <http://portal.infonavit.org.mx/wps/portal/TRABAJADORES/CreditodelInfonavit/EnQueConsiste/RequisitosSolicitudCredito/>, → Tasas de interés

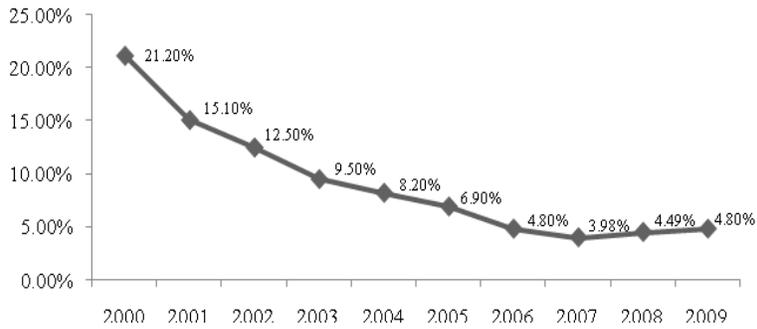
Administration. A new management team from the private banking sector decided to overhaul the organization's mission, structure and procedures. Several financial and operational changes were implemented, with the objective of transforming INFONAVIT from what was perceived as a public-subsidy issuer to a social housing bank. The organization was restructured under three clear core business activities: fiscal collections (collecting mandatory fees from employers), loan origination (issuing new mortgage loans) and servicing (collecting repayments). The servicing department concentrated on designing a new collections and incentives scheme that would bring INFONAVIT's non-performing loan rate to reasonable levels. The loan origination area redesigned credit criteria, seeking to minimize risk; it also changed the way in which workers applied for a loan, from a "lottery system," which had proved to be very prone to corruption, to a rolling, first-come-first-served system. Non-essential activities (such as construction supervision) were outsourced, enabling the institute to reduce its workforce. The institute implemented an innovative "Affordable Housing" program intended to boost housing supply for the low-income segment of potential borrowers. It also launched a Mortgage Backed Securities (MBS) issuance program.

The changes proved to be highly successful. Mortgage issuance almost doubled, from about 250 thousand in 2000, to approximately 494 thousand in 2008 and 447 thousand a year later. The non-performing loan rate was significantly lowered too, from 21.2 percent in 2001, to 4.8 percent in 2009 (see Figure 19). Also, a worrying trend, in which an increasingly larger fraction of its loans were granted to INFONAVIT's higher-income affiliates, was reversed.<sup>18</sup>

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<sup>18</sup> In 1997 the segment with incomes lower than four TMW's received about 80 percent of all mortgages, but over the next four years the figure had steadily dropped to 2001's 50 percent. In March 2002, the administration launched the "Vivienda Económica" (Affordable Housing) Program, geared to promoting an increase in the supply of housing that could be bought by workers with incomes lower than four TMW's. In effect, INFONAVIT used its market power to force the industry to cater to a previously-neglected income segment. By end-year 2008, 62 percent of INFONAVIT's new mortgages were issued to workers who purchased affordable housing. Members with incomes lower than 4 TMW's received 56.4 percent of all loans.

**Figure 19. INFONAVIT's Nonperforming Loan Rate (NPL)**



Source: INFONAVIT Annual Report (2009).

INFONAVIT currently offers credit products for housing purchase, upgrading, construction (on a plot owned by the borrower) and lender substitution. Since 2003, it also offers co-financing products with FOVISSSTE and financial intermediaries (commercial banks, SOFOLEs and Multi-purpose Financial Organizations or “Sociedad Financiera de Objeto Múltiple,” SOFOMes). Since affiliation to the institute requires a worker’s employer to contribute to the fund, its coverage is limited to formally employed workers. According to INFONAVIT, as of January, 2010 it had 14.862 million affiliated workers (33 percent of the total workforce). INFONAVIT’s share of the housing finance market has ranged from 35 percent (1987 and 1992) to about 98 percent of the market (1982). The latest available figure on market share is about 59 percent, for the year 2009.

## ii. FOVISSSTE

The “Fondo para la Vivienda del Instituto de Seguridad y Servicios Sociales para los Trabajadores del Estado” (FOVISSSTE) was created in 1972 by the same constitutional amendment that created INFONAVIT. The organization administers the housing fund for public-sector workers, with funding provided by the Federal Government. As with INFONAVIT, each worker has an individual account; if she does not use the funds, they are reimbursed at retirement.

FOVISSSTE’s history closely resembles INFONAVIT’s: it initially took charge of both construction and loan activities, and in 1990 its governing board decided to focus on housing loans.

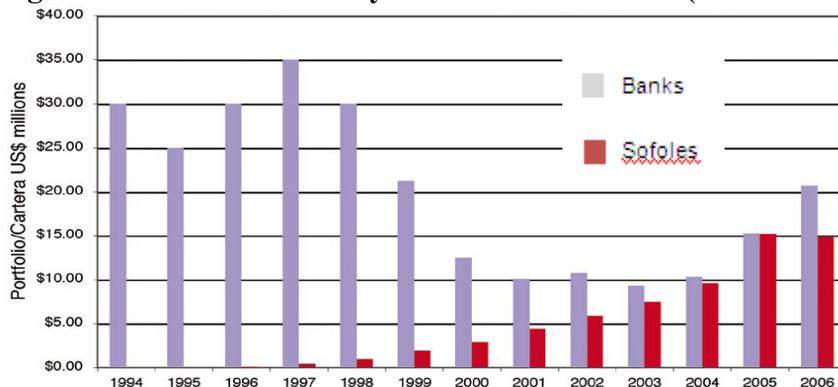
It currently provides credit products for housing purchase, upgrading, construction (on a property of the borrower) and lender substitution. FOVISSSTE’s main loan eligibility criterion is seniority in the system, measured in terms of the number of continuous two-month periods in which the public employer has made deposits to the worker’s account. FOVISSSTE sets application periods according to its annual financing program; eligible workers must apply and enter a random selection process, after which the winners are offered loans.

The latest affiliation figures publicly available for ISSSTE/FOVISSSTE are from 2008; at that time, it had 2,542,307 workers (about 7 percent of that year’s workforce).<sup>19</sup>

### iii. Private Mortgage Providers

Banks and SOFOLEs currently play an important role in loan issuance, both in terms of construction bridge-loans (to housing developers) and individual mortgages. Figure 19 shows the recent evolution of Banks’ and SOFOLEs’ loan portfolio.

**Figure 20. Loan Portfolio by Banks and SOFOL’s (US Million)**



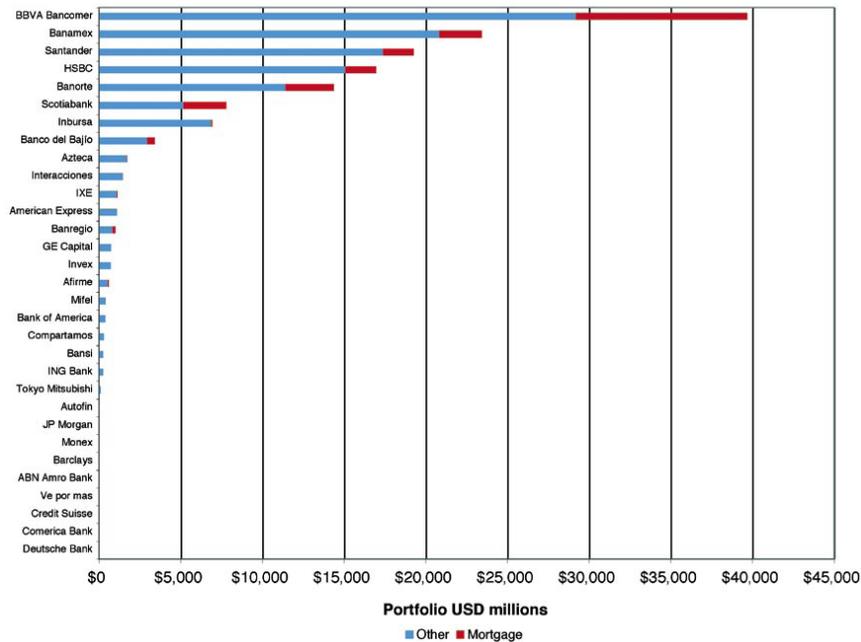
Source: Softec (2010).

Commercial banks withdrew from the mortgage market in the mid-1990s, as a consequence of the 1994-1995 “Tequila Crisis.” In the aftermath, most banks, which were then owned by Mexican financial groups, were sold to international financial institutions (*Banco Mexicano* and *Serfín* to Spain’s *Banco Santander*; *Bancomer* to Spain’s *BBVA*; *Inverlat* to Canada’s *Scotiabank*; *Banamex* to *Citigroup*, and *Bital* to *HSBC*). Since 2002, banks have

<sup>19</sup> [http://www.issste.gob.mx/issste/anuarios/2008/capitulo\\_01\\_estadisticas\\_de\\_poblacion/cuadro\\_1\\_1\\_2008.xls](http://www.issste.gob.mx/issste/anuarios/2008/capitulo_01_estadisticas_de_poblacion/cuadro_1_1_2008.xls)

steadily increased their market share. Today, BBVA Bancomer, Banamex, Santander, HSBC, Banorte and Scotiabank are the leaders (see Figure 21).

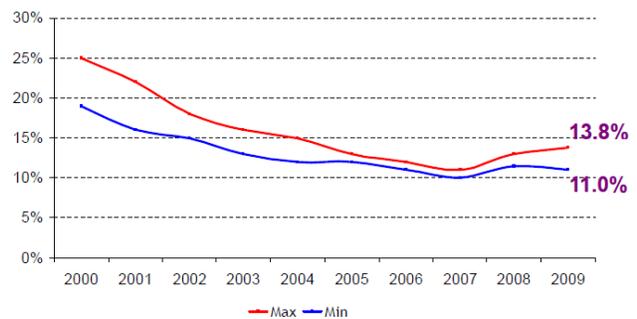
**Figure 21. Loan Portfolio by Bank (US Million)**



Source: Softec (2010)

The recovery of mortgage banks has been enabled by the stabilization of the Mexican economy. As Figure 22 shows, mortgage interest rates have decreased sharply since 2000, picking up only slightly during the current financial, worldwide crisis. Credit conditions have also eased (see Table 4).

**Figure 22. Interest Rates on Mortgage Loans**



Source: Mexican Banking Association (ABM, 2010).

**Table 4. Evolution of Credit Conditions, 2000-2009**

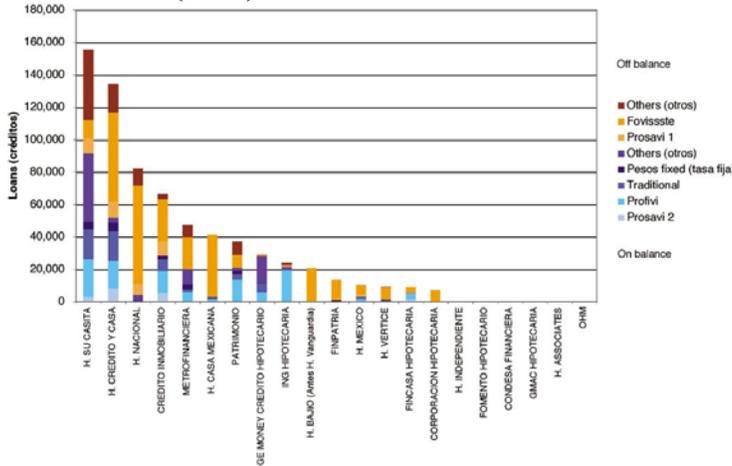
	2000	2008	2009 - 2010
<b>Interest rate</b>	Variable	Fixed	Fixed, with incentives for timely payment
<b>Upfront fees</b>	6%	3% - 0%	3% - 0%
<b>Term</b>	10 - 15 yrs	Up to 30 yrs	Up to 30 yrs
<b>Loan may be applied towards</b>	Housing purchase	Multiple uses (purchase, refinancing, remodeling)	Multiple uses (purchase, refinancing, remodeling)
<b>Monthly payment (pesos a month, per thousand pesos in loan)</b>	\$22	\$9.5 - \$11	\$10.5 - \$12
<b>Down payment</b>	+35%	10% - 20%	10% - 20%
<b>Mortgage Insurance</b>	No	For high LTV's	For risk mitigation
<b>Unemployment insurance</b>	No	Yes	Yes
<b>Tax deductibility of interest payments</b>	No	Yes	Yes

Source: Mexican Banking Association (ABM, 2010). LTV's refers to Loan-to-Value Ratio

Non-bank financial institutions were authorized to operate in the mortgage market in 1995, under the generic name “SOFOL” (Limited-purpose Financial Organizations, or “Sociedades Financieras de Objeto Limitado”). They are subject to tighter regulation than banks with similar operations; for instance, while capital requirement for Banks is at 2.4 percent, SOFOLEs must meet an initial capital requirement of 7.2 percent, which can be reduced to 4.8 percent if certain portfolio performance criteria are met.

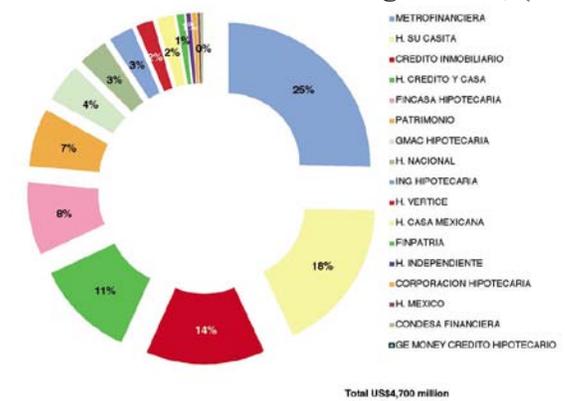
SOFOLEs have been intensively funded by SHF since the latter's creation. They have been active in the issuance of mortgages to housing purchasers, and in granting bridge loans to housing developers. The largest SOFOLEs are *Hipotecaria Su Casita*, *Hipotecaria Nacional* (now a subsidiary of *BBVA Bancomer*, a comercial bank), *Hipotecaria Crédito y Casa* (assets of which were acquired by *ABC Capital*), *GE Money*, and *Patrimonio Inmobiliario*.

**Figure 23. Loan Portfolio by Type of Product and SOFOL (2008)**



Source: Softec (2008).

**Figure 24. Breakout of SOFOLEs' Market Share in Construction Bridge Loans, (2008)**

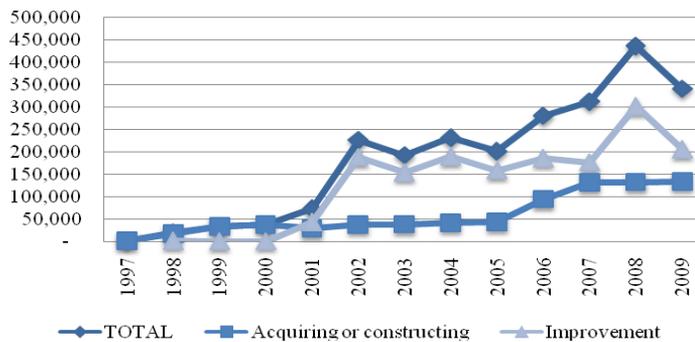


Source: Softec (2008).

### 3.2.1.2. Subsidy Providers

Mexico has a long history in implementing housing subsidy programs. Two current programs have been key elements of the housing policy package that was initiated in 2001: “*Esta es Tu Casa*” (operated by CONAVI) and “*Tu Casa*” (operated by FONHAPO).

**Figure 25. Federal Housing Subsidies**



Source: Data of CONAVI “Housing Statistics” from 1997 to 2009, [http://www.conavi.gob.mx/politica\\_estadisticas.html](http://www.conavi.gob.mx/politica_estadisticas.html)

### i. CONAVI

The *Comisión Nacional para el Fomento a la Vivienda* (CONAFOVI) was created in July 2001. It was originally charged with “the design, coordination, promotion and implementation of the Federal Government’s housing policies and programs”<sup>20</sup> Its name was changed to CONAVI (*Comisión Nacional de la Vivienda*) and its mandate broadened in 2006, with the issuance of the Housing Law. It is currently charged with:

<sup>20</sup> Decreto por el que se crea la Comisión Nacional de Fomento a la Vivienda, Article 1.

- Coordinating housing-related actions by the federal government,
- Ensuring that the federal government meets its goals regarding housing, which are stated in the National Housing Program (“Programa Nacional de Vivienda”),
- Supervising that housing activities are aligned with general principles regarding sustainable development, urban development and land zoning,
- Designing and operating mechanisms (i.e., programs) for housing-related savings, financing and subsidies,
- Encouraging the issuance of official norms regarding housing,
- Promoting increases in housing quality,
- Encouraging reduction of red tape, and
- Supporting information exchange and technical assistance regarding housing.

Since 2007, CONAVI operates the “*Esta es Tu Casa*”<sup>21</sup> (“This is Your House”) subsidy program, which has a 5.87 billion peso budget for the 2010 fiscal year. The program grants up-front subsidies for the purchase of a house (or lot with basic services), or for housing upgrades, to workers with low incomes.

## ii. FONHAPO

In 1971, the Federal Government created the National Institute for the Development of Communities and Housing (“Instituto Nacional para el Desarrollo de la Comunidad y de la Vivienda”, INDECO). Its main objective was the construction of low-cost housing developments for low-income workers. In 1981, the Federal Government decided to let states manage the construction of low-income housing, dissolved INDECO and transferred its assets to housing institutes created by the states.

In the same year, President Luis Echeverría created the National Trust Fund for Popular Housing (“Fideicomiso Fondo Nacional de Habitaciones Populares,” FONHAPO), which absorbed part of INDECO’s activities, as well as those of the Popular Housing Fund (“Fondo de Habitaciones Populares”).<sup>22</sup> Originally, FONHAPO’s main activity was financing intermediaries

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<sup>21</sup> Formally, “Programa Esquemas de Financiamiento y Subsidio Federal ‘Esta es tu Casa’”.

<sup>22</sup> Information taken from: IFAI (2008) Estudio para el Recurso de Revisión 1472/08

(mainly non-profit civil associations) which, in turn, issued loans to individuals for housing purchase or upgrading purposes.

In 2001, FONHAPO launched a subsidy program named “Programa de Ahorro y Subsidios para la Vivienda Progresiva” (ViVAh), which is now called “Programa de Ahorro y Subsidio para la Vivienda ‘Tu Casa’ (commonly referred to as “Tu Casa”). In 2003, it launched the “Vivienda Rural” subsidy program.<sup>23</sup> Both programs offer up-front grants for housing purchase or upgrading, and are geared towards families with incomes under the poverty line.

### 3.2.2. Secondary Market

#### i. Sociedad Hipotecaria Federal<sup>24</sup>

*Sociedad Hipotecaria Federal* (SHF) is a second-tier bank originally created in 1963 under the name “Fondo de Operación y Financiamiento Bancario a la Vivienda (FOVI).” In 2001, the Mexican Federal Government granted it development-bank status and changed its name.

SHF is charged with contributing to the development of primary and secondary housing finance markets, through the issuance of credit and guarantees for housing acquisition, construction and upgrading projects. It is also charged to promote an increase in productive capacities and technological development related to housing.

Its main programs (all second-tier, operated through commercial banks, SOFOLEs and SOFOMes) include *AhorraSHF* (a savings program that enables the saver to demonstrate his or her financial capacity over time, and therefore obtain a mortgage loan); Guarantee Programs (that focus on bridge loans and on default by MBS issuers, and cover up to 85 percent of outstanding defaulted balances); and Payment Insurance (that focuses in individual loans, covering between 5 percent and 25 percent of outstanding defaulted balances, depending on each credit’s Loan-To-Value).

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en contra del Fideicomiso Fondo Nacional de Habitaciones Populares. Available at: [http://buscador.ifai.org.mx/estudios/2008/DGEI-207-08%20Estudio-1472\(08\)-FONHAPO.doc](http://buscador.ifai.org.mx/estudios/2008/DGEI-207-08%20Estudio-1472(08)-FONHAPO.doc)

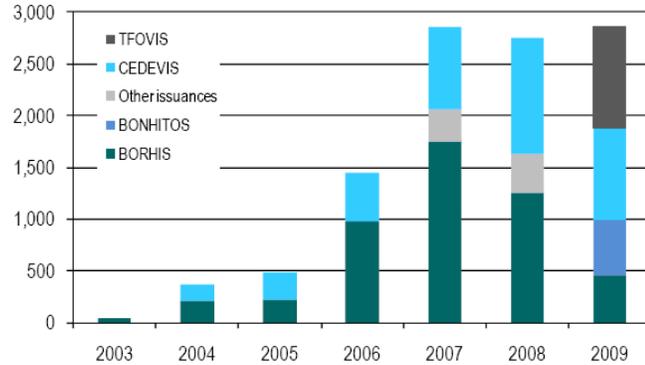
<sup>23</sup> Reglas de Operación del Programa Vivienda Rural. Available at: <http://www.fonhapo.gob.mx/portal/programas/informacion-general-vivienda-rural/vivienda-rural/reglas-de-operacion.html>

<sup>24</sup> Information taken from [www.shf.gob.mx](http://www.shf.gob.mx) on March 16th, 2010.

**ii. Mortgage Securitization**

The first Mexican Mortgage Backed Securities (MBS) were issued in 2003. Between 2005 and 2007, the volume of MBS doubled each year and leveled off since then. Initially, the only MBS issuers were SHF (commonly referred to as “BORHIS”) and INFONAVIT (“CEDEVIS”); different types of securities appeared in the last three years. INFONAVIT is the largest issuer with 35 percent of the market.

**Figure 26. Funding from Residential Mortgage Backed Securities (RMBS). 2003-2009 (Million USD)**



Source: SHF–Mexican Housing Day 2010.

Total MBS issuances stagnated in 2008 and 2009 due to the economic crisis and investor skepticism. In March 2010, however, INFONAVIT produced the largest MBS emission at one of the lowest coupons ever, giving insight into investors’ confidence and positive expectations for the year.

**3.2.3. Regulatory Infrastructure**

**3.2.3.1. Tri-level Government Structure**

Mexico’s legal framework implies an intricate, dispersed structure of responsibilities over housing development and finance. At the highest level, the housing market is regulated by Article 4 of the Federal Constitution, which states “all families have a right to enjoy a decent and worthy house.” There are three other federal laws that, in some way or another, are related to the housing market and urban planning: the Planning Law,<sup>25</sup> the General Law for Human Settlements<sup>26</sup> and the Housing Law.<sup>27</sup> Responsibilities foreseen by these laws, for each level of government, are as follows:

<sup>25</sup> Ley de Planeación, available at: <http://www.diputados.gob.mx/LeyesBiblio/pdf/59.pdf>

<sup>26</sup> Available at: <http://www.cddhcu.gob.mx/LeyesBiblio/pdf/133.pdf>

<sup>27</sup> Ley de Vivienda, available at: <http://www.cddhcu.gob.mx/LeyesBiblio/pdf/LViv.pdf>

### **i. Municipal Governments**

The main regulators of housing production are municipalities. According to Article 115, Subsection V of the Mexican Constitution<sup>28</sup> and article 9 of the General Law for Human Settlements, municipal governments are responsible for Regulating urban development (i.e. setting zoning charts and municipal urban development plans); providing public services (e.g., drinking water, sewage, garbage disposal); authorizing, controlling and overseeing land usage; issuing construction licenses and permits; and partaking in titling regularization activities.

### **ii. State Governments**

Article 115, Subsection II of the Mexican Federal Constitution, and Article 8 of the General Law for Human Settlements, authorize states to issue laws regarding municipal topics, including urban development. Municipal laws must be aligned with any laws that states choose to pass on the matter.

To date, most Mexican states have issued laws that set general rules regarding urban development in their territories; for instance, the Urban Development Law of the State of Sonora<sup>29</sup> contains provisions pertaining: minimum infrastructure (e.g., drinking water, electricity, sidewalks, green areas) to be provided in different kinds of developments (e.g., housing developments, commercial developments); minimum lot sizes and street widths required for different kinds of land and housing developments; minimum obligations that land developers acquire with their activities; and detailed procedures that municipal governments must utilize regarding lot subdivision and construction licenses, among other issues.

These state laws have been somewhat useful, in the sense that they provide a minimum conceptual standardization—within each state—for municipal activities regarding urban development.

### **iii. Federal Government**

Two federal institutions have significant responsibilities for the housing market: CONAVI and the Federal Ministry for Social Development (SEDESOL). The latter is charged with

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<sup>28</sup> Chamber of Representatives, Current text of the Mexican Constitution, available at <http://www.diputados.gob.mx/LeyesBiblio/pdf/1.pdf>

<sup>29</sup> Available at: [http://www.cgeson.gob.mx/archivos/biblioteca/leyes/estatal/leyes/ley%20254\\_desarrollo%20urbano.pdf](http://www.cgeson.gob.mx/archivos/biblioteca/leyes/estatal/leyes/ley%20254_desarrollo%20urbano.pdf)

coordinating regional planning (“along with states and municipalities”); regulating, along with states and municipalities, mechanisms for the creation of land reserves; encouraging the construction of infrastructure works needed for regional development; advising state and municipal governments in the design of urban development plans and programs, as well as training state and municipal officials in the matter; and setting specific guidelines regarding infrastructure, public facilities and adequate links to the urban environment, that must be complied with by any land or housing developments financed with federal funding, or with funding from federal housing institutions (such as INFONAVIT or FOVISSSTE). SEDESOL appears to be currently holding public discussion forums regarding the abovementioned guidelines and is expected to publish them soon.

In such an intricate legal context it is difficult to display an adequate planning capacity; it would require close coordination between federal, state and municipal governments. The problem is compounded by three additional factors at the local level. The first is that the main regulators for housing development—mayors—have incentives to focus on the short term, not in the medium or long run. This is because mayors have three-year terms and no official can be consecutively reelected in Mexico.<sup>30</sup>

Moreover, local authorities usually lack the human and financial resources needed to enact and promote good urban planning. These two problems are related: mayors do not have incentives to improve municipalities’ finances because collecting taxes is politically costly and their term is too short to show results from increasing revenue. The third issue is that new-housing construction has increasingly occurred in extremely large developments which would need coordination between different municipalities.

Quite obviously, the result has not been satisfactory. Only 36 percent of the country’s 2,500-plus municipalities have an Urban Development Plan (Indesol-INEGI, 2001). Among cities with more than 15 thousand inhabitants (a group comprised by 358 localities), about a quarter do not have a formal Urban Development Plan (See Table 5).

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<sup>30</sup> Mexican Constitution, Articles 59; 115-I.

**Table 5. Urban Planning in Cities with More than 15 Thousand Inhabitants**

Size of urban locality	Cities that DO have Urban Development Plan	Cities that do NOT have Urban Development Plan	Total
Metropolitan Areas	41	15	56
More than 50 thousand inhabitants	70	3	73
Less than 50 thousand inhabitants	161	68	229
<b>Total:</b>	<b>272</b>	<b>86</b>	<b>358</b>

Source: SHF (2009).

### 3.2.3.2. Titling and Legal Protection

Although there are no official estimations on the subject, Mexico faces considerable problems with land registration. Some authors argue that between 33 percent and 70 percent of the country's houses that existed prior to the current housing expansion lack proper registration. Even though most of these estimations are questionable from a methodological standpoint, land registration seems to be a real problem; SEDESOL is currently undertaking an evaluation on the subject<sup>31</sup> and has a program that grants subsidies for land regularization.<sup>32</sup>

The problem implies two obstacles for the development of the Housing Finance Market. First, a substantial part of the potential supply for the secondary market (i.e., used housing) is not susceptible to act as mortgage collateral. Second, a fraction of the land needed for housing expansion cannot be readily transacted.

Another issue is investment protection, in the form of foreclosure procedures. In Mexico, a foreclosure process can take between 24 and 35 months, depending on the state.

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<sup>31</sup> "Proyecto para la Identificación de Asentamientos de Origen Irregular"

<sup>32</sup> PASPRAH ("Programa de Apoyo a los Vecindados en Condición de Pobreza Patrimonial para la Regularización de Asentamientos Humanos Irregulares").

**Table 6. Length of Foreclosure Procedures in Mexican States (months)**

State	Average Foreclosure Length (months)	State	Average Foreclosure Length (months)
Aguascalientes	24	Colima	28
Hidalgo	24	Campeche	29
Guanajuato	25	Coahuila	29
Sinaloa	25	Tabasco	29
Baja California	26	Tlaxcala	29
Michoacán	26	Yucatán	29
Morelos	26	Zacatecas	29
Durango	27	Chiapas	30
Guerrero	27	Queretaro	30
Nayarit	27	Chihuahua	31
Sonora	27	Estado de Mexico	31
Jalisco	27	Distrito Federal	31
Nuevo León	28	Puebla	31
Quintana Roo	28	Baja California Sur	32
San Luis Potosí	28	Oaxaca	32
Tamaulipas	28	Veracruz	35

Source: INFONAVIT (2009).

#### 4. Policy Analysis: Effects of Subsidies on Repayment Behavior

As was previously discussed, one of the key components of the current Mexican housing policy is “*Esta es tu Casa*,” a large subsidy program that provides upfront grants to low-income families who are eligible to obtain a mortgage loan.<sup>33</sup> Over the 2007-2009 period the program supported over 315 thousand families.

Under its current design, “*Esta es tu Casa*” could theoretically have negative financial implications for mortgage institutions, which would have to compensate for them either by adjusting interest rates, or by receiving subsidies themselves. This risk stems from poorer workers have lower job stability than richer ones: according to data from the National Occupation and Employment Survey, poorer workers have a lower probability of having a written work contract (see Table 7), and of having an indefinite-term written contract (see Table 8). They also hold jobs for shorter periods of time (see Table 9). Lower job stability could translate into higher default rates, and therefore imply higher servicing costs than was the case with higher-income borrowers.

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<sup>33</sup> The program grants subsidies towards housing purchase, construction or upgrade. Our analysis focuses only on the first component.

**Table 7. Percentage of Working People, by Income Level and Whether They Work under a Written Contract**

Income level, times the Minimum Wage (TMW)	Percentage of people who...		
	do have a written contract	do not have written contract	do not know
Up to 1 TMW	4.0%	42.3%	53.7%
Between 1 and 2 TMW	24.9%	50.8%	24.2%
From 2 to 3 TMW	42.5%	38.1%	19.4%
From 3 to 5 TMW	57.1%	21.4%	21.5%
Over 5 TMW	60.4%	9.5%	30.0%

*Source:* Authors' compilation with data from ENOE (National Occupation and Employment Survey).

**Table 8. Percentage of Working People Who Have a Written Contract, by Income Level and Contract Period**

Income level, times the Minimum Wage (TMW)	Percentage of people who work and have a written contract, by whether...			
	contract has indefinite period	contract is temporary, with a duration of...		
		less than 2 months	2 to 6 months	6 months to a year
Up to 1 TMW	61%	5%	17%	12%
Between 1 and 2 TMW	74%	5%	11%	7%
From 2 to 3 TMW	82%	3%	7%	5%
From 3 to 5 TMW	86%	1%	5%	4%
Over 5 TMW	89%	1%	4%	3%

*Source:* Authors' compilation with data from ENOE (National Occupation and Employment Survey)

**Table 9. Breakout for Working People According to Whether They Have Worked Continuously for Current Employer**

Income level, times the Minimum Wage (TMW)	Have you worked for the same employer, every year, since the first date in which you started working for your current employer?		
	Yes	No	Does not know / No answer
Up to 1 TMW	68.1%	1.0%	31.0%
Between 1 and 2 TMW	66.0%	0.9%	33.1%
From 2 to 3 TMW	73.8%	1.0%	25.2%
From 3 to 5 TMW	81.8%	0.9%	17.3%
Over 5 TMW	88.4%	0.8%	10.8%

*Source:* Authors' compilation with data from ENOE (National Occupation and Employment Survey)

Whether the program implies higher costs for mortgage institutions is especially relevant in a context in which the main mortgage provider, INFONAVIT, offers lower interest rates to lower-income rather than higher-income workers, under a cross-subsidy scheme. The institute's mortgage rates start at 4 percent (applicable to workers with incomes up to 1.5 TMW) and slide up to 10 percent (for workers with incomes higher than 10.1 T MW).<sup>34</sup> Fortunately, this theoretical implication can be empirically tested.

A litmus test for Mexican housing policy, therefore, would be to show that it can enhance access and be financially sustainable at the same time. This section tries to shed light on this question, by evaluating the impact on credit behavior, of subsidies provided by CONAVI's program to INFONAVIT's borrowers.

#### ***4.1. Context Information: Program Characteristics and Other Details***

CONAVI's program ("*Esta es tu Casa*") seeks to improve access to housing for workers who, even when eligible to obtain a mortgage, would receive an insufficient amount to purchase adequate housing. That is, it is designed to enable loan-eligible workers to access better housing than they could purchase otherwise. From a different point of view, it eases the financial burden of buying a house. By providing an up-front lump-sum when the loan is originated, total debt is reduced and monthly payments become more affordable.

The program provides a subsidy of approximately USD \$3,000 to low-income families that acquire a house using a mortgage loan, which may be granted by different financing institutions (such as INFONAVIT, FOVISSSTE; or federal, state or municipal government agencies). Our database includes mortgage operations issued exclusively by INFONAVIT; therefore, our paper focuses on this case only.

The program has several eligibility criteria; the main two, as applicable to INFONAVIT mortgage operations, are as follows:

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<sup>34</sup> For the detailed scale, see INFONAVIT's webpage: <http://portal.infonavit.org.mx/wps/portal/TRABAJADORES/CreditodelInfonavit/EnQueConsiste/RequisitosSolicitarCredito/> → Tasas de interés

- *Income.* Applicants for the program must earn equal or less than four times the minimum wage applicable in the Mexico City area. The 2010 income limit is therefore approximately 6,987 pesos (USD \$560) a month.
- *Housing price.* To be eligible for the subsidy, the housing unit to be acquired by the borrower must have a price of less than 158 times the monthly Minimum Wage applicable in the Mexico City area. In 2010 this limit is equivalent to 275,992 pesos (approximately USD \$22,000).

According to INFONAVIT, applicants are granted subsidies in a strict first-come first-served basis. CONAVI's program does not have sufficient funds to grant a subsidy to every eligible applicant. Therefore, when funds run out, applicants must decide whether to wait until the next year (and try to receive a subsidy then) or to purchase a house anyway (and therefore produce any existing gap between the house price and the sum of the loan amount and their INFONAVIT savings).

Once they obtain a loan by INFONAVIT, workers must make monthly payments under one of two possible mechanisms. Borrowers who keep a regular, formal job, and receive a monthly salary from an employer have their payment deducted from their paycheck. Their employer then transfers the payment to INFONAVIT, along with regular contributions to the housing fund, every two months. Given that the institute maintains a regular, long term, direct relationship with all formal employers in the country, there is virtually no risk of credit default, as long as a borrower remains in a steady and formal job. This mechanism is known as "Ordinary Regime" (*"Régimen Ordinario de Aportaciones,"* also known by its Spanish acronym ROA). About 80 percent of the workers who took out a loan during the 2007-2009 period remained in the "ordinary regime" over the entire period.

The second mechanism is commonly known as the "Extraordinary Regime" (*"Régimen Extraordinario de Aportaciones,"* also known by its Spanish acronym REA). It applies to workers who had a steady and formal job when they took their mortgage loan, but then left the formal economy or became self-employed. These workers who no longer have a formal employer (who can deduct payments and transfer them to INFONAVIT), must make monthly payments directly to the institute.

The abovementioned implies that only workers under REA actually have a chance of displaying a repayment behavior that differs significantly from what was agreed upon in the mortgage contract.<sup>35</sup> Our analysis focuses, therefore, on REA workers only.

#### ***4.2. The Database***

The database that we used for this evaluation comes from INFONAVIT. Due to privacy concerns, we were not granted full access to INFONAVIT's entire database; we instead obtained a large, random sample, containing about 222 thousand observations for the 2007-2009 period. The sample represents about 16 percent of all mortgage operations completed during that same period.

The database contains information on several socioeconomic characteristics of the borrowers, (for instance, their wage); the original characteristics of the loan (including the credit amount, whether the worker received a subsidy and its amount, the applicable interest rate, and the balance of the borrowers' housing-savings account); basic information on housing characteristics (construction area, age, number of bedrooms) and data on the subsequent repayment behavior of borrowers.

#### ***4.3. General Assessment of the Program***

To start with a general assessment of the program's outcomes, we tried to determine whether the program's objectives were being met. Specifically, we wanted to answer two questions: i) does the program appear to be adequately targeted (i.e., for workers who would not be able to purchase a house otherwise?); and ii) does the program seem to allow eligible workers to purchase a "higher quality" (e.g., larger) house than they could otherwise acquire?

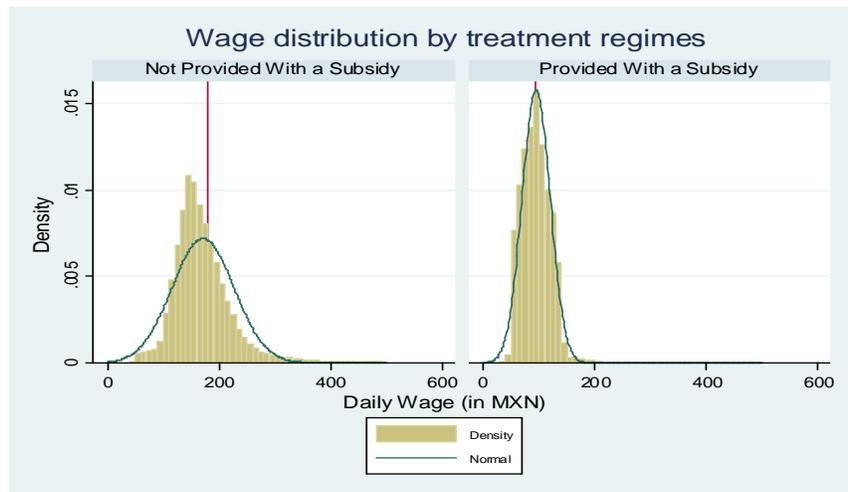
To address the first question, we began by calculating how many eligible workers received subsidies. As Table 15 (see Appendix) shows, 41 percent of eligible workers (91,374 out of 222,479) did receive a subsidy. Since the database contains only actual mortgage operations, 59 percent of eligible workers who obtained a mortgage did not receive a subsidy but purchased a house anyway.

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<sup>35</sup> Setting aside special cases, such as employers who make timely deductions but then make late transfers to INFONAVIT.

We then compared the income distribution for eligible workers who did and did not receive grants. As Figure 27 shows, on average, eligible non-beneficiaries have higher wages than beneficiaries. While the former earn about MXN \$150 a day, the latter earn MXN \$92 on average. Beneficiaries also show a small variance: few individuals earn more than MXN \$200 (approximately the median value for eligible borrowers who did not receive a subsidy).

**Figure 27. Wage Distribution by Treatment Regimes (only for price eligible borrowers)**



*Source:* Author’s compilation using data from INFONAVIT.

We also compared income and savings levels for eligible borrowers who did, and did not, receive a subsidy. As Table 15 shows (see Appendix), eligible borrowers awarded a subsidy have daily incomes that are, on average, 40 percent smaller than those of workers who did not receive a subsidy. Both groups are eligible for the subsidy program. Figures vary for different house price ranges, but in all cases, borrowers who did not receive a subsidy show a higher salary. The same is true if we compare the balance of housing-savings accounts across groups: on average, borrowers who did not receive a subsidy have savings that are 26 percent higher than those who did receive a grant.

The fact that the majority of eligible workers purchased a house even when they did not receive a subsidy, and with the fact that workers who received a grant are poorer than those who did not, raise two important issues. The first is that the program’s income eligibility cut-off point may be too high. The second is that benefits are primarily received by lower-income workers

(within the eligible group) even when no formal mechanism is provided. Is this because the program's field operators are somehow targeting poorer applicants, or because richer (but still eligible) workers are self-selecting out of the program? Unfortunately, we do not have enough information to provide an appropriate answer.

Next, we turned to the second question: does the program seem to allow eligible workers to purchase a "higher quality" (e.g., larger) house than they could otherwise acquire? To that end, we analyzed housing characteristics for the two groups. As the reader can observe in Table 16 (see Appendix), workers who received a grant purchased housing units that are very similar, in terms of construction area and number of bedrooms, to those purchased by eligible workers who did not receive a subsidy. The former, however, purchased slightly older houses. Given that the first group has a lower income than the second, subsidies do seem to enable recipients to purchase a larger (higher quality) house than they could otherwise acquire.

#### ***4.4. Empirical Questions***

As was previously discussed, this section's main objective is to try to determine whether borrowers who received subsidies (e.g., those who "received the treatment") show different repayment behaviors than borrowers who did not receive financial support (i.e., those who "did not receive the treatment"). If differences exist, mortgage institutions would have to compensate for them, either by adjusting interest rates, or by receiving subsidies themselves.

To this end, we chose to analyze two different repayment "outcomes." The first is the *number of consecutive months without missing a payment, immediately after buying the house*. Provided that the intervention (i.e., the grant) is only delivered once, and that a grant reduces financial burden for a given housing price level, if we compare workers with similar levels of financial burden, we would expect to see better credit behavior for the treated in the short term (during the initial stages of the loan). Second, we chose to analyze the *percentage of monthly missed payments*. Again, if we were to compare workers with similar levels of financial burden, we would expect borrowers who received the subsidy to miss fewer monthly payments than those who did not receive the subsidy, given that their monthly payments are relatively lower.

As was also previously discussed, only workers in the REA regime actually have the chance to default their loans; so, we focused our analysis on them. Out of 222 thousand observations in the database (all eligible borrowers), roughly 50 thousand are workers who were

eventually in REA. On average, these borrowers remained in the “ordinary regime” (ROA) for one year (see Table 10, column I). About 40 percent of them have migrated back to the “ordinary regime” after spending an average of five months in the “extraordinary regime” (see Table 10, column II). There seems to be no difference between workers who received the subsidy and those who did not, in terms of the time they spent under REA status.

**Table 10. Length of Time Under REA Status, for Workers Who Did Not Remain in ROA over the Entire Analysis Period**

		<i>Months in ROA status, before switching to REA</i> I	<i>Months in REA, before switching back to ROA</i> II
<b>Not provided with a subsidy</b>	<i>N</i>	28,244	12,861
	<i>Mean</i>	12.778	5.113
	<i>Sd</i>	(7.078)	(3.395)
	<i>Min</i>	0	2
	<i>Max</i>	33	26
<b>Provided with a subsidy</b>	<i>N</i>	21,859	8,777
	<i>Mean</i>	11.513	5.162
	<i>Sd</i>	(6.078)	(3.268)
	<i>Min</i>	0	2
	<i>Max</i>	33	26
<b>Both</b>	<i>N</i>	50,103	21,638
	<i>Mean</i>	12.226	5.133
	<i>Sd</i>	(6.689)	(3.344)
	<i>Min</i>	0	2
	<i>Max</i>	33	26

Source: Author’s compilation using data from INFONAVIT.

#### 4.4.1. Methodology

One of the most significant challenges to finding the effect of an intervention is the availability of a valid control group. Namely, in order to assess the impact of a program, we need to answer the question: What would have happened to the beneficiaries of the subsidy if they had not received it?

The most straightforward way to identify the effect of an intervention is through experimental design. Random assignment helps control observable and unobservable factors that could affect the outcome, so the only difference between the treated and the non-treated becomes the treatment itself. Since this is not a possibility, we need to resort to other methodological alternatives. In the absence of an experimental design, the eligibility rules can be used as

instruments to identify participation. In the case of CONAVI, we can exploit the fact that program eligibility is determined by two factors: the price of the house purchased and the borrower's income.

Therefore, we sought to find a suitable approach to build a control group, by exploiting the fact that there are eligible borrowers who did not receive a subsidy. As was previously discussed, CONAVI does not have enough funds to supply benefits to all eligible INFONAVIT borrowers: only about 41 percent of eligible borrowers in the database were provided with a grant. When CONAVI's funds are depleted, no further borrowers receive the subsidy.

Provided that there are clear rules for CONAVI's subsidy assignment, we propose employing a Propensity Score Matching (PSM) approach. The idea behind this methodology is that when treatment cannot be randomized, a second-best approach is to build a counterfactual approach based on the observed characteristics of those who received the treatment. In PSM, each participant is matched to a non-participant on the basis of a single propensity score, which reflects the probability of being assigned to treatment, based on a set of observable characteristics. Such characteristics are not to be affected by the intervention, neither for the treated, nor for the control group. This approach was first proposed by Rosenbaum and Rubin (1983), and is now widely employed in impact evaluation. Khandor, Koolwal and Samad (2009) provide a detailed literature review and a practical guide to implement this approach. The evaluation we propose is similar to the one developed by Ruprah and Marcano (2007), who evaluate the effect of subsidies on delinquency rates for the Chilean case.

PSM relies on the assumptions that treatment assignment is determined by observable variables that are not affected by the treatment assignment (also called conditional dependence in the impact evaluation literature). These assumptions seem plausible in this case, provided that the selection criteria do not seem to be violated during the implementation process.

The first step, then, is to assess whether the treated and control groups are comparable. Indeed, we did not find borrowers with income higher than four times the minimum wage (USD \$560 in monthly income in 2010) and/or houses with a price higher than 158 times the monthly minimum wage (USD \$22,079 in 2010), who obtained a subsidy. This suggests that assignment rules are in fact being followed. However, as was previously discussed, for the whole eligible group of borrowers there are differences in income between the treated and the non-treated.

Table 17 through Table 19 provides descriptive statistics for eligible borrowers according to their status (ordinary or extraordinary). As we can see, even when the groups are significantly different in income (i.e., the treated group has a lower income), they do not seem to be dissimilar in other characteristics. Our analysis relies on the assumptions that these observable differences explain most of the subsidy's assignment and that there are no unobservable factors, such as intrinsic motivation, that play a role in beneficiaries self-selection. Our argument is that such differences are explained because workers with lower income tend to look more actively for the subsidy. Of course, this assumption might not be accurate, and further field research is required to verify it.

Matching brings two advantages over regression analysis. First, no assumptions are required regarding a linear relation among treatment, covariates and outcomes. Second, with matching every borrower in the treatment is compared with borrowers in the control group that are as similar to each other as possible. With PSM, we create an index which measures the probability of being treated, for every borrower. This index can be generalized in the following way:

$$P(X) = P(\text{Treatment} = 1|X)$$

Thus, the subsidy's Average Treatment Effect on the Treated can be estimated with

$$ATT \equiv E\{Y_{10} - Y_{00} | \text{Treatment} = 1\} = E\{Y_{10} - Y_{00} | \text{Treatment} = 1, p(X_0)\} = E\{E\{Y_{10} | \text{Treatment} = 1, p(X)\} - E\{Y_{00} | \text{Treatment} = 0, p(X)\} | \text{Treatment}\}$$

We compute the PSM based on a logic model by regressing the credit behavior variables (dependent variables) with the variables for treatment assignment such as income, savings, house price, as well as time and geographical variables. Table 19 (see Appendix) describes the independent variables used in the model, while Table 11 describes the dependent variables. After computing the probability of being treated, we employ a non-parametric kernel methodology to match the treatment propensity of treated and untreated borrowers. The standard errors are estimated by bootstrapping (250 iterations). Finally, as suggested by Heckman, Ichimura, and Todd (1997), our study compares observations within the common support region. Namely, once we apply the PSM methodology, we take into account the propensity score distribution function of both, the treated and the control group, and exclude those observations outside the overlapping region.

**Table 11. Mean and Standard Deviations for the Dependent Variables**

		Percentage of monthly payments missed (2006-2009)			Number of consecutive months without missing a payment, immediately after purchase (2006-2009)		
		All	ROA	REA	All	ROA	REA
<b>Eligible workers who did NOT receive a subsidy</b>	N	131,105	102,831	28,274	131,105	102,831	28,274
	mean	0.05	0.011	0.191	13.343	13.424	13.049
	SD	0.13	0.038	0.218	9.188	9.422	8.272
<b>Eligible workers who DID receive a subsidy</b>	N	91,374	69,509	21,865	91,374	69,509	21,865
	mean	0.051	0.008	0.185	14.621	14.722	14.297
	SD	0.134	0.039	0.215	8.711	8.939	7.936
<b>Both</b>	N	222,479	172,340	50,139	222,479	172,340	50,139
	mean	0.05	0.01	0.189	13.868	13.948	13.593
	SD	0.132	0.039	0.217	9.017	9.252	8.151

Source: Author's compilation with INFONAVIT data.

#### 4.4.2. Results

Before implementing the PSM approach, we first run a naïve regression. Although we expect that the treatment effect identified by this approach will be biased, this process is useful to understand the direction in which the subsidy might be acting. This approach is also useful to understand correlations between the borrower's characteristics when the loan was originated and their credit behavior. The model specification is given by:

$$Y = \alpha_0 + \beta_1 T + \sum_j \gamma_j X_j + \epsilon$$

We evaluate two dependent variables. In the first model,  $Y$  represents the number of consecutive months without missing a payment, immediately after buying the house. For the second model,  $Y$  represents the percentage of monthly missed payments. The variable  $T$  takes the value of 1 if the eligible borrower was awarded the subsidy when he decided to take the loan and 0 otherwise.  $X$  represents a vector of borrower's characteristics such as income, price of the house, savings, etc.

Table 12 and Table 13 show the variables used as covariates and the regressions results. We begin by analyzing the covariates. We find that the borrower's income and savings are positively correlated with credit behavior for both models. Also, borrowers who bought a new house, on average, seem to behave better than those who bought an older one. Other variables show results that might be contradictory if we compare their correlations with both dependent

variables. The price of the house is positively correlated with a higher percentage of missed payments. However, this same variable is positively correlated with the number of consecutive monthly on-time initial payments. For the covariate gender, the opposite is true. While men tend to have a lower percentage of monthly missed payments, they seem to have a worse record regarding consecutive monthly on-time initial payments.

**Table 12. Ordinary Least Squares Regression**

Dependent variable: Percentage of defaults in monthly payments  
[only for eligible borrowers who haven't been in ROA status all the time]

Number of jobs	=	50,127			
Pseudo R2	=	0.064			
			<i>Coef.</i>	<i>Std. Err.</i>	<i>Z</i>
<i>Dummy (I=provided with a subsidy)</i>	d_subs	-0.0102***	-0.00282	-3.623	0.000292
<i>Borrower's daily income (in times of 4 minimum wages)</i>	sal_vsm	-0.0124***	-0.00208	-5.97	2.39E-09
<i>Price of the house (in times of 158 monthly minimum wages)</i>	q_prec_2	0.0489***	-0.0141	3.464	0.000532
<i>Balance of housing-saving account (in MXN)</i>	im_saldo_s~a	-6.32e-07***	-1.09E-07	-5.806	6.45E-09
<i>Age of the house (in years)</i>	Edad	0.0001	-0.000207	0.485	0.628
<i>Acquired a new house (I=yes)</i>	in_viviend~a	-0.0138***	-0.00331	-4.157	3.23E-05
<i>Borrower's gender (I=male)</i>	id_genero	-0.0369***	-0.00194	-19.01	0
<i>Borrower's Age (in years)</i>	Age	0.000734***	-0.000146	5.033	4.85E-07
<i>Obtained the loan in 2008 (I=yes)</i>	yr08	-0.0863***	-0.00202	-42.7	0
<i>Obtained the loan in 2009 (I=yes)</i>	yr09	-0.105***	-0.00357	-29.35	0
<i>Constant</i>	_cons	0.271***	-0.0136	19.96	0

Source: Authors' compilation using INFONAVIT data.

**Table 13. Ordinary Least Squares Regression**

Dependent variable: Number of consecutive months without missing a payment immediately after buying the house  
[only for eligible borrowers who haven't been in ROA status all the time]

Number of jobs	=	50,127			
Pseudo R2	=	0.061			
			<i>Coef.</i>	<i>Std. Err.</i>	<i>z</i>
<i>Dummy (I=provided with a subsidy)</i>		1.768***	(0.106)	16.63	0
<i>Borrower's daily income (in times of 4 minimum wages)</i>		0.117	(0.0782)	1.496	0.135
<i>Price of the house (in times of 158 monthly minimum wages)</i>		2.602***	(0.531)	4.897	9.77e-07
<i>Balance of housing- savings account (in MXN)</i>		1.04e-05**	(4.10e-06)	2.536	0.0112
<i>Age of the house (in years)</i>		0.0340***	(0.00778)	4.366	1.27e-05
<i>Acquired a new house (I=yes)</i>		0.932***	(0.125)	7.470	0
<i>Borrower's gender (I=male)</i>		-0.245***	(0.0732)	-3.347	0.000818
<i>Borrower's Age (in years)</i>		0.0164***	(0.00549)	2.979	0.00289
<i>Obtained the loan in 2008 (I=yes)</i>		0.292***	(0.0761)	3.829	0.000129
<i>Obtained the loan in 2009 (I=yes)</i>		-6.411***	(0.134)	-47.71	0
<i>Constant</i>		9.985***	(0.511)	19.52	0

Source: Authors' compilation using INFONAVIT data.

CONAVI’s subsidy seems to work in the expected direction for both dependent variables. Beneficiaries have on average a lower percentage of missed monthly payments (1 percentage point) and show a higher number of consecutive monthly on-time initial payments (1.8 months). However, these results cannot be conclusive: borrowers in the treatment and comparison groups are different in terms of income, savings, and other observable characteristics, which could be explaining the results. We seek to correct this comparability problem by implementing the PSM approach described in the previous section.

Table 14 shows the results of running a PSM approach. The Average Treatment Effect on the Treated (ATT) of the subsidy concerning the number consecutive monthly on-time initial payments is positive and significant. On average, borrowers in the “extraordinary regime” (or REA) who received the subsidy remain up-to-date for 1.3 months longer following the loan origination than those who did not receive it. These results are significant either with normal or bias corrected (bootstrapped) standard errors. Also, the direction of this finding is consistent with the regression approach (a positive effect) and the order of magnitude is similar (1.7 vs. 1.3).

Regarding the percentage of missed monthly payments, the subsidy’s effect (ATT) is not significant. When we compare the differences in outcomes between the treated and control group, the later appears to miss a lower percentage of monthly payments. However, the normal as well as the bias-corrected standard errors make this result statistically not different from zero.

**Table 14. Results from PSM Approach**

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat	Bootstrap Statistics (250 reps)				
							Bias	Corrected S.E.	[95% Conf. Interval]		
Percentage of defaults	<i>Unmatched</i>	0.3223	0.3124	0.0099	0.0030	3.27					
	<i>ATT</i>	0.3223	0.3155	0.0068	0.0072	0.94	-0.00053	0.00647	-0.0059	0.0195	(N)
	<i>ATU</i>	0.3124	0.3100	-0.0024	.	.			-0.0057	0.0189	(P)
	<i>ATE</i>			0.0016	.	.			-0.0054	0.0207	(BC)
Months without missing a payment, after buying the house	<i>Unmatched</i>	14.2754	13.0995	1.1759	0.1197	9.82					
	<i>ATT</i>	14.2756	12.9365	1.3391	0.2927	4.57	-0.01589	0.27793	0.7917	1.8865	(N)
	<i>ATU</i>	13.0987	15.3655	2.2668	.	.			0.8282	1.8913	(P)
	<i>ATE</i>			1.8599	.	.			0.8593	1.9151	(BC)

Note: S.E. for ATT does not take into account that the propensity score is estimated.

ATT = Average Treatment Effect on the Treated; ATU = Average Treatment Effect on the Untreated; ATE = Average Treatment Effect

While these results seem to be consistent, they rely on key assumptions that must be maintained hold for them to be valid. First is that the differences between the treated and the control group that play a role in subsidy assignment are observable. We noted that borrowers in the treatment group have lower income levels and saving than the control group. The PSM approach implemented in our impact evaluation is able to take those observable variables into account and match only comparable borrowers across groups. However, further field research needs to be done to find out details about the subsidy's application process.

## **5. Conclusions**

The Mexican housing finance system faces important challenges to the current boom's sustainability. If housing-related quality of life is to be improved, regulation must be thoroughly revised. There is significant room to strengthen investors' protection, by improving foreclosure procedures. The market should take greater advantage of used housing, as it relies too heavily on new housing to satisfy demand. In addition, the mechanism whereby *ejido* property is converted to private property—and can therefore be transacted—should be revised, as to make the process easier, cheaper and faster. There is also an important area of opportunity for federal institutions such as CONAVI to collect and publish relevant information that would support the market's appropriate development.

Fortunately, empirical evidence suggests that the large subsidy programs currently under operation do not have negative financial implications for mortgage institutions. Actually, the subsidies appear to improve repayment behavior among workers, especially among those in the “extraordinary regime.” Additionally, subsidized borrowers with lower income and savings levels seem to have access to pricier houses, with higher quality, than they would have been able to afford otherwise. Thus, attaining the socially-oriented objectives of improving access to quality housing and to mortgage credit via upfront subsidies is being met without weakening the financial standing of mortgage institutions.

However, the current income eligibility cut-off point for CONAVI's program should be revised. The current cut-off point seems to be somewhat inefficient in targeting benefits only to workers who would not be able to purchase a house otherwise.

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## Appendix – Tables

**Table 15. Wages, Balance of Saving Accounts and Amount of Subsidies (If Awarded), Eligible Workers Only**

Housing price ranges (Times the Minimum Wage)	Distance from price limit (=158 monthly minimum wages)	-90%	-80%	-70%	-60%	-50%	-40%	-30%	-20%	-10%	Total
	House Price (in terms of Daily Minimum Wage)	[480.32-960.64)	[960.64-1440.96)	[1440.96-1921.28)	[1921.28-2401.6)	[2401.6-2881.92)	[2881.92-3362.24)	[3362.24-3842.56)	[3842.56-4322.88)	[4322.88-4803.2)	Total
	House Price (in MXN) *	[40,000 - 50,000)	[50,000- 75,000)	[75,000 - 100,000)	[100,000 - 120,000)	[120,000 - 145,000)	[145,000 - 175,000)	[175,000 - 200,000)	[200,000 - 220,000)	[220,000 - 265,000)	Total
Eligible workers who DID receive a subsidy	Frequency	2	16	78	236	717	2,162	40,244	41,886	45,764	131,105
	Mean balance of housing-savings account (in MXN)	10,274.395	23,085.522	24,713.610	20,313.013	15,401.531	15,374.557	15,568.118	17,352.134	21,020.164	18,051.910
	SD	4,392.258	21,747.589	22,614.552	21,864.684	17,756.472	14,998.039	11,053.826	12,046.575	14,550.784	13,028.290
	Borrower's daily income (in MXN)	72.340	94.453	101.705	97.410	93.642	108.175	136.776	155.437	168.144	152.882
	SD	12.247	37.320	44.589	37.991	33.868	30.304	26.801	26.010	30.107	31.640
Eligible workers who DID NOT receive a subsidy	Frequency	0	0	7	62	317	2,235	59,675	22,232	6,846	91,374
	Mean Amount of subsidy (in MXN)	0	0	31,171.904	37,271.107	36,730.555	33,883.773	34,125.734	31,470.261	27,737.878	33,006.067
	Mean balance of housing-savings account (in MXN)	.	.	9,497.404	12,043.881	12,482.582	11,555.170	11,861.743	15,331.971	19,132.730	13,245.437
	SD	.	.	5,023.316	6,575.797	7,800.574	7,568.571	8066.866	10561.543	14254.511	9564.600
	Borrower's daily income (in MXN)	.	.	59.707	77.572	76.991	78.971	87.274	108.320	121.557	94.716
	SD	.	.	14.364	24.006	21.870	20.327	21.976	23.651	20.813	25.273
Both	Frequency	2	16	85	298	1,034	4,397	99,919	64,118	52,610	222,479
	Mean balance of housing-savings account (in MXN)	10,274.395	23,085.522	23,460.511	18,592.590	14,506.650	13,433.159	13,354.545	16,651.671	20,774.557	16,077.851
	SD	4,392.258	21,747.589	22,097.684	19,961.265	15,458.480	11,972.252	9,559.335	11,593.155	14,526.326	11,966.089
	Borrower's daily income (in MXN)	72.340	94.453	98.246	93.282	88.538	93.330	107.212	139.100	162.082	128.993
	SD	12.247	37.320	44.408	36.406	31.629	29.574	34.164	33.745	33.023	40.880

\* The price ranges are not necessarily mutually orthogonal because of differences in the value of the minimum wage over the years. \*\* The price limit is equivalent to 4308.2 times the daily minimum wage (same as 158 monthly minimum wages).

**Table 16. Housing Characteristics for Eligible Workers**

	2007			2008			2009			Total		
	Did NOT receive a grant	DID receive a grant	Subtotal	Did NOT receive a grant	DID receive a grant	Subtotal	Did NOT receive a grant	DID receive a grant	Subtotal	Did NOT receive a grant	DID receive a grant	Subtotal
<i>Frequency</i>	13,973	1,163	15,136	15,754	2,621	18,375	16,035	3,062	19,097	45,762	6,846	52,608
<i>Construction area (sq-m)</i>	46.254	45.808	46.220	46.168	46.742	46.250	44.854	47.085	45.212	45.734	46.736	45.865
<i>Number of rooms</i>	1.667	1.775	1.675	1.690	1.741	1.698	1.637	1.619	1.634	1.664	1.692	1.668
<i>Age of house (years)</i>	1.895	2.276	1.925	2.226	2.707	2.295	1.813	2.974	1.999	1.980	2.753	2.081
<i>Percentage of borrowers who purchase new housing</i>	81.1%	81.3%	81.1%	83.9%	81.9%	83.6%	84.4%	73.6%	82.6%	83.2%	78.1%	82.5%
<i>Subsidy amount (CONAVI Program)</i>		25158.49	1933.095		26325.84	3755.104		29926.24	4798.354		27737.88	3609.594
<i>Price per sq-m</i>	5252.397	5248.205	5252.075	5479.286	5347.939	5460.553	5847.883	5746.846	5831.683	5539.207	5509.438	5535.333
<i>Price</i>	228973.3	224298.5	228614.1	237904.5	233492	237275.1	248082.6	247242.3	247947.9	238743.8	238080.3	238657.5
<i>Number of bathrooms</i>	1.007	1.012	1.007	1.010	1.010	1.010	1.007	1.017	1.008	1.008	1.013	1.009

Table only includes cases of eligible workers who purchased a housing unit with a price below 10% of the program's price limit.

**Table 17. Descriptive Statistics: Independent Variables for Eligible Borrowers**

		<i>Borrower's daily income (MXN)</i>	<i>Price of purchased house (MXN)</i>	<i>Interest rate (percent)</i>	<i>Borrower's Age (years)</i>	<i>Borrower's gender (1=male)</i>	<i>Acquired a new house (1=yes)</i>	<i>Balance in housing-savings account (MXN)</i>	<i>Age of house (years)</i>	<i>Time with loan (months)</i>	<i>Fraction of analyzed period, in which workers stayed in ROA status</i>
<b>Did NOT receive a subsidy</b>	<i>N</i>	131,105	131,105	131,105	131,105	131,105	131,105	131,105	131,105	131,105	131,105
	<i>mean</i>	152.882	213684.900	6.143	31.224	0.651	0.829	18051.91	1.819992	18.372	0.932
	<i>sd</i>	31.640	25008.800	0.956	7.426	0.477	0.376	13028.29	5.62839	10.624	0.160
	<i>min</i>	2.4	40000	4	10.61621	0	0	0	0	1	0
	<i>max</i>	219.2	263215	9	103.9961	1	1	243731.7	101	36	1
<b>DID receive a subsidy</b>	<i>N</i>	91,374	91,374	91,374	91,374	91,374	91,374	91,374	91,374	91,374	91,374
	<i>mean</i>	94.716	197029.700	4.611	33.062	0.567	0.879	13245.44	1.422166	17.617	0.920
	<i>sd</i>	25.273	19275.020	0.594	8.528	0.496	0.327	9564.6	5.228603	9.086	0.173
	<i>min</i>	0.01	80000	4	9.215981	0	0	142.42	0	1	0
	<i>max</i>	219.04	263215	8	68.28561	1	1	164542.3	218	36	1
<b>Both groups</b>	<i>N</i>	222,479	222,479	222,479	222,479	222,479	222,479	222,479	222,479	222,479	222,479
	<i>mean</i>	128.993	206844.500	5.514	31.979	0.616	0.850	16077.85	1.656601	18.062	0.927
	<i>sd</i>	40.880	24254.710	1.119	7.949	0.486	0.357	11966.09	5.471222	10.028	0.166
	<i>min</i>	0.01	40000	4	9.215981	0	0	0	0	1	0
	<i>max</i>	219.2	263215	9	103.9961	1	1	243731.7	218	36	1

Source: Authors' compilation based on INFONAVIT data.

**Table 18. Independent Variables for Eligible Borrowers Who Have Always Been in ROA Status**

		<i>Borrower's daily income (in MXN)</i>	<i>Price of the house (in MXN)</i>	<i>Interest rate (in percentage)</i>	<i>Borrower's Age (in years)</i>	<i>Borrower's gender (1=male)</i>	<i>Acquired a new house (1=yes)</i>	<i>Amount in saving account (in MXN)</i>	<i>Age of the house (in years)</i>	<i>Time with loan (in months)</i>	<i>Proportion of time in ROA status</i>
<b>Did NOT receive a subsidy</b>	<i>N</i>	102,831	102,831	102,831	102,831	102,831	102,831	102,831	102,831	102,831	102,831
	<i>mean</i>	154.121	215471.700	6.154	31.418	0.657	0.833	18734.6	1.807471	16.717	1.000
	<i>sd</i>	31.802	25033.370	0.960	7.532	0.475	0.373	13379.98	5.554453	10.679	0.000
	<i>min</i>	2.4	40000	4	10.61621	0	0	0	0	1	1
	<i>max</i>	219.2	263215	8.2	103.9961	1	1	243731.7	101	36	1
<b>DID receive a subsidy</b>	<i>N</i>	69,509	69,509	69,509	69,509	69,509	69,509	69,509	69,509	69,509	69,509
	<i>mean</i>	95.390	198912.000	4.617	33.494	0.574	0.877	13822.39	1.434965	16.109	1.000
	<i>sd</i>	25.884	19581.260	0.604	8.664	0.495	0.328	9839.944	5.194767	9.232	0.000
	<i>min</i>	0.01	82500	4	9.215981	0	0	142.42	0	1	1
	<i>max</i>	219.04	263215	8	68.28561	1	1	164542.3	218	36	1
<b>Both</b>	<i>N</i>	172,340	172,340	172,340	172,340	172,340	172,340	172,340	172,340	172,340	172,340
	<i>mean</i>	130.433	208792.800	5.534	32.255	0.623	0.851	16753.39	1.65723	16.472	1.000
	<i>sd</i>	41.277	24383.490	1.125	8.072	0.485	0.356	12315.72	5.415329	10.125	0.000
	<i>min</i>	0.01	40000	4	9.215981	0	0	0	0	1	1
	<i>max</i>	219.2	263215	8.2	103.9961	1	1	243731.7	218	36	1

Source: Authors' compilation based on INFONAVIT data.

**Table 19. Independent Variables for Eligible Borrowers Who Have Not Always Been in ROA Status**

		<i>Borrower's daily income (in MXN)</i>	<i>Price of the house (in MXN)</i>	<i>Interest rate (in percentage)</i>	<i>Borrower's Age (in years)</i>	<i>Borrower's gender (1=male)</i>	<i>Acquired a new house (1=yes)</i>	<i>Amount in saving account (in MXN)</i>	<i>Age of the house (in years)</i>	<i>Time with loan (in months)</i>	<i>Proportion of time in ROA status</i>
<b>Did NOT receive a subsidy</b>	<i>N</i>	28,274	28,274	28,274	28,274	28,274	28,274	28,274	28,274	28,274	28,274
	<i>mean</i>	148.377	207186.200	6.102	30.516	0.629	0.817	15569.01	1.865	24.390	0.687
	<i>sd</i>	30.628	23814.770	0.940	6.981	0.483	0.387	11318.28	5.889	7.905	0.204
	<i>min</i>	47.4	76500	4	18.135	0	0	0	0	1	0
	<i>max</i>	219.1	263215	9	66.771	1	1	241042.9	60	36	0.972
<b>DID receive a subsidy</b>	<i>N</i>	21,865	21,865	21,865	21,865	21,865	21,865	21,865	21,865	21,865	21,865
	<i>mean</i>	92.573	191045.800	4.594	31.689	0.544	0.882	11411.28	1.381	22.410	0.667
	<i>sd</i>	23.093	16930.500	0.563	7.927	0.498	0.322	8371.227	5.334	6.621	0.201
	<i>min</i>	45.62	80000	4	18.136	0	0	362.77	0	2	0
	<i>max</i>	218.97	263215	8	62.715	1	1	136275.7	101	36	0.972
<b>Both</b>	<i>N</i>	50,139	50,139	50,139	50,139	50,139	50,139	50,139	50,139	50,139	50,139
	<i>mean</i>	124.042	200147.600	5.445	31.027	0.592	0.846	13755.87	1.654	23.526	0.678
	<i>sd</i>	39.081	22558.300	1.093	7.431	0.491	0.361	10346.41	5.659	7.437	0.203
	<i>min</i>	45.62	76500	4	18.135	0	0	0	0	1	0
	<i>max</i>	219.1	263215	9	66.771	1	1	241042.9	101	36	0.972

Source: Authors' compilation using INFONAVIT data.

**Table 20. Results from PSM Approach**

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat	Bootstrap Statistics (250 reps)		
							Bias	Corrected S.E.	[95% Conf. Interval]
Percentage of defaults	<i>Unmatched</i>	0.3223	0.3124	0.0099	0.0030	3.27			
	<i>ATT</i>	0.3223	0.3155	0.0068	0.0072	0.94	-0.00053	0.00647	-0.0059 0.0195 (N)
	<i>ATU</i>	0.3124	0.3100	-0.0024	.	.			-0.0057 0.0189 (P)
	<i>ATE</i>			0.0016	.	.			-0.0054 0.0207 (BC)
Months without missing a payment, after buying the house	<i>Unmatched</i>	14.2754	13.0995	1.1759	0.1197	9.82			
	<i>ATT</i>	14.2756	12.9365	1.3391	0.2927	4.57	-0.01589	0.27793	0.7917 1.8865 (N)
	<i>ATU</i>	13.0987	15.3655	2.2668	.	.			0.8282 1.8913 (P)
	<i>ATE</i>			1.8599	.	.			0.8593 1.9151 (BC)

Note: S.E. for ATT does not take into account that the propensity score is estimated.

Treatment assignment	Psmatch2: Common support		
	Off Support	On Support	Total
<i>Untreated</i>	6	10,569	10,575
<i>Treated</i>	2	8,256	8,258
<i>Total</i>	8	18,825	18,833