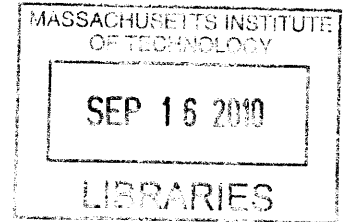


**Property values, housing subsidies and incentives:  
evidence from Chile's current housing policies**

by

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MA in Economics  
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**ARCHIVES**

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## **Abstract**

This study evaluates the performance of low income housing subsidy programs currently operating in Chile. The use of detailed microdata allows a close assessment of the relationship between individual subsidy grants, characteristics of the units purchased and actual transaction prices. The study entails both the comparison between programs with different incentive frameworks, and the relative performance of each of these programs in a context of major increases in the levels of assistance provided.

The evidence suggests that in most cases virtually the entire increase in the subsidy to the purchaser, which is intended to make housing more affordable, is translated into increased housing prices. In fact, in subsidized transactions between 2007 and 2009 the agreed purchase prices were almost entirely determined by the maximum subsidy amounts set by the housing authority. This occurred repeatedly in transactions performed through programs where the granted subsidy was virtually a 1 to 1 function of the agreed transaction price and where subsidy beneficiaries have little or no incentive to bargain. In such a framework, all the increases in subsidy levels that occurred in the period were translated into equivalent increases in prices with very limited improvements in the quality and location of the units purchased. On the contrary, prices tended to move much more closely with the unit's predicted price (determined by its actual characteristics) in less generous programs that provide lump sum transfers and where beneficiaries are responsible for paying larger proportions of the balance. However, even in these cases, up to 64 cents per dollar of housing subsidy are estimated to be translated directly into house price inflation.

The estimated positive impact of subsidy amounts on prices of existing units is a form of wealth transfer that benefits current owners. Although the majority of today's sellers in this segment are low to middle income households that benefitted from housing policy efforts in previous decades, these owners are certainly wealthier than current subsidy beneficiaries and also wealthier than other households still waiting to receive housing assistance. Such wealth transfers may be inappropriate, and undermine the declared goal of targeting housing assistance efforts on those who need it most.

Thesis supervisor: William C. Wheaton  
Title: Professor of Economics

## **Acknowledgements**

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I am deeply obliged to Chile's Ministry of Housing and Urban Development and particularly to those at the Commission for Housing and Urban Studies for granting me access to such detailed data and helping me work through it. Also especially grateful to Ivan Miranda at Chile's Postal Service for his priceless technical support in the geocoding process.

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## **Section I Introduction**

Chile is often considered a pioneer in the design and implementation of housing subsidy programs in Latin America (OECD, 2007). Throughout the 20<sup>th</sup> century, governments representing different political coalitions have set a high priority on meeting the country's housing needs. Specifically in the last 30 years, Chilean housing policies have evolved into a demand-oriented system of up-front and targeted capital subsidies intended to promote homeownership and reduce the housing deficit (Cummings and Di Pasquale, 2002). As opposed to countries like the United States where housing assistance for the poor is based on different rental support mechanisms, the Chilean approach has always attempted to ease access to homeownership and provide asset building capabilities, even in the most vulnerable segments. Recently Chile's approach has been exported and implemented with relative success in other developing countries such as Colombia and South Africa (Gilbert, 2004).

Chile's successful efforts to gradually reduce the housing deficit have recently made possible additional policy targets which were not a priority in previous decades: increasing standards of subsidized housing units (size and location) and reduction of residential segregation along with more efficient patterns of city growth. The debate between quantity and quality has gradually moved to center stage, with most recent policy and budgetary decisions leaning towards quality improvements instead of further increases in the annual number of subsidies granted. In fact, the average subsidy amounts (in dollars per beneficiary household) almost doubled between 2007 and 2009.

This massive increase in subsidy levels came along with the gradual elimination of public provision housing programs and the decision to concentrate all efforts on beneficiary based subsidy programs. The latter, in addition to the gradual increase in the housing stock due to decades of housing policy programs, has resulted in the surge of an incipient market for existing units in the lower priced segments, especially in larger metropolitan areas such as Santiago, Concepcion and Valparaiso.

The buoyant market for low priced existing units has been catalyzed by recent public policy adjustments that allowed and facilitated the use of housing subsidies to purchase previously built homes. To the extent that a large percentage of the individual sellers were beneficiaries of housing subsidies in previous decades, the use of current subsidies to purchase existing units does not necessarily yield an equivalent increase in homeownership levels. However, allowing this gives sellers the chance to move up the housing ladder, change neighborhood or city or pursue other forms of investment with the product of the sale. Moreover, enabling current subsidy beneficiaries to buy existing units provides them with more alternatives and adds value to a large portion of the housing stock that had been virtually absent from the real estate market until now.

It is in the context of this newly active market for existing units that this study attempts to assess the performance of the housing programs currently operating in Chile. The 2007-2009 across-the-board increase in housing subsidy levels and the coexistence of assistance programs that differ both in subsidy/price ratios and in the determination of the subsidy amounts to be granted, provides an excellent scenario for this assessment. The use of detailed microdata allows a close look at the relationship between individual subsidy amounts granted, characteristics of the units purchased and actual transaction prices.

Given this combination of housing programs with differing incentives and the increasing levels of assistance provided, the issues surrounding the relationship between property values, housing subsidies and incentives become particularly interesting to study. Key questions are whether transaction price changes reflect housing attributes or are mainly composed of subsidy pass-through into house price inflation; and whether this relation is any different between programs that provide different bargaining incentives. Additionally, simply assessing whether the units purchased by the end of 2009 were significantly bigger, newer or better located than those bought in 2007 is of interest and currently unknown.

Similar questions have been addressed by different authors who have focused primarily in the performance of rental vouchers. Crews and Olsen (2002) use hedonic techniques to assess whether Section 8 rental subsidies granted in the United States are too high in value. This program provides subsidies that cover a portion of the rent to be paid by low income families for privately owned rental units and it is currently the largest federal housing program operating in the US. The authors find that the assistance granted greatly exceeds the minimum rent levels for existing units that meet program requirements.

Also regarding Section 8 vouchers in the US, Susin (2002) concludes that this program has raised rents for unsubsidized poor households. He finds that metropolitan areas with more generous voucher allocations exhibited faster increases in rent levels compared to those where less vouchers were distributed. Laferrere and Le Blanc (2004) studied the French rental housing allowance system and reported higher rent increases in units set to host incoming tenants that received housing allowances. They argue that this finding is consistent with individual private landlords capturing part of the subsidy in the short run.

The present study attempts to answer similar questions but in a context where housing subsidies target homeownership and where data allows comparison between programs that offer different incentives and levels of assistance. The research is based on hedonic techniques and takes advantage of a comprehensive dataset of geocoded administrative records that merges information from Chile's Ministry of Housing and Urban Development, Internal Revenue Service and Census data.

The study is structured as follows. Section II gives a broad description of the evolution of housing policies in Chile and a detailed description of the programs to be evaluated. Section III describes the data available and displays preliminary descriptive statistics. Section IV presents the empirical approach and provides evidence on prices and housing attribute mix of the subsidized units purchased in the period. Section V extends the research and attempts an estimation of the impact of subsidy amounts on prices. Finally, Section VI presents the main conclusions and offers policy recommendations.

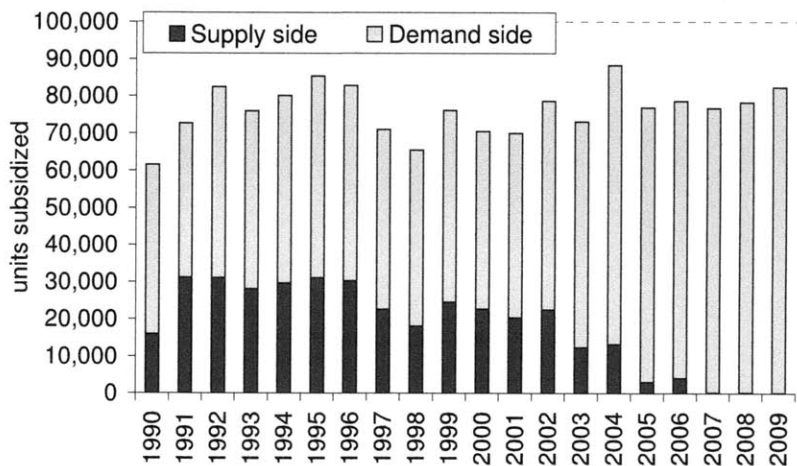
## Section II Housing policies in Chile and program description

### General context

Housing policies in Chile have always played a central role in the country's approach to development and poverty reduction. Particularly in the last three decades, on average more than 55% of the units built each year had some degree of explicit government assistance through housing subsidies.

With regards to delivery mechanisms, currently all housing assistance programs operate within a demand-side subsidy framework. Public provision programs, which were the main channel through which households from the 1st income quintile accessed housing during the 80s and 90s, have gradually been eliminated in favor of beneficiary based subsidies (see Graph 1).

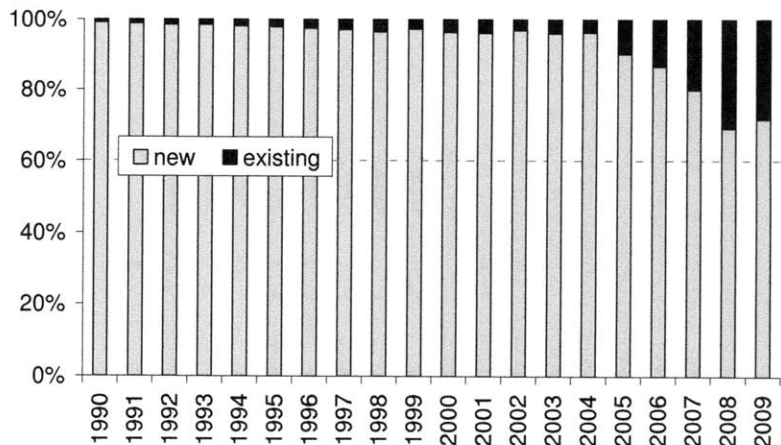
**Graph 1:**  
Housing subsidies by delivery mechanisms in Chile



Despite being demand oriented in the sense that the subsidy went to the household and not to the developer, until very recently most programs strongly favored the purchase of new units over existing ones. For years this bias was justified by the explicit goal of boosting economic activity, increasing employment and ensuring an increase in aggregate levels of homeownership. Additionally, policy makers argued that the collective purchase of new units in newly built neighborhoods helped maintain community ties between benefitted households, especially in the case of those originally living together in illegal settlements. On the other hand, other observers have simply argued that public funding for new housing is more visible and electorally more rewarding than the individual dissemination of beneficiaries along older neighborhoods.

That perception has changed in the last 5 years. Modifications in subsidy program regulations implemented by the end of 2006 facilitated the acquisition of second hand units through subsidized programs, especially in the lower income brackets. In fact, during 2008 and 2009, the percentage of the subsidies used to purchase existing units reached 30% (Graph 2).

**Graph 2:**  
Housing subsidies in Chile by condition of the purchased unit



In the last two years, this proportion nearly reached 50% in Santiago's metropolitan area which now has a large stock of existing units and where land for new development is relatively more expensive. A relevant benchmark is that between 2004 and 2006, 56% of all registered transactions in Santiago involved existing units (this includes both the subsidized and unsubsidized transactions). The fact that existing units accounted for almost 50% of all subsidized transactions in Santiago during 2008-2009 is evidence that housing assistance programs have gradually become neutral in the sense that they no longer favor new over existing units.

From the supply side, this change is closely related to the recently loosened restrictions that made it virtually impossible for a previous year housing subsidy beneficiary to sell her property. Other than the 5 year prohibition on sales (that previous and current subsidy beneficiaries still need to comply with), normative requirements and administrative hurdles made it extremely complicated for sellers (many of them previous years' beneficiaries) to meet and agree to sell to a current subsidy beneficiary (the main source of demand for this kind of housing). These impediments both severely affected the asset building capacity of those who benefitted from housing subsidies in the past (their homes were virtually out of the market), and also precluded the development of a deep housing market in the lower priced segments.

However, now that this has changed, the distinction between existing and new units becomes particularly relevant when analyzing property values and the effect of subsidies on prices. In the case of new units the awarded subsidy will eventually be received by the developer and any profits will be shared between the developer and the previous land owner. In fact, it should not come as a surprise that the main developers associations permanently advocate for more and larger subsidy amounts and their technical input is often considered in the process of subsidy level determination.

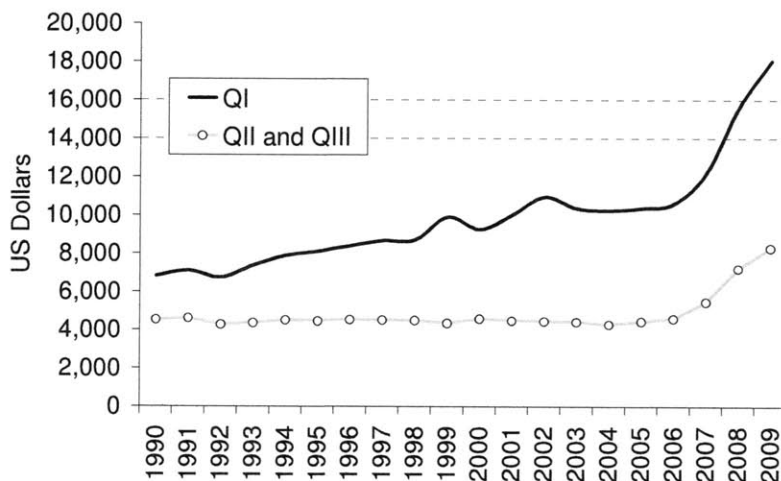
In the case of existing units, subsidy levels to be granted are currently set to be equal to those for new units. The subsidy goes to the individual beneficiaries, regardless of their choice between a new and an existing unit. Sellers of existing units are completely absent from the process in which subsidy amount levels are determined. Composed of several thousands of individual homeowners (many of them beneficiaries of housing programs in previous decades), potential sellers take the subsidy levels as given. These individual sellers interact freely with subsidy beneficiaries and other unsubsidized buyers. Prices are determined through these individual negotiations with the only external constraint of those imposed by subsidy regulations in case the buyer is a subsidy beneficiary.



Along with the elimination of program regulations that used to favor the purchase of new units, in 2006 Chile's housing authorities initiated a series of modifications in housing subsidy programs in what was promoted as shift in policy priorities from quantity to quality.

Most of the changes implemented starting in 2007 consisted of increases in the level of assistance to be provided, along with an attempt to tie this increases to better housing attributes, particularly size and location. Households in the 1<sup>st</sup> income quintile saw their benefits increase from an upfront capital subsidy of US 10,000 on average to one of US 18,000 over three years. On the other hand, households from income quintiles II and III benefitted from an increase in benefits of US 4,000 on average, up from a level of assistance that had been frozen since 1990 (Graph 3).

**Graph 3:**  
Average subsidy paid by income quintile



It is worth noticing that the increase in subsidy levels initiated by the end of 2006 coincided with the programs' shifts towards neutrality between new and existing units.

In short, housing policies in Chile have recently evolved to promote the surge of an active market for existing units in the lower priced segments. This happened along with the average level of assistance provided being doubled between 2007 and 2009. Additionally, all subsidy programs operating in the most affordable segments are now demand-side subsidies with individual beneficiaries that interact with individual sellers.

### Detail of the programs to be assessed

As mentioned earlier, housing subsidy programs in Chile have always pursued homeownership and operate as upfront capital subsidies that partially or fully cover the price of the house chosen by the beneficiary. Rental assistance is not an option. Households are only eligible for assistance once, and their children may only apply for housing benefits once they leave their parent's home and form a new and independent household. Property owners are not eligible for housing assistance.

Targeting is achieved through socioeconomic surveys which rank households and yield explicit scores that are then considered for program application. An additional targeting mechanism is provided by the price caps imposed by different programs. Program beneficiaries are not permitted to purchase homes above specified price limits, which naturally helps prevent wealthier households from applying for assistance that would force them to purchase units below their preferred and affordable standards.

The three subsidy programs to be considered here fall within the category of demand-side subsidies and they all assist the beneficiaries in the purchase of new or existing dwellings. Each is targeted to different income groups:

- FSV 1 - Fondo Solidario de Vivienda, chapter 1- : for the first income quintile
- FSV 2 - Fondo Solidario de Vivienda, chapter 2- : for the second income quintile
- DS 40 - Decreto Supremo 40- : for the third income quintile

FSV 1 exists since 2002 and targets the most vulnerable segments. To qualify households must score below the 20<sup>th</sup> percentile in socioeconomic vulnerability surveys (originally in the Ficha CAS and currently in the Ficha de Protección Social – FPS). This program does not allow beneficiaries to complement the subsidy with additional funds obtained from mortgage loans. It was created to replace the previous housing delivery method for lower income families: Vivienda Básica SERVIU. The latter operated until 2002 and was designed as a public provision program in which the government developed the projects, contracted their construction, and then assigned the units to families that needed to provide a minimum savings requirement and engage in a complementary mortgage loan that the government itself provided.

FSV 1 came to replace this program after years of mortgage delinquency rates ranging 70% and after the authorities acknowledged that these segments were not in financial position to serve mortgage debts and that the government was particularly inefficient in payment collector and enforcer. Under these premises, initial versions of FSV 1 actually doubled the benefits provided by the previous program and eliminated the possibility of taking out any sort of mortgage loan, either public or private. FSV 1 therefore subsidizes almost 100% of the price by setting a maximum subsidy amount to be granted and by households choosing any unit under that maximum amount. As mentioned earlier, this program was initially conceived to subsidize the purchase of new units but starting in 2006 it became effectively neutral between new and existing units.

DS 40 was implemented in 2004 and it is the current version of a 30 year tradition of lump sum transfers designed to facilitate homeownership among middle to low income households (3<sup>rd</sup> income quintile). It operates as an individually granted voucher and it may be complemented with a mortgage loan obtained in the private financial market. On average the subsidies awarded cover 20% to 25% of the total price of the units purchased. It has always been neutral in terms of not favoring the purchase of new over existing units.

FSV 2 was created in 2006 and it was intended to fill in the gap that was created between the very generous FSV 1 and the relatively less attractive DS 40. It allows beneficiaries to obtain complementary mortgage loans and it also allows the purchase of existing units. Its target is the 2<sup>nd</sup> income quintile.

All three programs were in operation during the analyzed period (2007-2009) but they suffered major modifications, especially in terms of the subsidy amounts granted in each (see Tables 1 and 2).

**Table 1:** Definitions and benefits available in the first semester of 2007:

	<b>FSV 1</b>	<b>FSV 2</b>	<b>DS 40</b>
<b>Target</b>	1 <sup>st</sup> income quintile	2 <sup>nd</sup> income quintile	3 <sup>rd</sup> income quintile
<b>Minimum savings requirement</b>	US 400	US 1,200	US 2,000
<b>Maximum subsidy</b>	US 13,200	US 11,200	US 8,400 – (0.2*Price) (for units under US 24,000)  US 3,600 (lump sum independent of price, for units above US 24,000)
<b>Price equals</b>	Savings + Subsidy	Savings + Subsidy + Loan	Savings + Subsidy + Loan
<b>Mortgage loan</b>	Not allowed	Allowed. Restricted to a maximum of US 12,000.	Allowed. No restriction on size.
<b>Maximum price of unit to be purchased</b>	US 13,600 (unless additional savings are provided by household)	US 24,400 (unless additional savings are provided by household since loan amount is restricted)	US 40,000 (above that limit the voucher is worth 0)
<b>Subsidy design</b>	Subsidy amount increases with agreed price until maximum subsidy of US 13,200 is reached.	Subsidy is flat for units over US 12,400. Moving above that mark requires more savings or a mortgage loan.	Subsidy decreases with price for units under US 24,000 and then is flat until the US 40,000 price limit is reached.

As was already mentioned, during 2007 and 2008 the subsidy amounts granted in each program changed significantly. Maximum subsidy amounts were greatly increased in FSV1 and FSV2, both by an increase in the base subsidy and by the creation of an additional subsidy for well located units (Table 2).

**Table 2:** Definitions and benefits available in 2008 and 2009:

	<b>FSV 1</b>	<b>FSV 2</b>	<b>DS 40</b>
<b>Maximum subsidy</b>	<p>US14,800 (plus an additional subsidy for well located units of US 8,000 )</p> <p>Maximum total subsidy: US 22,800 (up from US 13,200 in 2007)</p>	<p>US12,800 (plus an additional subsidy for well located units of US 4,000)</p> <p>Maximum total subsidy: US 16,800 (up from US 11,200 in 2007)</p>	<p><u>2008:</u> US 11,000 – (0.175*Price)</p> <p><u>2009:</u> US 8,000 (lump sum independent of price)</p>
<b>Maximum price of unit to be purchased</b>	<p>US 23,200 (unless additional savings are provided by household)</p>	<p>US 30,400 (unless additional savings are provided by household since loan amount is restricted)</p>	<p>US 40,000 (above that limit the voucher is worth 0)</p>

Certainly the most significant modification undertaken in the period was the introduction of an additional subsidy for well located units which added up to US 8,000 in the case of FSV 1 and up to US 4,000 in FSV 2 (this benefit was not available within DS 40). In an attempt to allow beneficiaries to purchase units in well served areas, in December 2007 the authorities increased the subsidy amounts to be granted in these locations. The increase was to be granted only for the purchase of units located in well served areas, but because of the criteria used to determine area eligibility, in large cities the raise was basically available across the board, regardless of the specific location. In essence this modification implied a direct increase in the maximum subsidies available for FSV 1 and FSV 2 beneficiaries.

In brief, other than the price caps set for each program, the key differences are:

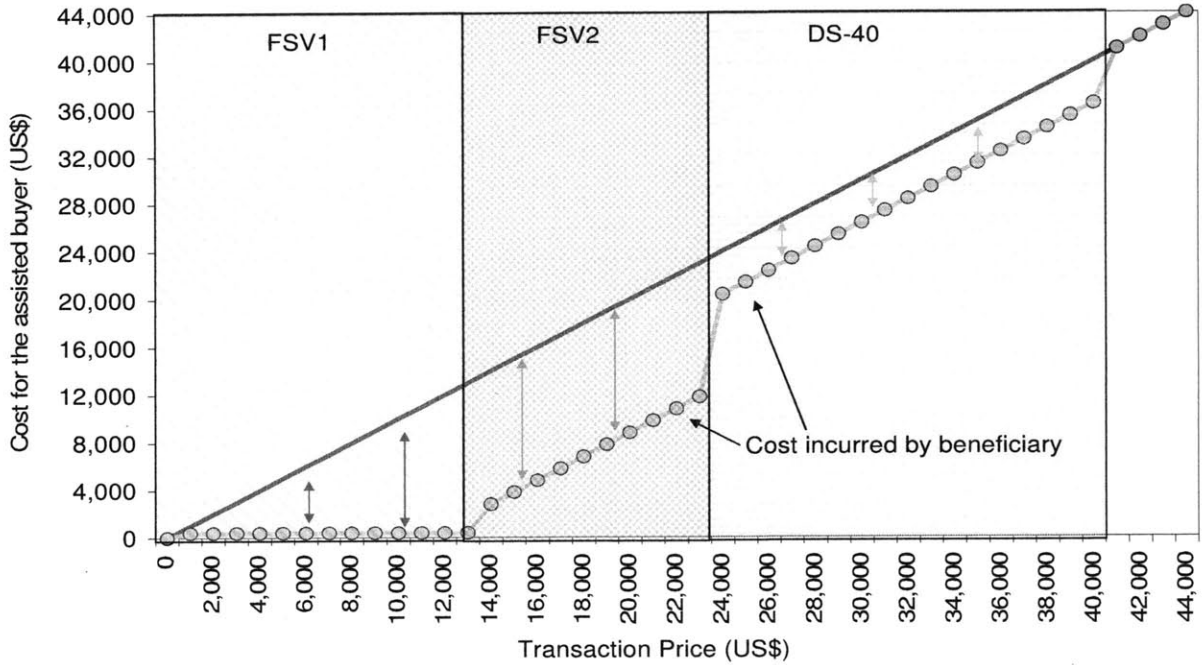
- FSV 1 beneficiaries are not allowed to apply for mortgage loans and subsidy increases with price (a price effect)
- FSV 2 and DS 40 beneficiaries can get loans and therefore larger subsidies translate into more housing expenditure or smaller loans (an income effect)
- Subsidy/price ratios are significantly different between programs (ratios above 95% on average for FSV 1, around 65% for FSV 2 and under 25% in the case of DS 40).

Graphs 4 and 5 display the schedule of transaction prices and the actual cost incurred by the buyer depending on the subsidy program from which she benefitted. The arrows represent the amount of subsidy in each case.

The graphs are presented as if the three programs do not overlap in terms of prices. However, that is true only for the movement from less to more expensive houses. For example, FSV 1 beneficiaries could not buy units beyond the US 13,600 mark on 2007. On the contrary, DS 40 beneficiaries are entitled to buy units between US 0 and US 40,000, in each case obtaining a subsidy determined by DS40 regulations

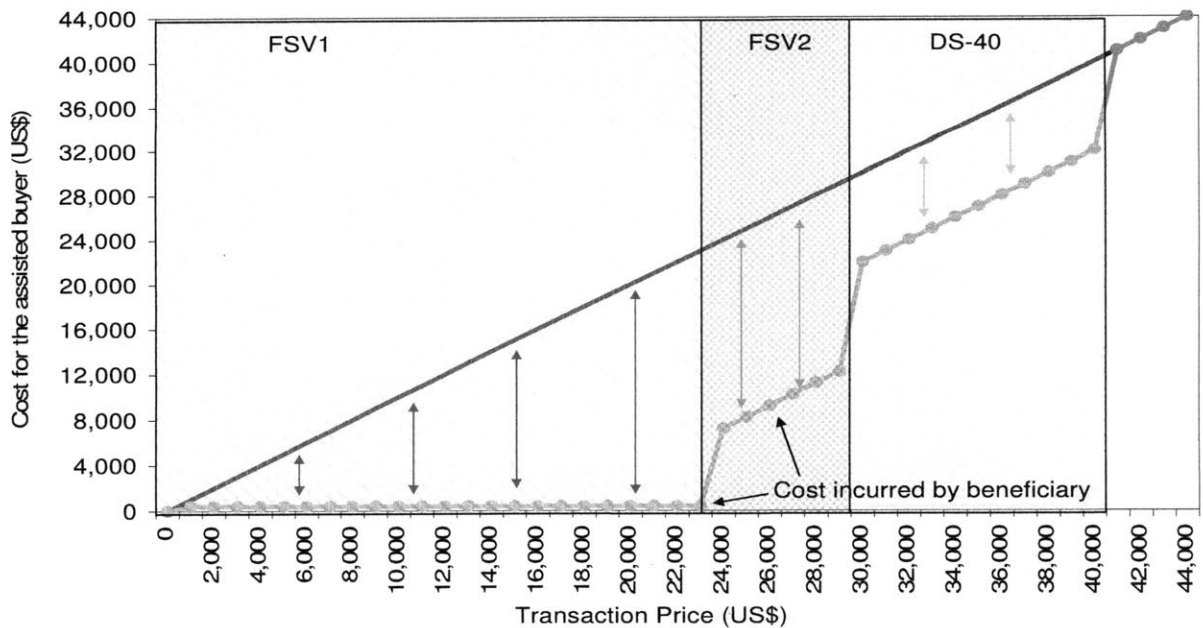
(certainly less generous than those from FSV1 and FSV2 for which DS40 households do not meet income eligibility requirements).

**Graph 4:**  
House prices and actual cost for subsidized buyers (2007)



The raise in subsidy amounts between 2007 and 2009 is evident from the increase in the price range now available for FSV1 and from the length of the arrows in the case of FSV2 and DS40.

**Graph 5:**  
House prices and actual cost for subsidized buyers (2009)



### **Section III Data sources and descriptive statistics**

Data on subsidized transactions for the 2007-2009 period was obtained from administrative records provided by Chile's Ministry of Housing and Urban Development (MINVU). The database consists of disaggregated information for each subsidy paid between 2007 and 2009. Each observation contains information on the unit's price, the amount of subsidy granted, the subsidy program involved, square meters of built structures, whether it was a house or an apartment, street address and the geographical coordinates.

To complement this information, each subsidy observation was paired with the corresponding information obtained from 2007's Real Estate Cadastre, equivalent to an assessor's database compiled by the Internal Revenue Service (SII). That way each observation was enriched with information on its current assessed value, lot size, year of construction and quality of the structure.

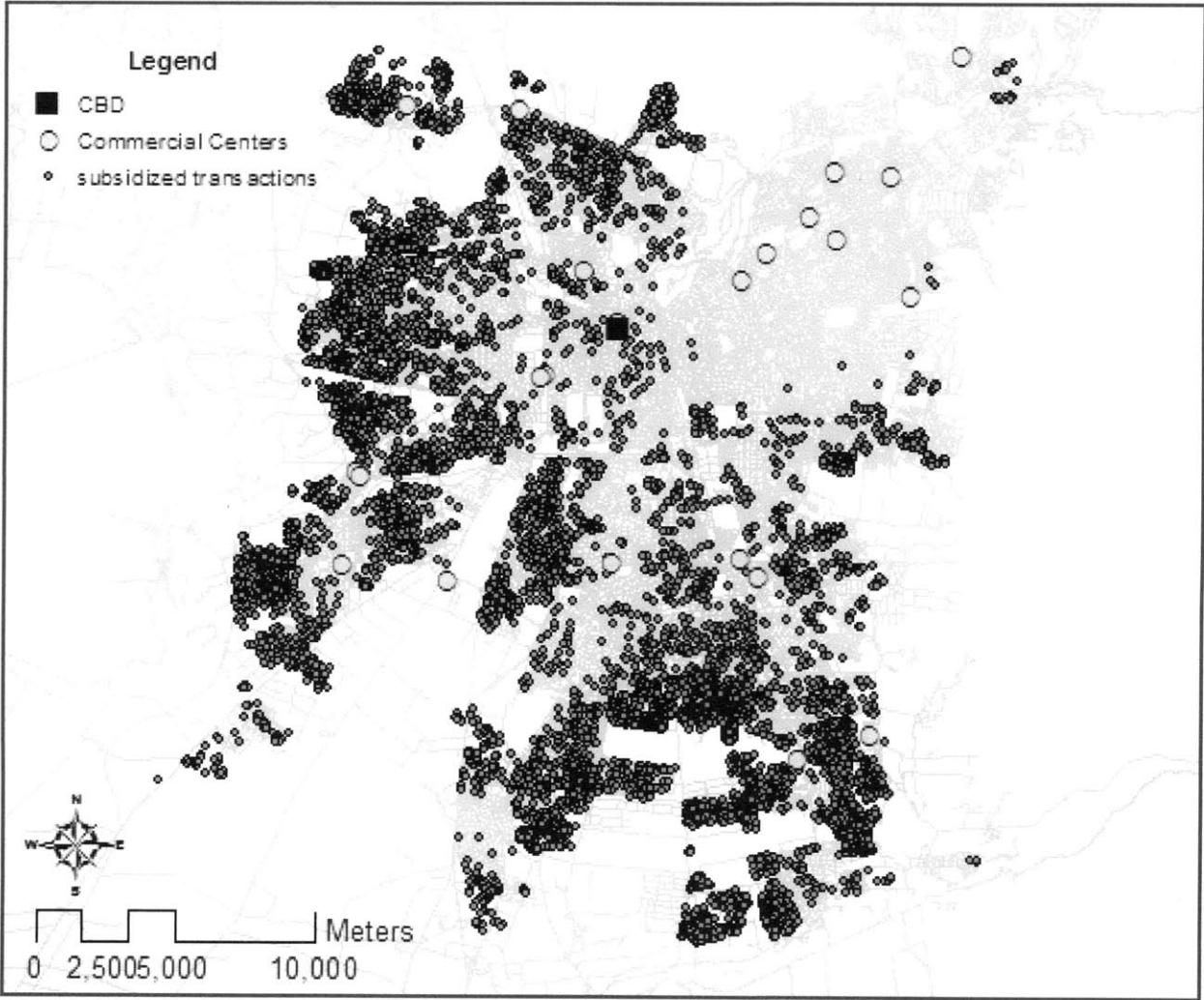
The merge of SII's Real Estate Cadastre with MINVU's administrative records was performed using the address of the purchased units after having them normalized by Chile's Postal Service. From a total of 22,528 subsidized transactions of used units registered in Santiago during 2007 and 2009, 16,968 were successfully matched and geocoded (75,3%).

With the geocoded subsidized transactions it was possible to calculate the Euclidean distance to the Central Business District (CBD) and to commercial areas (shopping centers). Distance to subway stations, parks, schools and hospitals was also obtained and considered in the estimations. Finally, by geographically matching the addresses with their corresponding Census block groups it was possible to obtain the percentage of residents with college education in the neighborhood.

These data was obtained from the 2000 National CENSUS and was available at the block level. To avoid sharp discontinuities produced by the presence of outliers (blocks with scarce units where all residents or none have college education) and by absence of data in specific areas due to inexact matching of data layers, the Census data was geographically smoothed using inverse distance weighted interpolation. This implies that at each point, the percentage of residents with college education is a weighted average of the percentage obtained from the underlying block and other nearby census blocks, using weights that decline with the distance to the original point.

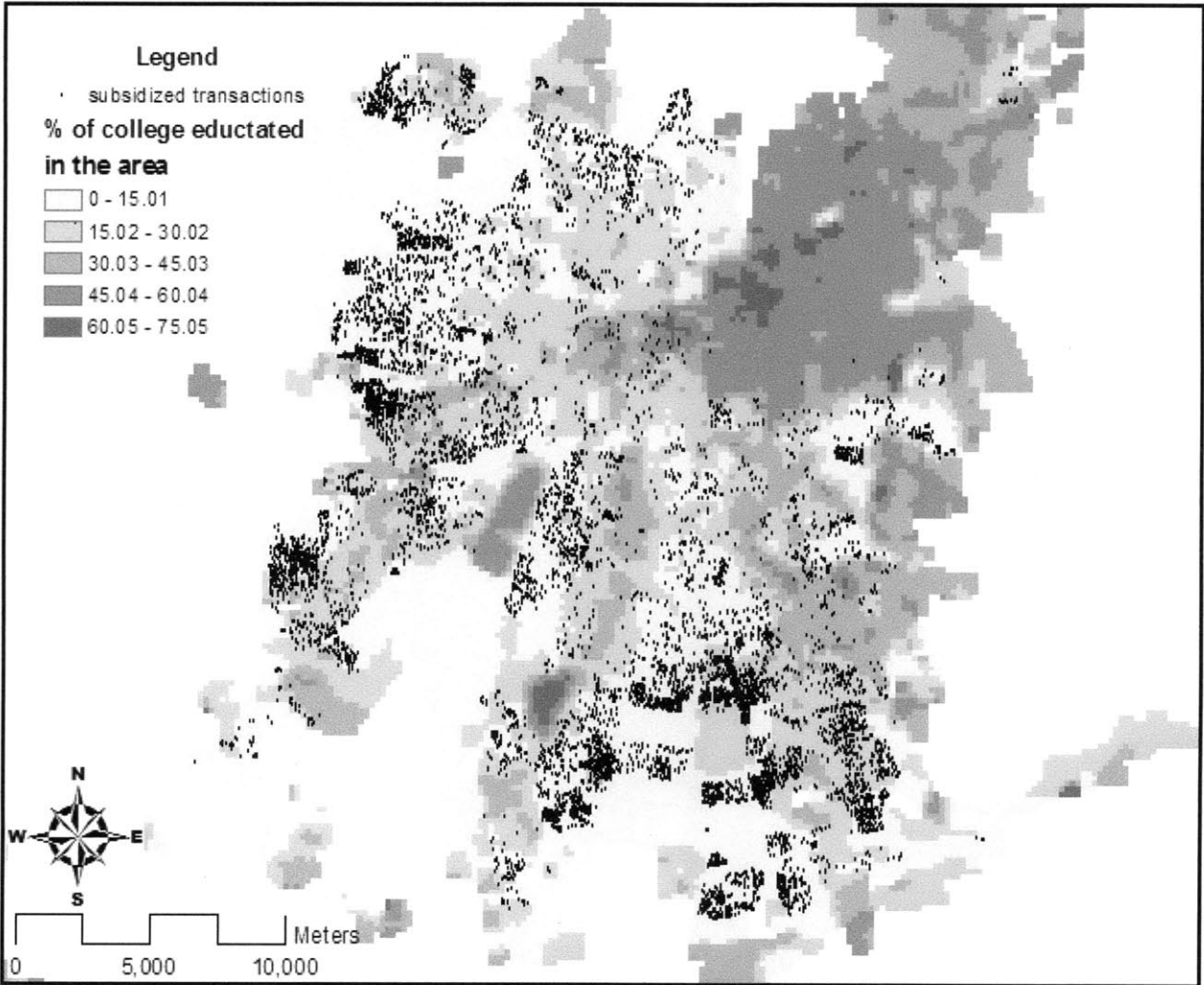
The spatial distribution of the subsidized transactions is concentrated in the periphery of the Santiago (away from the CBD) where land values and house prices are lower, with a large number of transactions located in southern municipalities like La Pintana and Puente Alto. The almost complete absence of subsidized transactions in the northeastern cone is explained by the fact that those neighborhoods are by far wealthiest in the city (and in the country) and there are virtually no units to be purchased within the price range allowed by the subsidy programs (US 40,000 maximum price).

**Figure 1:** Subsidized transactions in Santiago (2007-2009) and location of commercial centers and CBD



A consistent pattern can be observed in the next map which shows how the vast majority of the registered transactions occurred in areas where the percentage of college educated residents was relatively low. Given that college education is an adequate proxy for income, this layer serves the purpose of assigning to each transaction an approximation to the income level in the surrounding neighborhood. Although there are hardly any transactions in the most educated areas, there is still significant variation in the college level of those areas where transactions did take place.

**Figure 2:** Subsidized transactions in Santiago (2007-2009) and percentage of heads of households with college education



As a benchmark to compare the 2007-2009 subsidized purchases, we use a database gathered by SII which contains all property transactions registered in Santiago between 2004 and 2006, which adds up to more than 180 thousand purchases (unfortunately the full transactions data for 2007-2009 has not been released by SII). The total sample includes both subsidized and unsubsidized transactions of new and existing units. However, for benchmark purposes, we decided to draw a sample from this database considering only the purchases of existing units under US 60,000. This subsample is composed by 68,871 transactions.



The average price for the purchase of subsidized units (considering all three programs) between 2007 and 2009 was US 21,968 with an average built surface of 48.3 square meters (see Table 3). The structure quality index of the units is calculated by SII and averaged 4.06 in a range that goes from 1 (best) to 5 (worst) after considering type and state of building materials. Except from the age of the properties, all housing attributes are relatively inferior in the subsidized sample compared to the 2004-2006 subsample of transactions of existing units under US 60,000. This was to be expected since subsidized transactions are restricted to units priced under US 40,000. Consistently, the full sample of 2004-2006 transactions exhibits notably better attributes and of course much higher average prices.

**Table 3:** Descriptive statistics of subsidized transactions and relevant control groups

	Mean	Std. Dev.	Minimum	Maximum
<b>Subsidized transactions in 2007-2009 (16,670 observations)</b>				
Price (\$)	21,967.51	7,843.13	9,000.00	40,000.00
Unit size (sqm)	48.32	16.02	20.00	229.00
Lot size (sqm) / excluding apartments	108.69	48.67	20.00	737.50
Apartment	0.39	0.49	0.00	1.00
Age	20.79	11.32	2.00	102.00
Age squared	560.15	676.56	4.00	10,404.00
Quality index 1(best) to 5(worst)	4.06	0.33	2.50	5.00
Distance to CBD (meters)	13,574.73	4,806.38	39.68	23,218.52
Distance to commercial centers (meters)	4,189.64	2,313.21	47.09	12,825.41
% of residents with college degree in area	12.20	8.32	0.00	62.94
<b>Transactions in 2004-2006 / only existing and priced under \$60,000 (68,871 observations)</b>				
Price (\$)	26,823.24	14,858.68	2,000.00	59,960.00
Unit size (sqm)	63.14	33.09	20.00	955.00
Lot size (sqm) / excluding apartments	169.29	184.49	20.00	5,000.00
Apartment	0.26	0.44	0.00	1.00
Age	25.57	17.43	3.00	105.00
Age squared	957.48	1,336.67	9.00	11,025.00
Quality index 1(best) to 5(worst)	3.78	0.57	1.00	5.00
Distance to CBD (meters)	10,631.13	5,500.59	35.01	30,110.44
Distance to commercial centers (meters)	3,271.61	2,148.59	14.04	20,064.62
% of residents with college degree in area	21.40	14.54	0.00	71.65
<b>All transactions in 2004-2006 / existing and new full price range (181,654 observations)</b>				
Price (\$)	76,046.25	92,251.55	2,000.00	1,957,160.00
Unit size (sqm)	78.35	54.29	20.00	992.00
Lot size (sqm) / excluding apartments	212.83	288.60	20.00	5,000.00
Apartment	0.49	0.50	0.00	1.00
Age	13.90	18.03	0.00	105.00
Age squared	518.25	1,102.27	0.00	11,025.00
Quality index 1(best) to 5(worst)	3.26	0.76	0.50	5.00
Distance to CBD (meters)	9,522.85	5,602.10	14.40	30,110.44
Distance to commercial centers (meters)	2,832.37	2,194.37	14.04	20,064.62
% of residents with college degree in area	31.27	17.92	0.00	75.05

Looking at each housing program in particular, average housing attributes registered in each segment exhibit the expected magnitudes and the corresponding differences between them (Table 4). Units purchased through FSV1 are smaller, older, of lower quality, are further away from CBD and commercial areas and are located in areas with lower percentages of residents with college education. Likewise FSV 2 units show equivalent differences with respect to those purchased through DS 40.

**Table 4:** Descriptive statistics of subsidized transactions by subsidy program

	Mean	Std. Dev.	Minimum	Maximum
<b>FSV 1 (10,281 observations)</b>				
Price (\$)	17,786.83	4,368.80	10,080.00	26,000.00
Unit size (sqm)	45.09	13.41	20.00	229.00
Lot size (sqm) / excluding apartments	99.05	44.41	20.00	737.50
Apartment	0.53	0.50	0.00	1.00
Age	19.52	10.11	2.00	81.00
Age squared	483.34	557.77	4.00	6,561.00
Quality index 1(best) to 5(worst)	4.10	0.32	3.00	5.00
Distance to CBD (meters)	14,294.52	4,722.00	598.32	22,922.08
Distance to commercial centers (meters)	4,722.64	2,325.06	245.96	12,527.52
% of residents with college degree in area	10.10	7.10	0.00	56.71
<b>FSV 2 (971 observations)</b>				
Price (\$)	20,589.88	5,202.76	11,600.00	31,200.00
Unit size (sqm)	48.44	17.40	23.00	172.00
Lot size (sqm) / excluding apartments	102.63	43.63	20.00	422.00
Apartment	0.31	0.46	0.00	1.00
Age	22.17	11.51	2.00	102.00
Age squared	623.87	715.77	4.00	10,404.00
Quality index 1(best) to 5(worst)	4.06	0.29	3.00	5.00
Distance to CBD (meters)	12,913.04	4,787.90	1,160.59	23,174.24
Distance to commercial centers (meters)	4,123.99	2,283.25	309.80	12,825.41
% of residents with college degree in area	12.39	8.01	0.00	47.33
<b>DS40 (5,418 observations)</b>				
Price (\$)	30,168.23	6,899.34	9,000.00	40,000.00
Unit size (sqm)	54.43	18.36	20.00	196.00
Lot size (sqm) / excluding apartments	119.74	51.30	20.00	704.00
Apartment	0.14	0.35	0.00	1.00
Age	22.96	12.98	2.00	99.00
Age squared	695.52	835.60	4.00	9,801.00
Quality index 1(best) to 5(worst)	3.96	0.34	2.50	5.00
Distance to CBD (meters)	12,320.94	4,694.24	39.68	23,218.52
Distance to commercial centers (meters)	3,183.47	1,927.94	47.09	12,558.40
% of residents with college degree in area	16.17	9.05	0.00	62.94

#### **Section IV      Prices and attribute mix: Empirical approach and results**

Hedonic price models are probably the most adequate approach to address the issues this study wishes to evaluate: the assessment of the evolution of house prices adequately controlling for quality and other attributes and the estimation of impacts on prices of specific factors like subsidy levels in this case. Seminal contributions like that of Rosen (1974) and several other studies (Malpezzi (2002) provides a comprehensive review) build on the ability of these models to isolate the relative contributions of the unit's characteristics and other amenities on its price.

However, using observed prices from subsidized transactions registered in 2007-2009 is not a valid option since those prices are most certainly contaminated (at least to a certain extent) by the subsidies actually involved in each transaction. In fact, it is precisely one of the goals of this study to determine the extent to which the assistance provided influenced the observed prices.

In this context, to adequately evaluate the relation between subsidized transaction prices and units' attributes, a predicted price  $P(p)$  was calculated using the implicit price of each housing attribute estimated from the units purchased between 2004 and 2006. As mentioned earlier, for this we used a sample of the 2004-2006 full transactions database obtained from SII but using only purchases of existing units under \$60,000.

During this period, the number of subsidized transactions was approximately 10% of the sample of 68,871 available observations. Although data constraints make it impossible to distinguish subsidized from unsubsidized transactions within this subsample, we do know that most of the subsidized transactions that took place in that period were undertaken by DS 40 beneficiaries that were granted the relatively small subsidy amounts that were available in that program at that time. This sample is therefore relatively free from any source of bias that housing programs may introduce.

The log-linear specification chosen yields a reasonable fit with all coefficients largely significant and with the expected signs and magnitudes. The model also includes a year trend in order for the predicted price -P(p)- of subsidized transactions in 2007-2009 to incorporate a time trend source of price appreciation (see Table 5).

**Table 5:**

Dependent variable: LN Price

Sample: All transactions of existing units under US 60,000 in 2004-2006

	Coefficient	Sig.	t-test
Intercept	-76.97607	***	(-14.82)
Unit size (sqm)	0.00400	***	(50.02)
Lot size (sqm)	0.00008	***	(4.78)
Apartment dummy	-0.17310	***	(-27.02)
Age	-0.00840	***	(-20.56)
Age 2	0.00002	***	(3.3)
Quality Index 1(best) - 5(worse)	-0.31879	***	(-63.16)
Distance to commercial center (kms)	-0.00455	***	(-8.08)
Distance to CBD center (kms)	-0.03179	***	(-27.31)
% college educated in area	0.01118	***	(57.21)
Year	0.04393	***	(16.96)
Number of observations			68,871
R-squared			0.2934
F (10,68860)			2859.33

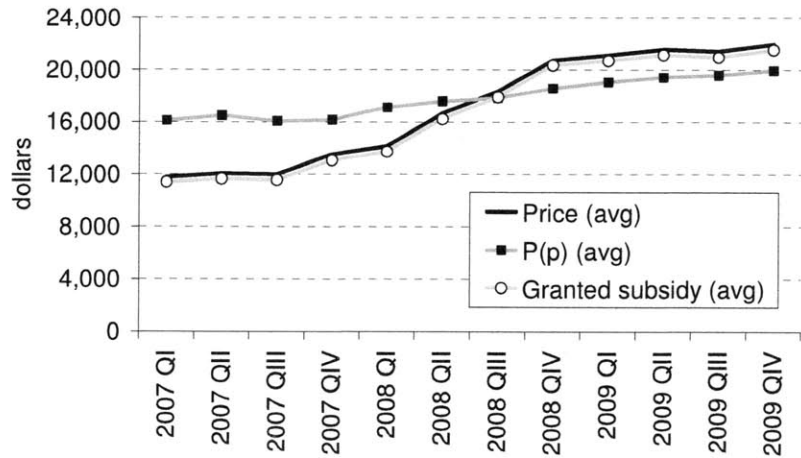
Sig: \*\*\* significant at 1%, \*\* 5%, \* 10%

Graphs 6, 7 and 8 show the evolution of the average predicted prices of the subsidized units, P(p) (considering their actual characteristics and the implicit prices presented in Table 5), compared to their actual prices and the granted subsidies for each program.

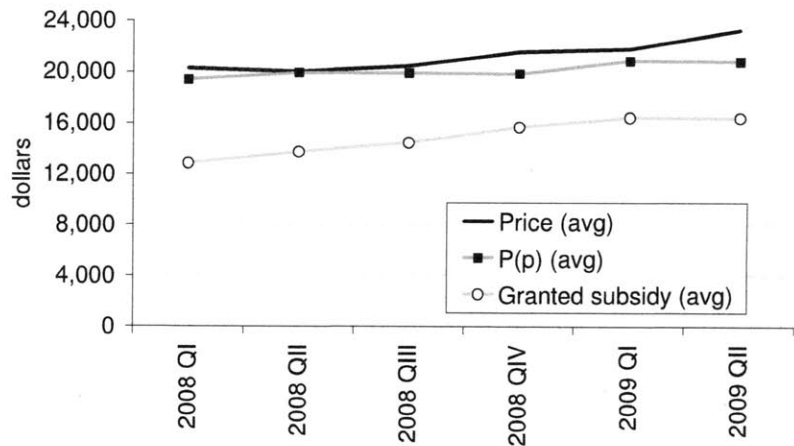
As expected, given the characteristics of the program, prices and granted subsidies are virtually the same in FSV 1 (Graph 6). However, the most significant issue here is that while prices and subsidies increased by 86% and 89% respectively, P(p) only grew 24%. This difference becomes even more significant considering that the increase in P(p) assumes and includes a 4.4% annual inflation rate, meaning that only 15 of the 24 point increase in P(p) was based on physical and/or location improvements. In other words, by the end of the period units were on average only 15% better with regards to their attribute mix, while their prices had increased 86%. This is the first indicator that a major portion of the increased subsidy amounts granted within this program was translated into house price inflation.

The link between prices and granted subsidies is certainly less tight in FSV 2 (Graph 7). In this case, the increase in the granted subsidies almost doubled the growth of actual prices. On the other hand, predicted prices P(p) only increased by 7%. In the case of DS 40 (Graph 8), prices and granted subsidies show similar levels of growth, but here predicted prices also show an important increase.

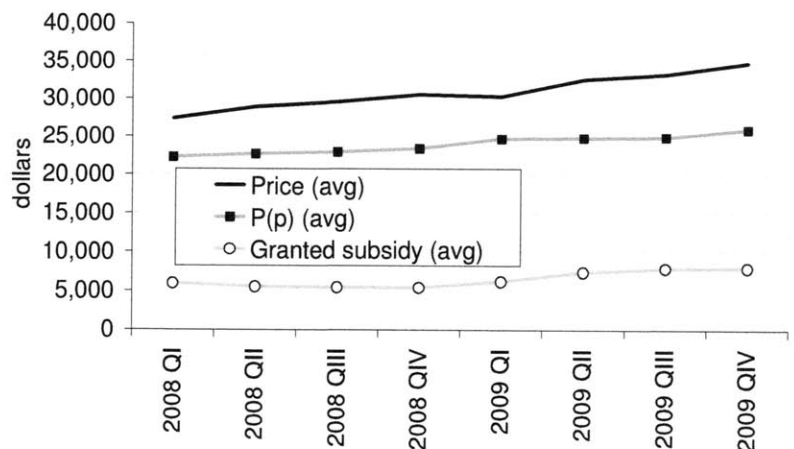
**Graph 6:**  
FSV 1 / average prices and subsidies per period



**Graph 7:**  
FSV 2 / average prices and subsidies per period



**Graph 8:**  
DS 40 / average prices and subsidies per period

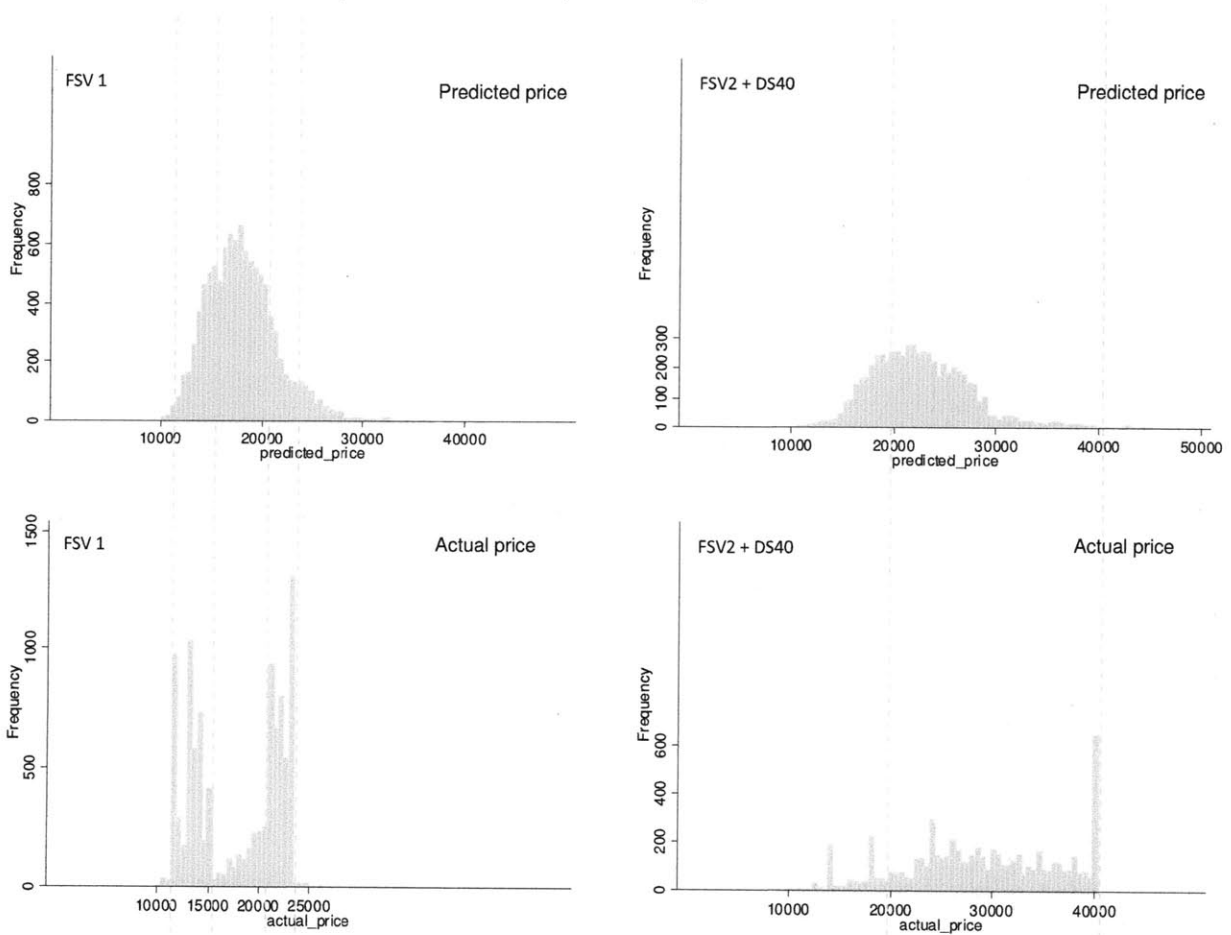


Analyzing the distribution of predicted prices (upper quadrants in Panel 1), units purchased through FSV 1 in 2007-2009 exhibit a behavior that somewhat resembles a normal distribution, with a mean of US 17,968 and a standard deviation of 3,594. In the case of FSV 2 and DS 40 the dispersion is larger, with an average of US 22,862 and a standard deviation of 5,353. However, these distributions change dramatically when the observed variable is the actual price instead of the predicted price.

In FSV 1 transactions (left quadrants in the Panel 1), actual prices tend to largely concentrate in two clusters, one around US 12,000 and the other near US 21,000. This abnormal distribution is consistent with the price evolution of FSV 1 transactions presented in the Graph 6: flat during 2007 in the proximity of US 12,000, sharp increase during 2008 and then flat again in 2009 around a level of US 22,000. These two peaks in the distribution coincide almost exactly with the maximum subsidy levels in place for FSV 1 during 2007 and 2009 respectively. This is a further indicator that transaction prices in FSV 1 seem to be more related to the maximum values determined by program regulations and not so much to property attributes here represented by  $P(p)$ .

In the cases of FSV 2 and DS 40, the distribution of actual prices is even broader than that of their respective  $P(p)$ . The mean of actual prices climbs up to US 28,685 (from a predicted price mean of US 22,862), while the standard deviation is now 7,490. The distribution of actual prices in this case resembles a uniform distribution with the exception of the sharp spike observed at the US 40,000 mark, beyond which the voucher is worth 0 for beneficiaries of DS 40 (right quadrants in Panel 1).

**Panel 1: Actual and Predicted price distributions (2007-2009)**

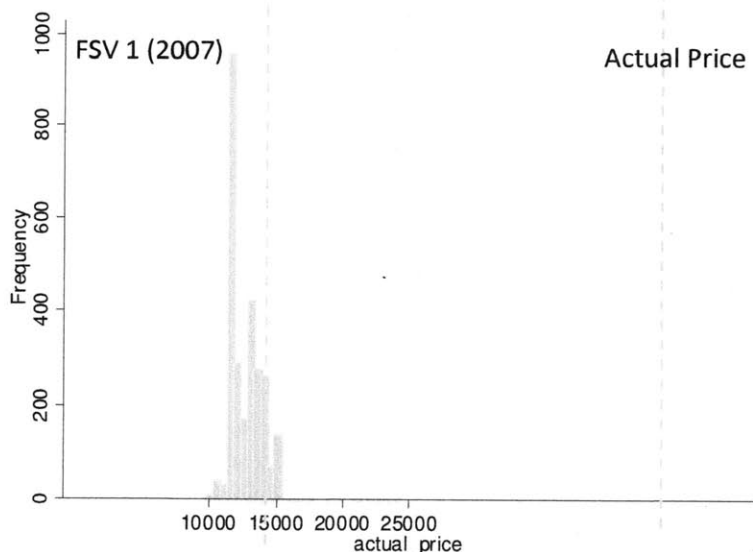
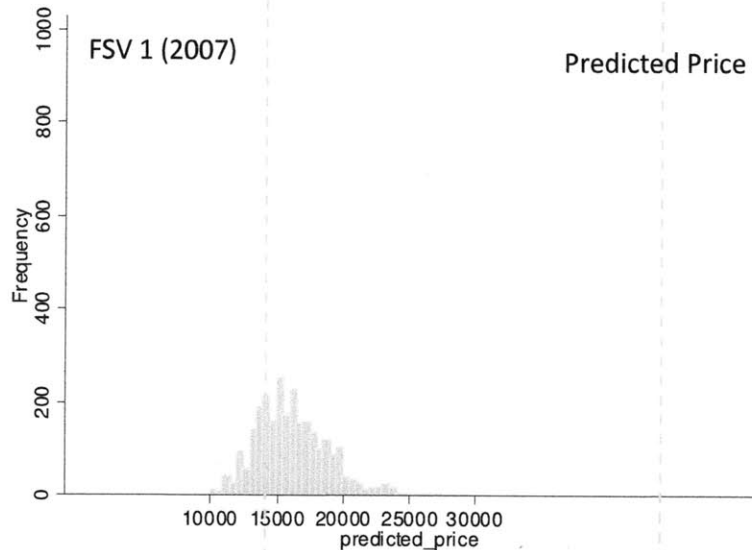
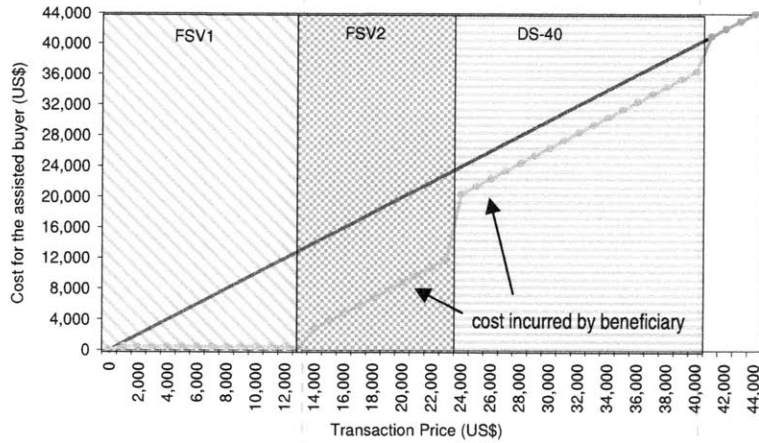


Looking separately at the transactions registered in 2007 and 2009 allows for a closer evaluation of how program regulations seem to have influenced transaction prices in FSV 1. In Panel 2, histograms of predicted and actual prices for FSV 1 transactions registered in 2007 have aligned under the corresponding subsidy schedule in place that year.

The most visible abnormality observed here is that although the majority of purchases involved units with a P(p) above US 14,000 (78%), almost all transactions settled for amounts under the US 13,600 mark (81%). This is precisely the maximum subsidy of US 13,200 plus minimum savings requirement of US 400.

But why would a seller settle to sell their home for less money than the value predicted from the unit's attributes? One possible explanation is the absence of adequate market information. As mentioned earlier this market segment was not particularly active before 2007, and therefore there is not much data to rely on, or at least not much available to the general public. Additionally, access to updated real estate indicators is difficult for potential sellers from low income segments, who have limited access to internet or other sources of market information. Moreover, realtors operating in this segment were scarce.

**Panel 2:** Subsidy schedules and price distributions in 2007



It can therefore be argued that sellers faced a new and large source of demand composed of FSV 1 beneficiaries (buyers) who were unable to pay prices much above the maximum subsidy they received plus the required savings. Apparently this depressed segment of the market became active when these new FSV 1 beneficiaries appeared on scene and an equivalent number of sellers emerged to match their offers.

But then why not sell for higher prices to FSV 2 beneficiaries? The most plausible explanation is that since FSV 2 was implemented only by the end of 2006, it was probably not as well known as FSV 1 among potential sellers and beneficiaries. Moreover, other than the maximum subsidy levels and corresponding price ranges available in each program, a key issue is the number of vouchers of each program that the government distributes each year. MINVU's initial budget for 2007 considered the distribution of 4 times more FSV 1 subsidies than FSV 2 in Santiago. In such a context, FSV 2 was not only a relatively unknown alternative, it was also far less relevant in terms of the number of potential buyers (beneficiaries).

However, even in a context of perfect information and with an equivalent number of FSV 1 and FSV 2 subsidy vouchers available, the design of FSV 1 still provides a strong incentive for agents to agree on prices just under the maximum subsidy levels that the program offers and in that way make use of the more generous assistance that FSV 1 gives. It is perfectly possible to reach Nash bargaining solutions where sellers of more valuable units agree to set an official price immediately below the maximum levels established within FSV 1 in order to allow the buyer (subsidy beneficiary) to receive the biggest subsidy possible (US 2,000 more than in FSV 2), and in parallel agree on an additional side payment to be made under the table by the beneficiary. The one limit to this strategic interaction is the ability of the buyer (subsidy beneficiary) to offer large enough side payments to the seller and simultaneously appear to meet the stringent socioeconomic requirements that FSV 1 imposes.



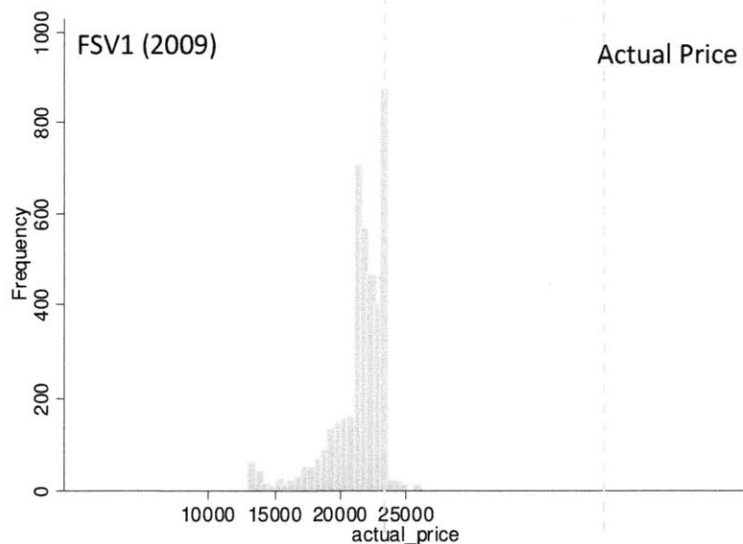
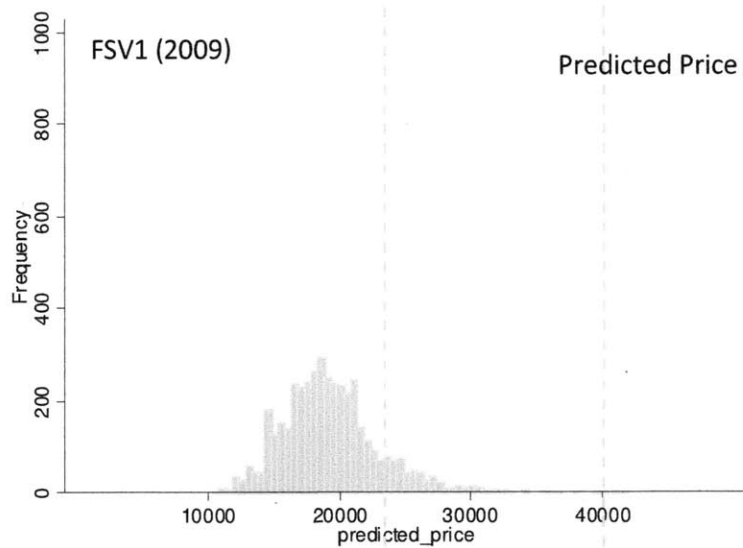
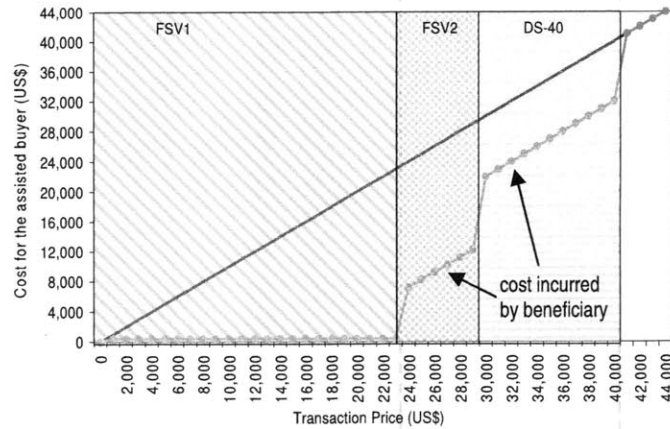
After a transition period in 2008 where agents gradually incorporated the new and increased subsidy levels derived from the additional subsidy to well located units, by 2009 the situation was completely different to that of 2007. Maximum subsidy amounts had increased from \$13,200 to \$22,800, meaning that a much broader range of units was now available to be purchased through FSV 1.

To a certain extent, the higher subsidies did lead to the purchase of units with better attributes.  $P(p)$  for units purchased in 2009 was 19% higher than those purchased in 2007 through FSV 1. However, the average transaction prices recorded almost doubled. Furthermore, as the lower graph in Panel 3 shows, the distribution of actual prices became heavily concentrated in the range between \$21,200 and \$23,200 (70.2% of transactions).

It is evident that once the government increased the maximum subsidy to be granted to \$22,800, most of FSV 1 beneficiaries moved to this upper limit of the subsidy and bought more expensive houses. That is a natural and completely predictable behavior. However, the fact that the average attributes mix did not improve as much is concerning.

The question is exactly the opposite of the one that emerged from 2007 data: why

Panel 3: Subsidy schedules and price distributions in 2009



would anyone pay more for a unit that it is not worth as much? The answer is relatively simpler this time: the beneficiary has no incentive to bargain since it is the government that is paying on her behalf. By setting a maximum subsidy, MINVU is publicizing its maximum willingness to pay. Sellers know this and beneficiaries are initially indifferent because it is not their money.

This raises a second question: if the government is now willing to pay more, why would a beneficiary settle for less housing (in terms of unit's attributes) than what can be purchased with the increased assistance granted? Again one possible explanation comes from the lack of adequate market information available for subsidy beneficiaries. Another is that beneficiaries may be assigning additional value to certain attributes of the chosen units like for example closeness to their relatives or to their current jobs.

An alternative and more compelling explanation is again that of a Nash bargaining solution where buyers privately negotiate with sellers and agree to set a transaction price consistent with the maximum subsidy available and then split the difference between this price and the unobservable "market" value they actually agreed on. Unfortunately data constraints make it impossible to determine the extent to which price increases were completely captured by the sellers or whether both parties agreed to share the difference.

## Section V Estimating the impact of subsidy amounts on prices

With the available data and the way in which subsidy programs are structured in Chile, estimating the impact of subsidy amounts on prices is not straight forward. Housing programs targeted at lower income groups provide larger subsidies (in absolute terms) for the purchase of relatively less expensive housing. Therefore, pooling all programs together naturally yields a negative correlation between subsidy amounts and transaction prices. Impact of subsidy amounts on price must therefore be analyzed separately between programs.

### FSV 1

In most cases the subsidy amounts are not exogenous to transaction prices, to the extreme that in FSV 1 both values are simultaneously determined. In fact, the subsidy amount is set to be equal to the agreed transaction price minus the minimum required savings of US 400 that must be provided by the beneficiary.

The maximum level of subsidy to be granted is determined by program regulations and as was shown earlier, in the vast majority of cases the observed prices are equal to this maximum subsidy plus the minimum savings requirement. Beneficiaries have a clear incentive to obtain the highest subsidy possible, that is, to buy the most expensive house that the program allows them to purchase.

Does this mean that attribute mix of the purchased units will improve hand in hand with the subsidy levels granted? Not necessarily and according to the data, this does not seem to be the case. While the increase in subsidy levels that occurred between 2007 and 2009 translated into equivalently higher transaction prices, the attribute mix of the units purchased improved much more modestly.

To evaluate the relationship between prices, predicted prices and subsidy amounts we propose the following model:

$$P - P(p) = \alpha - \beta * P(p)$$

where P is actual transaction price, and P(p) is the predicted price given unit characteristics.

If the observed prices are primarily determined by the maximum subsidy levels available and not by P(p), we should observe large differences between P and P(p) for less valuable units (small P(p) ). Naturally as P(p) increases, the difference would tend to 0. In the extreme case where P(p) has no relation whatsoever with P, then  $\beta=1$  and  $P=\alpha$ . In this case P would be equal to  $\alpha$ , which in turn should be equal to the maximum amount of subsidy to be granted at the time the transaction was recorded plus the minimum savings requirement.

The model to be estimated is therefore:  $P = \alpha + (1-\beta) * P(p)$

Separate regressions for 2007 and 2009 show that there is hardly any relationship between prices and P(p) in FSV 1. In 2007, the estimated  $\beta$  was 0.956 while  $\alpha$  was estimated to be 11,984 (Table 6). In a context where the maximum subsidy then available was US 13,200, the obtained coefficients clearly constitute evidence of the distortion that this subsidy mechanism imposes and of the almost complete disconnect between transaction prices and the actual attributes of the units purchased.

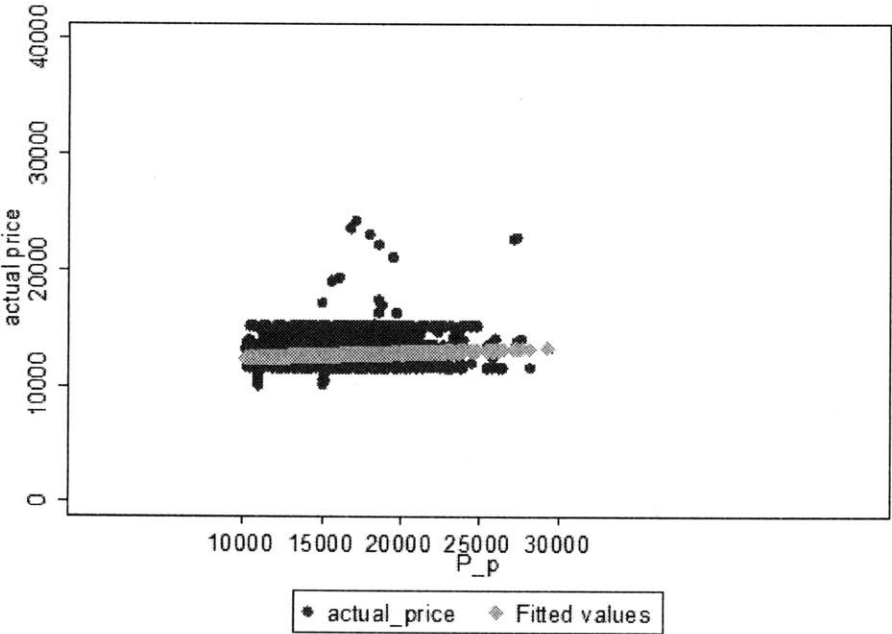
**Table 6:**

Dependent variable: Transaction price (US dollars)  
 Sample: FSV 1 transactions in 2007

	Coefficient	Sig.	t-test
Intercept	11,984.340	***	(82.49)
P(p)	0.044	***	(4.95)
Number of observations			2,675
R-squared			0.0091
F (2,2673)			24.52

Sig: \*\*\* significant at 1%, \*\* 5%, \* 10%

**Graph 9:** FSV 1 transactions in 2007 / actual and predicted prices



In 2009, once the transition to the increased subsidy levels was completed, the evidence shows that the relationship between prices and  $P(p)$  was still very weak. The estimated  $\beta$  is 0.838 and  $\alpha$  is estimated to be 18,393 (Table 7). The non zero coefficient of  $P(p)$  explains why the constant is now relatively further away from the maximum level of subsidy available at the time (US 23,200). The relatively larger variation in transaction prices and its mildly positive association to  $P(p)$  is evidence that not all transactions involved strategic behavior from either seller, buyer or both. However, the magnitude of the coefficients obtained still points to maximum subsidy levels determining prices in most of the cases.

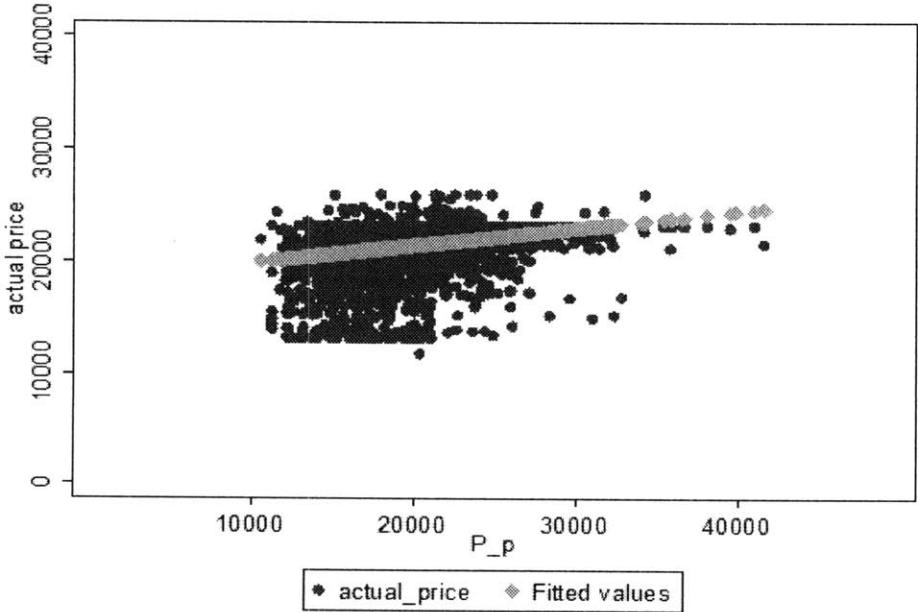
**Table 7:**

Dependent variable: Transaction price (US dollars)  
 Sample: FSV 1 transactions in 2009

	Coefficient	Sig.	t-test
Intercept	18,392.730	***	(107.3)
$P(p)$	0.152	***	(17.32)
Number of observations			4,172
R-squared			0.0671
F (1,4170)			299.9

Sig: \*\*\* significant at 1%, \*\* 5%, \* 10%

**Graph 10:** FSV 1 transactions in 2009 / actual and predicted prices



Comparing the results obtained for 2007 and 2009 shows an increase in the intercepts of the regressions which is roughly equivalent to the increase in the maximum subsidy levels available each year. This change is perhaps the most convincing evidence on how the design of this program turned a well intended increase in the levels of assistance provided into house price inflation and therefore into a wealth transfer to sellers (and hypothetically also to some buyers in the cases where the latter had sufficient bargaining power).

## FSV 2 and DS 40

On the other hand, FSV 2 and DS 40 present a different story. Here subsidy/price ratios are substantially smaller and the determination of subsidy amounts in these cases is not always directly linked by program regulations to the observed transaction prices. In fact, these programs can be viewed as lump sum transfers.

At this stage it is important to remember that FSV2 and DS 40 beneficiaries are permitted to obtain complementary mortgage loans and therefore larger subsidies translate either into more housing expenditure or smaller loans. Given that they constitute an income effect, the impact of this kind of subsidies on prices should be relatively lower than in FSV 1 and we should therefore observe a closer relation between prices and predicted prices in these cases. That is indeed the case (see Table 8 and Graph 11).

**Table 8:**

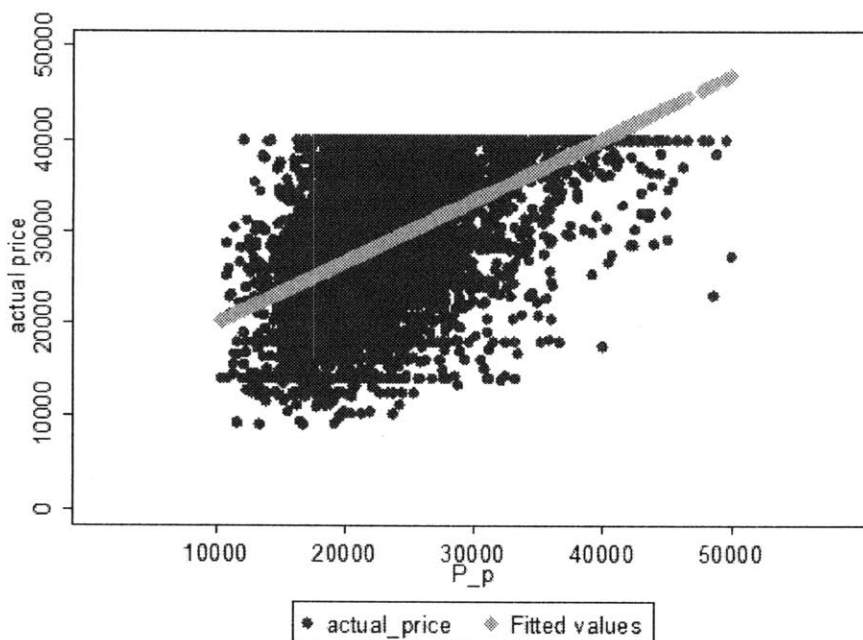
Dependent variable: Transaction price (US dollars)

Sample: FSV 2 and DS 40 transactions in 2007-2009

	Coefficient	Sig.	t-test
Intercept	13,372.940	***	(37.48)
P(p)	0.670	***	(44.11)
Number of observations			6,389
R-squared			0.2335
F (1,6387)			1945.5

Sig: \*\*\* significant at 1%, \*\* 5%, \* 10%

**Graph 11:** FSV 2 and DS 40 transactions in 2007-2009 / actual and predicted prices



Despite being clearly lower than 1, the coefficient obtained for P(p) of 0.669 is reasonably high. Especially considering the fact that subsidized transactions are truncated at the maximum price of US 40,000, mark beyond which DS 40 beneficiaries are not permitted to cash in their vouchers.

In order to adequately assess the impact of subsidy amounts granted on prices we need a truly exogenous source of variation for subsidy levels. This is only available in the case of FSV 2. Along the analyzed period FSV 2 strictly operated as a lump sum transfer of different magnitudes depending on the time the transaction took place: US 11,200 in the first half of 2007, US 12,800 in the second semester of 2007 and US 16,800 in 2008 and 2009. Although DS 40 did operate as a lump sum US 8,000 transfer during 2009, during 2008 the granted subsidies were fully determined by prices: Subsidy granted = US 11,000 – (0.175\*Price).

Therefore, only in the case of FSV 2 can we attempt to estimate:

$$P = \delta_1 + \delta_2 * Ph + \delta_3 * S$$

where S is the actual subsidy amount involved in each transaction

The estimated model implies that 64 cents per dollar of subsidy were directly translated into prices after controlling for unit's attributes through P(p) (see Table 9).

**Table 9:**

Dependent variable: Transaction price (US dollars)

Sample: FSV 2 transactions in 2007-2009

	Coefficient	Sig.	t-test
Intercept	5,368.295	***	(4.24)
P(p)	0.304	***	(7.73)
Subsidy	0.638	***	(8.34)
Number of observations			971
R-squared			0.1351
F (2,968)			75.63

Sig: \*\*\* significant at 1%, \*\* 5%, \* 10%

Although certainly less significant than the impact found in FSV 1, the estimated impact on prices of FSV 2 subsidies may seem surprisingly high for a lump sum subsidy program. An always plausible explanation for a situation like this is the existence of a relatively price inelastic supply, which is certainly reasonable given that we are analyzing the market for existing housing units. However, some attention should be paid to the fact that these were the first three years of operation of this program and that the number of transactions recorded was relatively smaller. In short, the impact of subsidy amounts on house prices is found to be large, even for lump sum programs such as FSV 2.

## Subsidy/price ratios

Another perspective from which to assess the impact of subsidy amounts on prices is to look at the relationship between actual and predicted prices separately for each program, given that all differ substantially in the subsidy/price ratios that they yield.

Table 10 shows that prices tend to be more closely related to predicted prices as subsidy/price ratios decline. In FSV 1, where subsidy incidence is above 95%, the coefficient on P(p) is extremely low (0.044 in 2007 and 0.152 in 2009). This coefficient increases to 0.351 in FSV 2 where subsidy incidence ranges 65%, and it reaches 0.567 in DS 40 where incidence drops to 25% on average. This evidence points in the direction that higher subsidy/price ratios are associated with larger price distortions in the housing market.

Table 10:

Dependent variable: Transaction price (US dollars)

	Coefficient	Sig.	t-test	N	R2
<i>Sample: FSV 1 transactions in 2007</i>					
Intercept	11,984.340	***	(82.49)	2,675	0.0091
P(p)	0.044	***	(4.95)		
<i>Sample: FSV 1 transactions in 2009</i>					
Intercept	18,392.730	***	(107.3)	4,172	0.0671
P(p)	0.152	***	(17.32)		
<i>Sample: FSV 2 transactions in 2007-2009</i>					
Intercept	13,657.800	***	(16.84)	971	0.0730
P(p)	0.351	***	(8.74)		
<i>Sample: DS 40 transactions in 2008-2009</i>					
Intercept	16,859.180	***	(45.47)	5,418	0.1998
P(p)	0.567	***	(36.77)		

Sig: \*\*\* significant at 1%, \*\* 5%, \* 10%



## **Section VI Conclusions and policy recommendations**

This study provides evidence that the increase in the dollar amounts of housing subsidies granted in Chile during 2007-2009 led to significant house price inflation in Santiago's market for existing units in the lower priced segments. Even in apparently less distorting programs involving lump sum transfers like FSV 2 (targeting 2nd income quintile households), up to 64 cents per dollar of housing subsidy are estimated to be translated directly into house price inflation. Furthermore, actual prices hold almost no relation to unit characteristics in programs like FSV 1 (targeting 1st income quintile households), where the subsidy operates as a price effect, with subsidy/price ratios close to 100% and where subsidy beneficiaries have little or no incentive to bargain. Although increases in subsidy levels did lead to improvements in the attribute mix of the units purchased in each program (predicted prices increased in 24% in FSV 1, 7% in FSV 2 and 16% in DS 40) a significant portion of the assistance provided was transferred to prices. This is especially clear in FSV 1 where prices appear to be almost fully determined by the maximum subsidy levels established by program regulations at each point in time.

Currently FSV 1 beneficiaries are not allowed to provide additional funds from a mortgage loans to complement their purchase. This leaves them with no incentive to bargain with the seller for a lower price since the government is essentially covering 100% of the balance. It is possible however, that this bargaining is indeed taking place privately between agents as they may be sharing the difference between the official declared price and an unobservable market value they negotiated. In any case, in such a context it is imperative for housing authorities to provide beneficiaries with updated market information so they can find the best units the subsidy can afford.

A complementary and direct measure is to reduce the difference between the assistance granted for the purchase of similarly priced units under different programs (the "edges" of the subsidy schedule), in particular at the maximum price limit of FSV 1. As long as it is possible for relatively better off households to prove themselves eligible for FSV 1 benefits (due to potential problems in the screening process), these subsidy differences will always provide incentives for agents to agree prices below the maximum limits of FSV 1, receive a larger subsidy and privately arrange for unaccounted side payments to be handed to the sellers.

An alternative would be for MINVU to attempt to link the maximum levels of assistance to the characteristics of the units chosen by the beneficiaries, using for example similar methodologies to the one currently used in the US to determine "fair market rents" in the context of Section 8 rental vouchers. This may bring in other distortions and it would require comprehensive and unbiased transactions data (or the use of methods to tease out eventual biases), but it may indeed help reduce house price inflation. However, linking subsidy amounts to unit characteristics will probably yield horizontal inequities, with different subsidy amounts being granted to equally poor households that happened to choose units of different value. To avoid this, an alternative would be to allow households to keep the difference between the subsidy granted and the price they agree with the seller. This would certainly provide the right incentives to bargain and reduce distortions in property values.

Another option is to reduce the almost 100% subsidy/price ratio implied in the design of FSV 1, either by reducing the assistance currently granted or by allowing beneficiaries to buy more expensive houses. Either option would necessarily involve a mortgage loan to cover the outstanding balance. Given the economic vulnerability of the households which FSV 1 targets, such loans would require some sort of

explicit government insurance, a mechanism for which there is plenty of (good and bad) experience around the world.

With regards to future research, an interesting extension would be to link the transactions data analyzed in this study to socioeconomic characteristics of the beneficiaries. These data would allow a regression discontinuity analysis to assess the effect of offering different subsidy characteristics at the “edges” where programs meet and actually overlap to a certain degree. Another promising approach would be to obtain from SII the complete transactions database from 2004-2009 and from there distinguish the subsidized transactions (from any of the three programs) from unsubsidized purchases. Being able to pair equivalent properties that were purchased with and without assistance in a given period would certainly reinforce the assessment of the subsidy’s impact on price.

Interesting extensions beyond the specific scope of this study are those related to the distributional effects involved in subsidizing the purchase of existing units and in the effects that the design of the different subsidy programs has on this matter. A thorough analysis of the socioeconomic characteristics of the sellers and the possibility of tracking them years after their sale would allow tests of whether these programs significantly increase homeownership in the aggregate. Beyond the homeownership issue, tracking sellers would enable researchers to adequately assess the actual asset building capacity explicitly pursued by Chilean housing policies and to evaluate whether the access to property is indeed an effective vehicle for social mobility among the poor.

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