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The Housing Market in Colombia: Socioeconomic and Financial Determinants

by

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Abstract*

This document provides an overview of the housing system in Colombia, exploring its socioeconomic and financial determinants and offering recommendations to improve the collection of basic data on the construction sector, household socioeconomic conditions, and mortgage markets. The paper also estimates a simultaneous econometric model for the country's housing market using quarterly data over the period 1991-2004. On the demand side, we find that the area of approved licenses is highly elastic to households' disposable income, new housing prices and real interest rates on mortgage credit. On the supply side, we find high input-cost elasticity and a moderate response to wealth effects. These results prove to be robust to different proxies and diverse estimation procedures.

JEL Classification: Financial Markets (E44); Mortgages (G21);
Housing Demand (R21)

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1. Introduction

Mortgage markets currently present two interesting analytical issues. The first is that, at the international level, there is a housing price boom in the United States (including New York, San Francisco and Seattle), Australia (Sydney), Great Britain (London), and Spain (Madrid and Barcelona), among other countries.[1]

This trend, which so far has extended from 1995 to 2004, invites us to rethink the following housing-related issues:

1) households' consumption/savings function;
2) housing as a preferred asset compared to financial savings or equity; and
3) the role of central banks in "asset inflation," particularly under inflation-targeting regimes.

A further issue relates to Colombia, where a construction recovery cycle (2003-2004) followed a major macroeconomic contraction of 4.3 percent in 1999, which involved a foreign exchange and mortgage crises that lasted from 1998 to 2001. This recovery remains weak, however, since it is not yet based on mortgage credit. The ratio of mortgage credit to GDP is currently as low as 5 percent, down from a historical peak of 12 percent during the mid 1990s.

Colombia's housing recovery stems mainly from capital inflows, the result of arbitrage in favor of Latin American markets with respect to U.S. markets, and significant increases in remittances from Colombians living abroad.[2] We estimate that the combined effect of these two forces has increased disposable income by as much as 1 percent of GDP over 2003-2004, and helps explain why the construction sector's annual average real rate of growth (about 12 percent) is triple that of the economy as a whole (close to 4 percent). If capital flows were to be reversed because of additional increases in the U.S. market interest rate differential, the construction recovery in Colombia could be in jeopardy.

This paper provides an overview of the housing system in Colombia and explores its socioeconomic and financial determinants. We also estimate a simultaneous econometric model for the housing market in Colombia using quarterly data over the period 1991-2004. On the demand side, we find that the area of approved licenses is highly elastic to households'

[1] See IMF (2003); Merrill Lynch (2004); *Economist* (2004b).
[2] See Banco de la República (2004a).

disposable income, new housing prices, and real interest rates on mortgage credit. On the supply side, we find high input-cost elasticity and a moderate response to wealth effects. These results prove to be robust to different proxies and diverse estimation procedures.

Section 2 makes international comparisons among mortgage regimes and discusses several features of the Colombian system, which is characterized by low mortgage-credit deepening and real interest rate ceilings. These ceilings were ordered by the Constitutional Court as a result of the social unrest caused by the flex-nominal system that prevailed during the 1993-1998 period. Section 3 focuses on the features of the Colombian housing and mortgage system, while Section 4 develops and estimates a simultaneous econometric model for housing in Colombia over the period 1991-2004 using quarterly data. Section 5 provides concluding remarks.

2. Mortgage Systems: An International Comparison

2.1. Housing Price Cycles in Some Developed Economies

House prices behave differently across and within countries, depending on economic cycles, capital markets, and local regulations dealing with land availability and environmental requirements. Take the case of Japan, where house prices declined by 19 percent in real terms nationwide and 32 percent in Tokyo over the period 1995-2002 (see Table 1). In spite of this decline, an apartment of 100 mts^2 in Tokyo still cost about US$850,000 in 2002, while the average price in the rest of Japan was close to US$300,000.[3]

In the United States, on the other hand, there has been a pronounced upward housing price cycle, particularly over the years 1995-2002. The average nationwide house-price increase was close to 27 percent in real terms, and in New York it was 47 percent in real terms.[4] The typical 100 mts^2 New York apartment cost almost one million dollars, not much above the price of a similar apartment in Tokyo after prices collapsed.[5] More recently, American housing price inflation quickened during 2004, while the Federal Reserve Bank (Fed) has been increasing the Federal Funds Rate (FFR) at a "measured pace" from 1 percent to 2 percent during the second half of 2004. While it is still too soon to say whether the pace of FFR increases will succeed in

[3] See Collyns and Senhadji (2003) on housing-price cycles in Asia..
[4] *Economist* (2003a, p.6).
[5] IMF (2003), p.17.

taming core inflation and housing price inflation, market expectations are for the FFR to reach 3.5 percent by the end of 2005.

In Great Britain in general, and London in particular, housing price gains have been more pronounced, surpassing 100 percent in real terms over 1995-2002, and the average house price does not differ much from those in the United States or New York, respectively. The Bank of England increased its reference rate five times during 2003-2004, and the rate stood at 4.75 percent in August 2004. The Bank's rapid reaction has sought to contain undesired accelerations of the general price level and in housing prices, and the prospects are good that there will be a gentle "pricking of the asset-bubble."[6]

House-price inflation in Spain requires special attention. Nationwide housing values increased 60 percent in real terms in the period 1995-2002, and this trend has continued in Madrid in 2003-2004.[7] The situation is likely to worsen because the Central Bank of Spain has delegated the conduct of monetary policy to the European Central Bank (ECB). The ECB has maintained the repo rate at 2 percent, since core inflation seems to be under control in the European Union (EU), but this general policy is of little help in containing asset-price inflation in Spain. It might be appropriate for Germany, however, where housing prices continued to fall in real terms during 2004. Furthermore, we will see that it is not only real interest rates close to zero that fuel housing prices in Spain, but the mortgage system as a whole, which features minimal down payments and long amortization horizons.

The typical apartment of 100 mts^2 in Madrid, however, still costs about half that of its counterpart in New York, London, or Tokyo, where land scarcity and stringent regulations play an important role in housing price formation. Interestingly, transaction costs differ significantly, with no particular rule: in New York and Madrid they run high at 12 percent of commercial value, while in London and Tokyo they seem moderate at 4 or 5 percent (see Table 1).

[6] Merrill Lynch (2004); *Economist* (2004d).
[7] See Tsatsaronis and Zhu (2004, p. 67); *Economist* (2004d).

Table 1. Housing Prices in Selected Countries and Cities, 1995-2002

	Real Variation (Percentage)	Value of 100mts^2 Two-Bedroom Unit (Thousands US$) *	Transaction Costs (% Price)
United States	**27**	**204**	
New York	47	925	12
Great Britain	**89**	**185**	
London	136	950	4
Spain	**58**	**147**	
Madrid	63	425	12
Japan	**-19**	**301**	
Tokyo	-32	850	5
Colombia	**-37**	**50**	
Bogotá	-39	72	4

* Dec. 2002

Source: Central Banks, *Economist* (2003a) and authors' calculations.

During the 1995-2002 period Colombia experienced a housing price decline of about 37 percent in the four main cities as a group; the fall was 39 percent in Bogotá because of the 1998-2001 crisis. As a result of that crisis, the typical apartment of 100 mts^2 cost only US$72,000 in Bogotá and about US$50,000 in the four main cities as a group by the end of 2002.

This short survey shows that real housing price cycles fluctuated between 50 and 150 percent in countries experiencing housing booms during 1995-2004, while those experiencing real housing price contractions have hovered at around 20 to 40 percent. The boom cycle has now lasted from four to six years in the United States and the United Kingdom, with some positive signals of a "soft landing" as a result of proper actions on the part of the central banks. Japan and Colombia are now in a recovery phase after drastic and rapid housing price contractions lasting two to four years. Spain and Australia, however, need close monitoring, as no proper cooling signals have been given by their central banks. Under these circumstances, there is still a risk of a bust.

2.1. Mortgage Systems

The economic theory of housing demand assigns crucial importance to credit and the ways in which it is provided or rationed.[8] Hence it is important to understand different mortgage systems and international practices. Table 2 illustrates several basic characteristics of selected mortgage systems. In the United States, for example, long amortization schemes (25-30 years) have helped develop private capital markets and deepen the public debt market; mortgage-backed securities (MBS) are an important reference in determining T-bills' "yield-curve," and *vice versa*. Given that about two thirds of the mortgage system is denominated in fixed nominal interest rates, a downward trend in the FFR usually sets in motion a complex process of mortgage refinancing at lower rates.

The FFR experienced significant reductions over the period 2000-2003, triggering an especially long episode of mortgage refinancing.[9] Some households chose to cash out mortgage refinancing and increased their consumption levels, which helped shorten the recession period. Others chose to de-leverage their net financial positions by paying down more expensive and non-tax-deductible consumer debt. Overall, the household financial obligations ratio remained rather stable at 18 percent over the period 2002-2004.[10]

A second characteristic of the U.S. mortgage system is a generous amount of financing: credits usually represent 70 to 100 percent of the house-market value.[11] Furthermore, there is some concern about the recent increase in the relative size of mortgage credits being approved by quasi-public banks, such as Fannie Mae/Freddie Mac. This policy has helped maintain the current boom in house financing at a time when there is some evidence of a housing-price bubble in 2000-2004. Similar policies have resulted in mortgage crises as recessions revealed households' over-indebtedness; cases include the United Kingdom in the period 1992-1994 and Colombia in the period 1998-2001.[12]

[8] See Muellbauer and Murphy (1997).
[9] It has been estimated that credit refinancing in the U.S. economy increased aggregate demand by about 0.3 percent of GDP per annum, representing US$150-200 a month for the typical household. See Brady, Canner and Maki (2000); and Greenspan (2004a).
[10] Greenspan (2004b).
[11] Case (2000), p.132.
[12] See Urrutia (2000) and Clavijo (2004).

Table 2. Main Characteristics of Mortgage Systems, 2000-2002

	Average Amortization Schedule	Credit / House Market-Value	Real Interest Rate	Tax Breaks	Interest Rate Setting
	Years		%	Direct / Indirect	
US	25 - 30	70 - 100	3 - 5	Yes / Yes	Fixed in Nominal Terms
UK	22 - 23	90 - 100	4 - 6	Yes / No *	Variable in Nominal Terms
Spain	18 - 20	80 - 90	0 - 3	Yes / Yes **	Variable in Nominal Terms
Colombia	10 - 12	Max. 70	8 - 13	Yes / Yes	Fixed in Real Terms

* Recently changed ** Up to 7% of VAT rate

Source: Official Housing Data, Central Banks, *Economist* (2003a) and authors' calculations.

In the U.S. economy, real interest rates on mortgages have hovered at around 3 to 5 percent in the 2000-2004 period. Consequently, the risk of a boom-bust cycle in the U.S. economy is more closely related to housing price volatility than to interest rate volatility.[13] In fact, a mistake in efforts to "prick the bubble" might set in motion a housing price collapse that would leave households with a high loan-to-value ratio (that is, mortgage credit/house value), and financial entities could then experience a significant increase in their non-performing loans (NPL) portfolio.[14]

A third characteristic of the U.S. system is that tax breaks are not limited to special treatments in direct/indirect taxes. Quasi-public banks pass on to mortgage creditors a benefit that has been estimated at between 25-50 basis points; this benefit represents an additional tax break of 8 to 10 percent of current market interest rates.

The U.S. mortgage system has provided a benchmark worldwide. The United Kingdom, for instance, has been studying ways in which some of this refinancing process could be replicated in order to further empower monetary policy by moving from a flexible interest rate system to a fixed rate system. No definite approach has been chosen, however, and real interest rates in the United Kingdom's mortgage system currently stand at 4 to 6 percent. In addition to being slightly above U.S. rates, these are more volatile.[15]

[13] See Caplin, Freeman and Tracy (1997); and Shostak (2004).
[14] A boom-bust cycle is certainly a risk that is currently facing Australia; see Merrill Lynch (2004).
[15] Muellbauer and Murphy (1997).

Concerns for the possible impact of ECB policies on the British mortgage system have been cited as one of the reasons why the United Kingdom has not joined the Eurozone.[16] It is clear that the Bank of England must closely monitor the particular circumstances of the mortgage market in Britain, where land scarcity and strict environmental regulations pose a danger of inflationary behavior during "asset booms."

As in the United Kingdom, the mortgage system in Spain has been dominated by flexible interest rates. Spain, however, has fully adopted ECB rulings, which have maintained a fairly neutral monetary policy stance. For Spain, this arrangement currently implies real-terms mortgage interest rates of close to zero. Such a monetary policy certainly represents a coordination challenge at a time when there are strong signals of a housing price bubble in the country's main cities.[17] Furthermore, unification of monetary and exchange rate policies has yet to produce growth convergence in the EU. The ECB faces serious difficulties in setting appropriate macroeconomic policies as cumulative growth differentials have increased, for instance, between Spain and France relative to Italy and Germany during the 1998-2004 period.

After the 1998-1999 financial crises, Colombia adopted a peculiar fixed-real interest rate mortgage system. Although such a system allows for pre-payments at no additional cost, the lack of sufficient competition among mortgage banks and high delinquency rates—hovering around 20-25 percent during 2000-2003—have maintained real interest lending rates at rather high levels of 8-13 percent annually (see Table 2). Since 1999, moreover, Constitutional Court rulings have required the Central Bank of Colombia to establish permanent ceilings for real mortgage lending rates in an effort to provide long-term house-financing at the lowest "market rate." Although such ceilings have not yet been binding because of the lax monetary policy adopted during the period 1999-2004, such economic activism by the Constitutional Court could certainly prove counterproductive for housing markets in the near future, when credit is expected to recover.[18]

Table 3 illustrates the expected macroeconomic effects of systems with fixed and flexible mortgage interest rates, respectively. As discussed above, under a fixed system a downward trend in market interest rates sets in motion a refinancing process that usually boosts aggregate demand, with a more lasting effect than under a flexible system. Under a flexible system, on the

[16] *Economist* (2003a).
[17] See Tsatsaronis and Zhu (2004).
[18] For more details on economic Constitutional Court rulings, see Clavijo (2001).

other hand, responses are more rapidly absorbed by the economy but they show less resilience and more volatility.

Table 3. Fixed *versus* Flexible Interest Rates

Impact on:	**Fixed**	**Flexible**
Aggregate Demand	Stable	Volatile
Financial System	Mismatches	Matches
Quasi-Public Banks	Required	Optional
Type	Fannie Mae/ Freddie Mac	Securitization Inst.
Down payments	Low	High

Source: Authors' compilation.

On the other hand, a flexible system helps to avoid the problem of mismatches between assets and liabilities. In Chile and Colombia mortgage interest rates have been traditionally indexed to CPIs, both on the asset and liability sides, so that inflation volatility would not affect the balance sheet performance. As inflation has been reduced from annual levels of 30-32 percent to 3-6 percent since the beginning of the 1990s, credit markets in Chile and Colombia have undergone a re-nominalization process (Fuentes et al., 2003).

Fixed-rate mortgage systems have been accompanied by the development of quasi-public banks that carry out the securitizations of long-term mortgages, as in the case of Fannie Mae and Freddie Mac in the United States. In developing economies there seems to be greater scope for private sector developments in regard to securitization markets. There is an ongoing debate about the advantages and disadvantages of each system, since no country seems to be completely satisfied with its existing institutional arrangement. The United Kingdom has recently analyzed the possibility of deepening the fixed-rate component of its system, but no definite strategy has been adopted. In the United States, as discussed above, concerns have been raised about cashing out house valorizations that could prove only temporary.[19]

[19] See Brady, Canner and Maki (2000).

2.3 Ownership Rates

Let us define households' ownership rate as the ratio of homeowners to the number of properties. This indicator is usually drawn from household surveys. In the United States, this rate has increased from 66 percent in the mid 1990s to 68 percent in the early 2000s (see Table 4). A similar trend has been observed in the United Kingdom and Spain, where ownership has reached even higher levels of 70 to 80 percent. The EU average, however, is much lower, at 61 percent. In Germany, about 40 percent of the population live in rented housing, and a similar pattern is evident in the Nordic countries. Thus not all developed economies have high ownership rates, as is usually believed. Nevertheless, housing accounts for most household wealth. In the United States, for instance, housing represents between one third and one half of net wealth.[20] Consequently, a change in housing prices alters perceptions of wealth more significantly than does a change in stocks' valuations.[21]

In developing economies, the World Bank reports that "secure ownership tenancy" is quite high, at 90 to 100 percent.[22] This seems odd in light of these countries' informality, lack of ownership titles, and difficulties in carrying out the rule of law.[23] In fact, one would expect ownership rates in developing economies to be much lower than in developed economies.

Table 4. Property Rates and Mortgage Market Conditions

	Owners / Households (Percentage)		Mortgage Loans / GDP (Percentage)		Real Annual Return (Percentage)
	1990s	2000s	1990s	2000s	1995 - 2002
U.S.	66	68	n.a.	58	7
U.K.	67	70	n.a.	55	10
E.U.	n.a.	61	n.a.	33	n.a.
Spain	n.a.	83	n.a.	54	21
Colombia	60	58	11	5	0.5
Chile	63	66	7	12	n.a.

Source: Official Housing Data, Central Banks, *Economist* (2003a), IDB (2004), and authors' calculations.

[20] IMF (2003 p.14).
[21] See Case (2000); Greenspan (2004c); *Economist* (2004a).
[22] World Bank (2002), p.177.
[23] See World Bank (1994); Szalachman (2000); De Soto (2000); Clavijo (2001, 2004); and Kalmanovitz (2003).

Official statistics, however, indicate that the expected gap in ownership rates does not exist. In Chile and Colombia, for instance, ownership rates are in the range of 58 to 66 percent, not greatly below the 60 to 70 percent reported above for developed countries.[24] In addition, ownership rates in Latin America are surprisingly high in light of very low mortgage credit/GDP ratios (currently 5 to 12 percent).

So a key question is posed: how could developing economies, with low savings rates, have achieved "ownership rates" like those of a developed world, without even having leveraged their mortgage markets? The answer is that a big fraction of those household properties in Latin America really represent low-quality and informal-housing developments—in many cases the result of land invasions— and self-constructed properties that lack basic sewage facilities or utilities. In fact, it has been estimated that nearly 50 percent of Latin America's population live in unhealthy properties that, nonetheless, they claim to own.[25] In the early 1990s, about 60 percent of Mexico City's population, 38 percent of Lima's and 26 percent of Bogotá's lived in self-constructed properties, usually in unstable settlements far from city centers.[26]

3. The Housing Sector in Colombia

3.1 Macroeconomic Impact

The relative importance of the construction sector in the Colombian economy is summarized in Table 5, which shows that housing and public works have accounted for about 5 to 7 percent of GDP in recent decades. More recently, and as a result of the 1998-1999 housing crisis, the construction sector's share of GDP has declined to 5.2 percent despite the 2002-2004 recovery; the sector has posted real growth rates of 6 to 9 percent annually. The housing sector alone represents only about 3 percent of GDP, approximately half of the share usually observed in many developed economies. Housing sector jobs account for 5 to 6 percent of total employment, and the sector has considerable potential to absorb unskilled workers. While it has a low-level wage structure, the housing sector nonetheless benefits from a very flexible labor market.

[24] See Szalachman (2000); and IDB (2004).
[25] UNDP (2003).
[26] See Gilbert (2001) and IDB (2004).

Table 5. Construction and Housing Sector Statistics for Colombia

	1980s	1990s	2000s
Construction			
Construction * / GDP	7.0	5.9	5.2
Buildings ** / GDP	n.a.	3.8	3.0
Employment / Total	6.7	6.3	5.4
Social Housing / Total Licenses	n.a.	n.a.	29.0
Housing			
Ownership Rates	66.0	59.8	58.0
Average Area (Mts^2)	45.0	60.0	70.0
Quantitative Deficit	n.a.	22.3	15.4
Qualitative Deficit	n.a.	4.2	13.3
Overcrowding Rate	n.a.	14.8	17.4
Mortgages			
Mortgage Credit / GDP	8.0	11.0	5.0
Mortgage Credit / Total	20.0	28.0	26.0
Real Interest Rate	7.0	13.5	11.0

* Construction = Buildings + Civil Works
** Buildings = Housing + Commercial Constructions

Source: DANE, Banco de la República, Cuellar (2002), DNP (2004), Szalachman (2000), and authors' calculations.

In 1998 Colombia reported an ownership rate of 58 percent, including about 6 percent of households that were servicing their mortgage credits. This ownership rate was lower than the 66 percent observed in the 1980s or the 60 percent reported during the 1990s.[27] Furthermore, behind the relatively high ownership rate of the late 1990s stand other housing statistics indicating that ownership does not necessarily translate into well-being for most Colombians. For instance, note that with the current mortgage credit/GDP ratio of only 5 percent, as shown in Figure 1, one should be suspicious about the quality of the housing. As mentioned above, it is actually the result of informal construction.

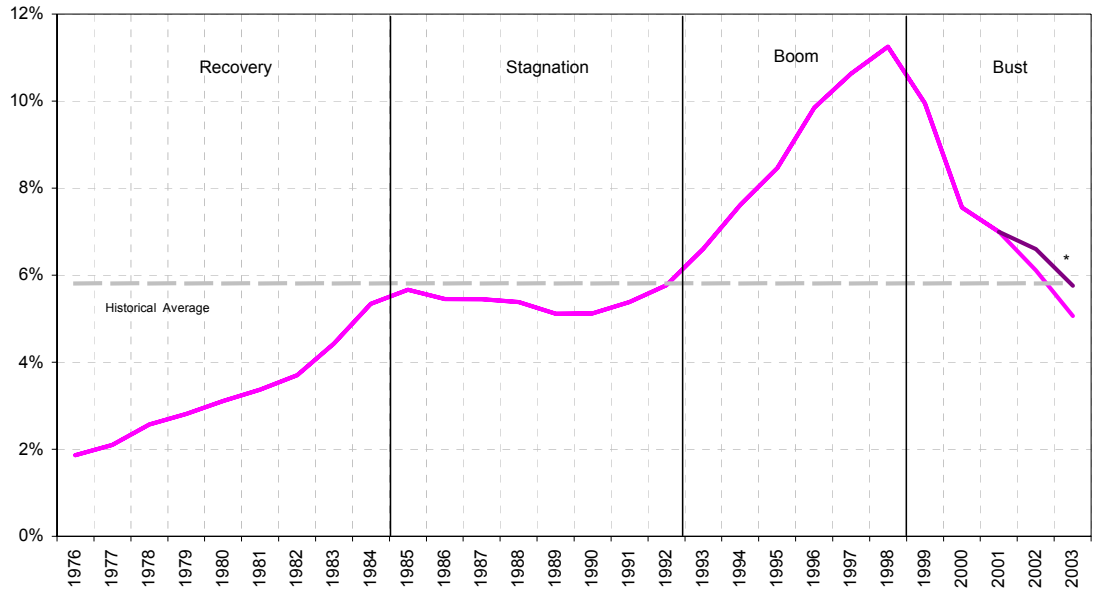
Colombia's quantitative housing shortage was around 22 percent in the 1990s, which was low by Latin American standards.[28] Considered in tandem with the qualitative housing shortage

[27] See Szalachman (2000).
[28] Szalachman (2000).

of around 26.5 percent and the overcrowding rate of nearly 15 percent, the conclusion is that about 45 percent of the population lives in unhealthy housing (see Table 5). Interestingly enough, this figure is not much different from that reported by expert urbanists, who have indicated that the "effective" shortage of adequate housing in Bogotá was close to 41 percent in 1995.[29]

More recent figures indicate that the quantitative housing deficit hovers at around 11 to 15 percent, while the qualitative deficit is about 13 to 20 percent, depending on whether figures from the National Planning Department (DNP) or the World Bank are used. If the updated overcrowding rate of 17 percent is also taken into account, Colombia had an "effective" housing deficit in the range of 41 to 52 percent at the end of the 1990s.

Figure 1. Mortgage Credit as a Percentage of GDP in Colombia, 1976 - 2003



* Includes securitizations.
Sources: Departamento Nacional de Estadística, Instituto Colombiano de Ahorro y Vivienda, Superintendency of Banks, Titularizadora Colombia and authors' calculations.

It is thus clear that despite national efforts to limit illegal urban settlements, particularly those led by the City of Bogotá, programs to extend the coverage of basic needs are still badly needed and the effects of existing programs are not fully understood.[30] Several issues complicate

[29] See Gilbert (2001), p. 15.
[30] See Secretaría de Hacienda de Bogotá (2003, p. 41); and UNDP (2003).

this process. First, the prospects of obtaining clear title to the properties inhabited by the poor are limited by the very illegality of these settlements.[31] Second, Social Housing Programs (known by their Spanish acronym VIS) have placed greater emphasis on budgetary procedures than ensuring that these programs correctly target the poor. The programs have not been adequately monitored once subsidies have been allocated.[32] It is therefore crucial to revamp statistical databases and scoring procedures so as to secure a proper assessment of the impact of VIS, which currently represent less than a third of new housing.

Given these circumstances, the officially stated housing shortage is alarming. It has been estimated that the VIS deficit stands at 1.2 million units while the deficit for regular housing stands at 1.7 million units, giving a total shortage of nearly three million units in a country of about nine million households. In addition, housing demand seems to grow at the same rate as the population, approximately 2 percent annually; this indicates an additional annual need for 170,000 units, consisting of about 100,000 in social housing and 70,000 in regular housing. Hence government housing programs of about 100,000 units per year would only satisfy the vegetative growth needs of VIS (DNP, 2003 p.107). To satisfy regular housing demand, moreover, the private sector must continue to build at its current rate in the years ahead, a task complicated by current mortgage credit conditions. Nonetheless, even in this optimistic scenario of sufficient VIS allocations and a dynamic private sector meeting regular housing demand, correcting historical imbalances in overcrowding indicators and unhealthy housing remains a daunting prospect.

In short, our call is for a surveillance program that focuses on housing issues in Colombia, a key element of which is the development of a comprehensive database with a macro-impact module (dealing with GDP-labor multipliers) and a micro-impact module (dealing with quality, budgetary, and social issues). Colombia's Vice Ministry for Housing has recently launched a similar program that could well be the platform of a more ambitious surveillance program, wherein key players should include the Administrative Department of Statistics (DANE), DNP and several private institutions. This is the only way in which Colombia could have a proper "housing road map," in which the lead should be taken by private real estate

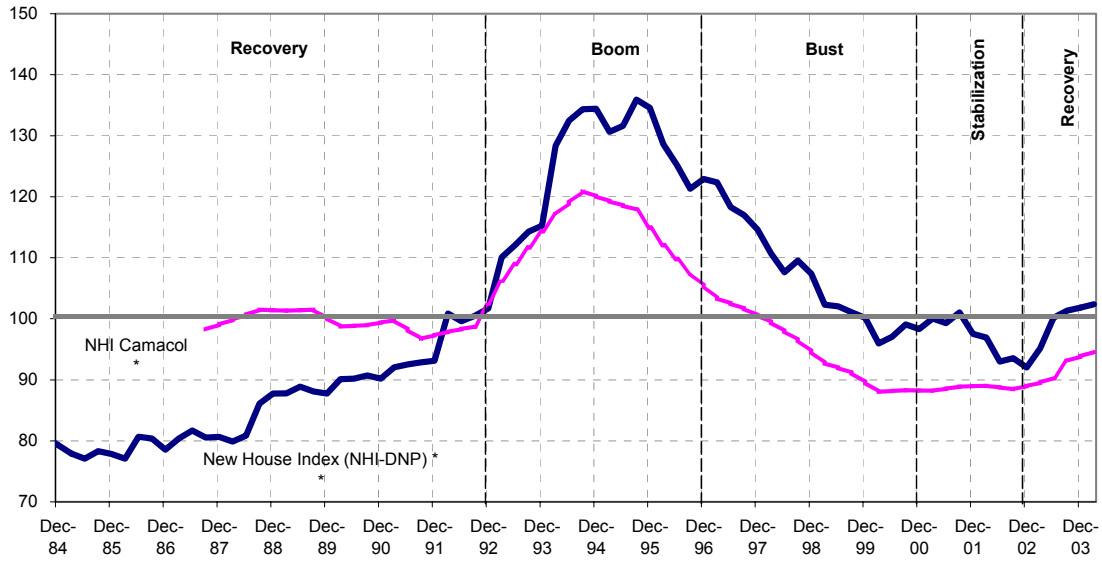
[31] See De Soto (2000, pp.46-62); and Gilbert (2001, p. 30).
[32] See DNP (2003).

developments, including massive leasing and rental projects, as currently occurs in Germany and Spain with projects known as "inmobiliarias."[33]

3.2 Real Estate Cycle

Figure 2 shows the ratio of the new house-price index for Bogotá with respect to the country's general CPI over the period 1984-2003. We have identified five cycles in the relative price of new housing in Bogotá. In the period 1984-1991 there was a slow upward trend, which reached the historical average (100) after increasing by about 25 percent during the period 1987-1991. This was a recovery period after the financial crisis of 1982-1984 and the coffee boom of 1986-1988.

Figure 2. Relative Price of New Housing in Bogota
[Average Value 1984-2003 (NHI / CPI) = 100]



Sources: * Cámara Colombiana de la Construcción, Camacol (1984-1993), ** Carrasquilla et al. (1994) and DNP (1994-2003). Re-scaled to historical average = 100.

The second part of the cycle occurred in the boom years of 1992-1995, when housing prices in Bogotá increased by 35 percent in real terms, leveraged by a tax amnesty given to repatriated resources and by strong monetary expansions. The third part of the cycle is the bust

[33] The benchmark for such a monitoring program can be found in the Office of the Deputy Prime Minister of England. See, for example, http://www.odpm.gov.uk.

that occurred in 1996–2000, prompted by the political crisis of 1996-1997 and the Asian crises of 1998-2000. The initial slowdown implied a fall of about 11 percent in real terms, and the crises brought about an additional decline of 17 percent, taking the index back to the initial levels of 100. The final episode shows an additional fall in the index to 90 during 2001-2002 and a slight recovery during 2003-2004, back to the historical average of 100.[34]

In short, during the boom-bust cycle the prices of new houses in Bogotá experienced a value loss of 39 percent in real terms in the 1996-2002 period. This collapse is deep by international standards, according to which boom-bust cycles usually range from 10 to 20 percent of historical values. Price fluctuations were also significant in other major Colombian cities, but less so than in Bogotá.[35]

3.3 Financial Returns on Housing

Financial returns on housing depend crucially on house-price fluctuations, which in turn affect the cost of renting. Lease-fees are determined by:

1. the economic cycle, which alters the lease-fee/home-value ratio in ranges that have fluctuated between 0.7 percent and 1.2 percent monthly in Colombia in the last two decades;
2. the structure of tax breaks related to mortgage credit *versus* lease-payments; and
3. the difference between housing-financial returns and other portfolios, where liquidity plays a key role.

Table 6 shows the financial return from renting a house in Bogotá over the period 1995-2002, after maintenance and property taxes.[36] In view of the value loss of about 37 percent that occurred during that period (see Figure 2), the conclusion is that the net financial return on home ownership was close to zero in real terms during the period 1995-2002. This result is quite poor

[34] More details are available in Banco de la República (2003, p. 41).
[35] House-value losses were about 34 percent in Medellin, 35 percent in Cali and 32 percent in Barranquilla. The weighted average real value-loss in the main cities has been estimated at 37 percent during 1996-2002, using weights of 50 percent for Bogotá, 20 percent for Medellin, 20 percent for Cali and 10 percent for Barranquilla. Housing-price series were constructed in our branch offices and are available upon request.
[36] We followed the standard methodology where: House-Financial Return = [Monthly Lease-Fee – Maintenance Costs – Property Taxes] + House Valorizations, as explained in Muellbauer and Murphy (1997, pp. 1702-1707).

when contrasted with the real annual return of 7 percent in the United States, 10 percent in the United Kingdom, or 21 percent in Spain over the period 1995-2002, as seen in Table 4.[37]

The prospects for Bogotá have improved recently (Fedesarrollo, 2004), as lease-fees are now close to 0.9 percent of the monthly house-market value. House valorizations are up about 10 percent in real terms per annum during the period 2002-2004. As a result, housing-financial returns now range from between 5.5 percent to 9.1 percent in real terms annually, as shown in Table 6.

[37] See *Economist* (2002b, p.11; 2004c, p. 68).

Table 6. Housing-Financial Returns in Bogotá, 1990-2003

Year	Lease Fee	Maintenance Costs	Property Taxes	Subtotal	Valorizations		Returns	
					3-Yr. Ave.	1-Yr. Ave.	3-Yr. Ave.	1-Yr. Ave.
	(1)	(2)	(3)	(4) = (1) - (2) - (3)	(5)	(6)	(4) + (5)	(4) + (6)
1990	12.0%	1.4%	0.7%	9.9%	5.7%	3.7%	15.6%	13.5%
1991	12.0%	1.4%	0.7%	9.9%	5.9%	3.8%	15.8%	13.6%
1992	12.0%	1.4%	0.7%	9.9%	6.1%	12.4%	16.0%	22.3%
1993	12.0%	1.4%	0.7%	9.9%	10.5%	16.9%	20.4%	26.8%
1994	12.0%	1.4%	0.7%	9.9%	16.5%	23.0%	26.3%	32.9%
1995	12.0%	1.4%	0.7%	9.9%	13.5%	0.8%	23.4%	10.6%
1990-1995 Av.				**9.9%**	**9.7%**	**10.1%**	**19.6%**	**20.0%**
1996	12.0%	1.4%	0.7%	9.9%	6.2%	-8.2%	16.1%	1.7%
1997	9.6%	1.4%	0.7%	7.5%	-2.6%	-6.7%	4.8%	0.8%
1998	8.4%	1.4%	0.7%	6.3%	-7.7%	-10.3%	-1.5%	-4.0%
1999	8.4%	1.4%	0.7%	6.3%	-8.9%	-9.2%	-2.6%	-2.9%
2000	8.4%	1.4%	0.7%	6.3%	-8.2%	-5.1%	-2.0%	1.1%
1996-2000 Av.				**7.2%**	**-4.3%**	**-7.9%**	**3.0%**	**-0.7%**
2001	9.6%	1.4%	0.7%	7.5%	-4.2%	2.7%	3.2%	10.2%
2002	9.6%	1.4%	0.7%	7.5%	-3.9%	-7.8%	3.6%	-0.4%
2003	10.8%	1.4%	0.7%	8.7%	1.0%	8.9%	9.6%	17.6%
2001-2003 Av.				**7.9%**	**-2.4%**	**1.3%**	**5.5%**	**9.1%**

Source: Authors' calculations.

By end-2002, the average 100 mts^2 apartment in Bogotá cost only US$72,000, while in other main cities a similar apartment cost only US$50,000.[38] This figure represented less than a tenth of the cost of the referenced apartment in cities such as New York, London and even Tokyo after the latter's asset bust. We have estimated that transactions costs in Bogotá are at the lower end of the spectrum at 4 percent, while in New York they are 12 percent of the market value.

3.4. The Mortgage System in Colombia

Regulated by Law 546 of 1999, Colombia's mortgage system is defined by the following main characteristics:[39]

1. financing horizons in the range of 5-30 years, although recent difficulties have caused the effective average term to shrink from 15 years to 10 years;
2. minimum down payments of 30 percent of house-market value, intended to avoid the over-indebtedness observed during the credit boom of 1993-1997;
3. high real mortgage-interest rates at 9 to 13 percent annually, which are regulated by ceiling rates set by the Constitutional Court and carried out by the Central Bank. These rates currently stand at 11 percent for social housing and 13.9 percent for other housing. This highly regulated environment has resulted from the real estate crises of recent years, whose legacies include still-high NPL indicators, currently at 11 percent, and declining mortgage credit, which presently represents only 5 percent of GDP.

Nevertheless, interesting financial developments have sought to cut financial costs and boost demand for housing credit. Several mortgage banks have moved to offer fixed nominal interest rates, avoiding the traditional CPI indexation of mortgage credits. In order to cover peso denomination risk, these institutions have maintained in their asset portfolios significant amounts of local CPI-linked treasury bills. The deepening of the local public-debt market since the mid 1990s has helped create a medium-term "yield-curve" for the recently-created Mortgage-Backed Security (MBS) in the Colombian-market, which currently has a portfolio close to 1 percent of GDP.

[38] This is the aftermath cost of the Asian crisis, as related in Cárdenas and Badel (2003, p. 53), Tenjo and López (2003, p. 171), and Herrera and Perry (2003, p. 153).
[39] See Cuellar (2002) and Clavijo (2001 and 2002).

The secondary market demand for MBS could increase as of 2006, when tax exemptions to the pension funds will expire.[40] Local treasuries represent about 30 percent of GDP and have a modified duration of close to 3.5 years. Of this total, the equivalent of nearly 15 percent of GDP are issued at fixed nominal interest rates, and the remainder are CPI-linked (with no significant exchange-rate indexation).[41]

As inflation in Colombia declines from the current 5-6 percent rate to the medium-term target of 3 percent, announced under the inflation-targeting regime adopted in 2000, mortgage-credit users should reap the huge benefit of a decline in real interest costs from 13.9 percent to a range of 8 to 12 percent in the near future. Consolidation of this cost-reduction, however, requires greater stability in court rulings on mortgage markets and a continuous decline in the NPL indicator, which has slowly fallen from 22 percent at the beginning of the decade to 11 percent in mid 2004.

Finally, it should be noted that Colombia's mortgage system is currently subject to several tax distortions. As shown in Table 2 above, Colombia grants generous direct and indirect tax treatments, including total tax deductions for interest and amortization payments not necessarily linked to mortgage credit. This is a desperate move to bolster the construction sector in the aftermath of the 1998-1999 financial crises.[42] At the margin, and in the early years of the legislation, such tax breaks probably had a positive effect in reviving the construction sector, but they currently represent a huge tax loophole that should soon be corrected to address the country's precarious fiscal situation.[43] Similarly, voluntary pension contributions should stop being treated as five-year personal certificates of deposit; exempt from taxes, these are often later used to access a second round of tax breaks when consumers purchase a house.

[40] See Zea (2003, p. 74).
[41] More details in Banco de la República (2004b).
[42] See Law 488 of 1998 and Law 633 of 2000 (Art. 23), which promoted the so-called AFC-accounts, reaching a historical-cumulative value of COP$45 billion in mid-2004 (about 1 percent of the certificate of deposit market).
[43] We found that the tax break might not actually compensate for the cost of mortgage credit, thus making the acquisition of property unattractive. In order for a tax break to produce a net positive in purchasing property, it is necessary for asset valorizations to be positive in real terms. A formal demonstration is available upon request.

4. Econometric Determinants of the Housing Market in Colombia

The fundamental determinants of the housing market in Colombia, paradoxically, have not been explored systematically.[44] In this section we attempt to address this lack of reliable estimates of demand-supply housing functions. These estimates cover quarterly data over the 1991-2004 period.

4.1. The Basic Model

We follow a standard demand for housing, which can be summarized as in equation (1):

$$H^D = \underset{+}{f}(y, \underset{-}{\mu}, \underset{?}{D}), \qquad (1)$$

where H^D is the demand for housing, y is average household real income, μ is the opportunity cost faced by the prospective buyer, and D is intended to capture other factors that could affect the demand schedule. It is also common to define μ as:

$$\mu = P_H * (r + \delta - \dot{P}_H^e / P_H), \qquad (2)$$

where P_H is the house price, r is the real interest rate, δ is the rate of depreciation (or the cost of maintaining the asset, including taxes) and $\dot{P}_H^e / P_H$ is the rate of valorization of the asset. Replacing (2) with (1) yields equation (3), which represents the (linear) function of housing demand in terms of its final price:[45]

$$H^D = \underset{+}{g}(y, \underset{-}{P_H}, \underset{-}{r}, \underset{-}{\delta}, \underset{+}{\dot{P}_H^e / P}, \underset{?}{D}). \qquad (3)$$

Muellbauer and Murphy (1997) explain how equation (1) is the result of intertemporal maximization of a consumer's utility function that chooses between two goods: housing and consumption goods. Hence the demand for housing has similar determinants to that for

[44] A notorious exception is the study of Fedesarrollo (2004), where supply-demand-supply functions were estimated. However, the sample-period was rather narrow (1997-2003) due to basic-data difficulties, and parameter estimates turned-out to be unstable.

[45] Muellbauer and Murphy (1997); Gallin (2003); Mühleisen and Kaufman (2003), among others, use an inverted demand function, as defined in (3), with the purpose of modeling price-behavior and detecting asset-bubbles.

consumption goods, including the vector of other variables represented by D. Such a vector, in turn, refers to future-income expectations and a *proxy* for households' wealth.

The housing supply function can be modeled as in equation (4):

$$H^S = s(P_H, \overline{H}, S), \quad (4)$$
$$\quad + \; - \; ?$$

where H^S is the quantity of housing supply, P_H its price, $\overline{H}$ is the stock of housing (which affects the construction of new houses) and *S* refers to all other variables that could affect the supply schedule.

This supply function can be inverted, as in equation (5), to be expressed as a function of housing prices P_H, instead of being a function of quantities H^S, such that:

$$P_H = s(H^S, \overline{H}, S). \quad (5)$$
$$\quad + \; - \; ?$$

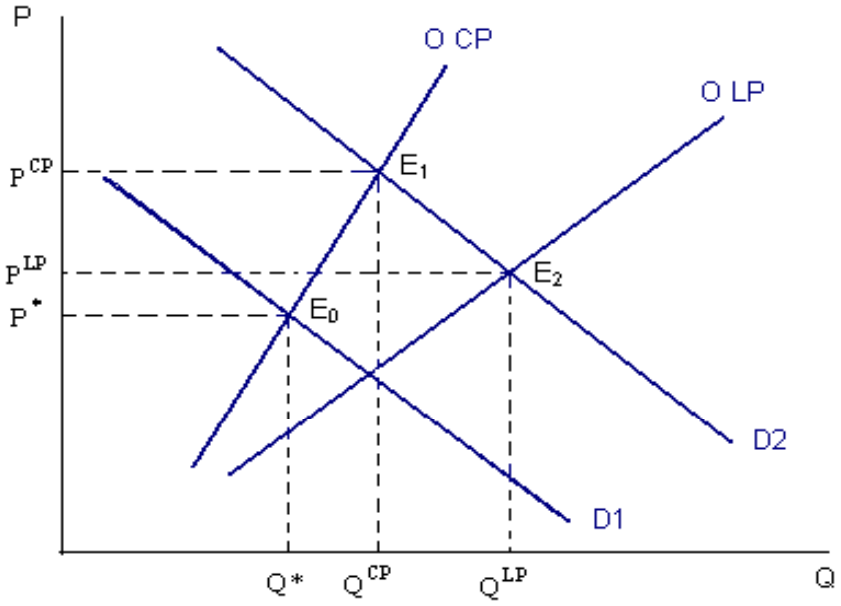
At the international level, it is quite common for analysts to concentrate on estimations of housing demand functions and disregard supply functions, given the difficulties of tackling the empirics of supply. Estimates of equation (5) usually appear along with simultaneous estimates of equation (3), such that price equilibrium for the housing market can be found in the context of:

$$H^D = H^S = H. \quad (6)$$

Figure 3 represents equations (3), (4), and (6). Our estimates aim at finding short-term price-quantities changes when components of supply-demand schedules change. If the demand for housing increases in the short run from D1 to D2, one would expect equilibrium prices to increase from E_0 to E_1. As the supply function responds in the medium term, however, the price increase should be lower, reaching E_2. The estimations became unreliable when we attempted to include dynamic responses of the supply function, so our following discussion will concentrate on short-term effects.[46]

[46] We used the well-known buffer-stock model, which proved to be rather unstable. Error correction models worked better but still did not prove sufficiently useful to be worth reporting.

Figure 3. Housing Market Equilibrium



4.2. Database[47]

Housing demand (H^D) and supply (H^S) were approached as the quantity of square meters of approved licenses for new housing. The sample consequently omits sales of existing homes and the rental market.[48]

Household disposable income (y) was taken from national surveys, and the real mortgage-credit cost (r) excludes social housing. We assume that depreciation and maintenance costs (δ) remained constant over the sample period. Different proxies of asset valuations changes were used, linking adaptive and semi-rational expectations. As the econometric significance of these variables was low, however, we discarded them.[49]

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[47] See Annex for data used.

[48] This implies that we will not be able to capture the substitution effect between new and used housing. Furthermore, such price data relate only to Bogotá. We found, however, that Bogotá's new house price index is a leading indicator for the rest of the main cities.

[49] Expected returns on house-valuations were obtained through an AR(1) process of the variable $\left(\frac{P_{+4} - P}{P}\right)$, and we included them in (3). Our semi-rational expectations model followed Muellbauer and Murphy (1997), but none of these estimates proved significant.

In the vector of variables *D,* in equation (3), we included the rate of unemployment as a proxy of income volatility (*Unempl*), which turned out to be systematically significant. The wealth effect on households was better captured through a stock-exchange index than through financial asset changes.[50]

As for the housing-supply function (equations 4 and 5), we used several proxies for capturing house-stock effects ($\overline{H}$) , but no satisfactory results were obtained. We even constructed a historical stock of available square meters without gaining much statistical significance.

Vector S incorporated an index of construction input-cost, financial opportunity cost, and some measurement of quality changes (an attempt to tackle the "hedonic price" problem). The variables used were, in order, the Camacol construction index cost, the certificate of deposit (CD) real interest rate and non-linear time variables.

4.3. Estimation and Results

Table 7 illustrates the initial non-simultaneous estimation results for housing demand and supply functions, for 1991-I / 2004-I (quarterly data). The approved licenses for new housing in Colombia are highly elastic to price changes (-1.23) in Bogotá (a city that currently leads housing market prices), and the negative sign indicates that we are dealing, as expected, with a normal good.

This housing demand function is also highly elastic to real (lagged) household disposable income (1.36) and sensitive to the volatility of that income as captured by the open unemployment rate. The magnitude and signs of these elasticities are consistent with traditional estimates for the U.S. economy.[51]

The demand for housing is relatively elastic to mortgage credit costs, showing an elasticity of -0.36, similar to the interest rate elasticities found in traditional money-demand functions. This gives empirical support to our claim that a housing sector with overly regulated interest rates, such as the ceilings imposed by court rulings, will hamper housing development. One should expect that, as NPL indicators decline over time, mortgage interest rates should fall, in turn causing a natural increase in housing demand. In other words, the provision of additional

[50] In fact, the traditional financial deepening indicators (like M3/GDP) were insignificant.
[51] See Arcelus and Meltzer (1973).

housing cannot be pursued through administrative restrictions on mortgage rates. We also found moderate support for wealth effects on housing demand. For instance, a 10 percent increase in stock exchange valuation is associated with a 3 percent increase in demand for housing.

As to the housing supply function, Table 7 reports price elasticity close to one (1.09), which is similar in absolute value to our estimate through the demand function. Input costs, in turn, are highly correlated with supply-price increases; the statistical significance of this correlation, however, is weak. Finally, financial opportunity cost plays a minor role in the supply function (-0.08), although it is consistently significant in statistical terms.

In order to correct our estimations for possible simultaneity bias, and to better characterize both supply and demand sides of the market, we also estimated this system through a Full-Information Maximum-Likelihood method (FIML).[52] In this scenario prices and quantities are estimated in a simultaneous market and are efficient under normality of estimated errors. We inverted the supply function, as in equation (5), and obtained FIML estimates of our supply-demand housing system.[53]

Table 8 reports our estimates under FIML, which basically confirm our previous results: income-price elasticities are high and have the expected signs. Furthermore, during the period under consideration these elasticities increased in absolute terms, reaching 1.5 for income, -1.8 for price, and -1.4 for income volatility (capture through unemployment). The impact of real interest rates on mortgages, however, decreased in absolute terms from -0.36 to -0.28. Nevertheless, the role of mortgage credit remained quite relevant. It should also be noted that the elasticity of input costs on the supply function remained high (2.28). This leads us to consider the possibility of oligopolistic behavior, which calls for further study at the micro level.

Finally, we found that housing prices behave cyclically, as captured by the quadratic-time component reported in Table 8. This factor could also be related to quality improvements in housing supply, which affect housing prices in a non-linear manner. [54]

[52] See Greene (2000) and Wooldridge (2000).
[53] Several colleagues commented to us that an alternative might have been to use a set of instrumental variables; however, we found that our FIML-approach, under normality of errors, fulfilled our expectations, having serious database restrictions.
[54] This is the case of the US economy, as reported by Mühleisen and Kaufman (2003), and there is also some evidence in the case of Colombia, as mentioned by Fedesarrollo (2004).

Table 7. Housing Demand and Supply Functions for Colombia
Method: OLS
Period: 1991:I-2004:I Quarterly

Demand Equation
Dependent Variable: Log (Square Meters of Approved New Licenses)*

	Coefficient	Stand. Error	Prob.
Constant	20.370	2.523	0.000
log (House Price)	-1.232	0.418	0.005
log (Real Income (-1))	1.365	0.606	0.029
log (Unemployment)	-1.132	0.208	0.000
log (Real Mortgage Interest Rate)	-0.364	0.119	0.004
log (Stock Exch.-Index)	0.298	0.085	0.001
Observations	53		
R2	0.688		
Durbin-Watson	2.065		
Prob Ljung Box (order 2)	0.908		

Housing-Supply Equation
Dependent Variable: Log (Square Meters of Approved New Licenses)*

	Coefficient	Stand. Error	Prob.
Constant	13.326	5.139	0.013
log (House Price)	1.092	0.270	0.000
log (Housing Cost-Index)	-1.068	1.218	0.385
Real Interest Rate	-0.078	0.013	0.000
Observations	53		
R2	0.550		
Durbin-Watson	1.446		
Prob Ljung Box (order 2)	0.041		

* Includes a dummy for 1999: IV, which improved estimation results.
Source: Authors' calculations.

Table 8. Simultaneous Housing Supply-Demand Function Estimates
Method: Full-Information Maximum Likelihood (FIML)
Period: 1991:I-2004:I Quarterly
Observations included: 53
Endogenous Variables: log (Square Meters of Approved Licenses) and log (New House Prices)

Demand Equation
Dependent Variable: Log (Square Meters of Approved New Licenses)*

	Coefficient	Stand. Error	Prob.
Constant	23.561	2.911	0.000
log (House Price)	-1.787	0.502	0.000
log (Real Income (-1))	1.486	0.557	0.008
log (Unemployment)	-1.420	0.245	0.000
log (Real Mortgage Interest Rate)	-0.283	0.114	0.013
log (Stock Exch. Index)	0.378	0.119	0.001
R^2	0.623		
Durbin-Watson	1.956		
Residuals Normality-Test *	0.117		0.943

Supply Equation
Dependent Variable: Log (New House Price)

	Coefficient	Stand. Error	Prob.
Constant	-9.761	1.775	0.000
log (House Price)	0.273	0.057	0.000
log (Housing Cost Index)	2.282	0.305	0.000
Real Interest Rate	0.015	0.005	0.005
t	0.035	0.008	0.000
t^2	-0.001	0.000	0.000
R^2	0.796		
Durbin-Watson	1.658		
Residuals NormalityTest *	0.031		0.985
Log Likelihood	101.201		
Determinant residual covariance	0.000		

* Jarque-Bera normality test
Source: Authors' calculations.

5. Concluding Remarks

We have provided an international overview of housing systems and place Colombia's mortgage system in that context, including an analysis of socioeconomic and financial determinants. Our survey showed that real house price cycles fluctuated between 50 and 150 percent in countries experiencing housing booms during the 1995-2004 period. In countries experiencing real-terms contractions, however, declines have ranged from 20 to 40 percent. The boom cycle has now lasted between four and six years in the United States and the United Kingdom, with some positive signals of a "soft landing" as a result of proper actions taken by their central banks. Japan and Colombia are now in a recovery phase, after experiencing drastic and rapid house-price contractions lasting two to four years. Spain and Australia, however, need close monitoring, since no proper cooling signals have been given by their central banks and there is still a risk of a housing bust.

In the case of Colombia, our recommendations aim at improving the collection of basic data on the construction sector, household socioeconomic conditions and mortgage markets. Colombia's construction sector represents about 5 to 7 percent of GDP, but more recently its share of GDP has declined to the lower end of the range at 5.2 percent, in spite of the 2002-2004 recovery. The housing sector in particular represents only about 3 percent of GDP, about half the share usually observed in many developed economies.

Our econometric estimates of the demand for housing in Colombia indicate that the area of approved licenses is highly elastic to households' disposable income, new housing prices, new housing and real interest rates on mortgage credits. On the supply side, we have found a high input-cost elasticity and a moderate response to wealth effects. Our estimates under FIML confirm our results: income price elasticities are high and have the expected signs.

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Annex: Housing Database for Colombia

New National Housing (Square Meters of Approved Licenses). Source: DANE and *Revista del Banco de la República*.

House Price Index (New Housing in Bogotá). Authors' estimations based on DNP index, linked to the index computed by Carrasquilla et al. (1994). Prices are deflated by CPI, based on December 2003=100.

Household Real Disposable Income. Data for 1990-1999 are taken from DANE Surveys of the seven largest cities. Data from March 2000 onward refer to the 13 largest cities. Data are expressed in real millions of pesos of 2003. Source: DANE and authors' calculations.

Unemployment Rate. Data for the seven largest cities. Sources: DANE and Banco de la República calculations since 2001.

Real Interest Mortgage Rate. 1990-1994 taken from ICAVI and turned into quarterly data through geometric interpolation; subsequently based on ICAVI-monthly data. Data is deflated by CPI-Unidad de Poder Adquisitivo (UPAC)-Unidad de Valor Real Constante (UVR) components. Source: ICAVI and authors' calculations.

Stock Exchange Index. Links Bogotá (IBB) and Colombia (IGBC), where June 29, 2001 =100. Source: BVC, Asobancaria, and authors' calculations.

Construction Input Cost Index. Refers to all-household construction, deflated by CPI, where December 1989=100. Source: Camacol-Cundinamarca.

Real Interest on CDs. 12-month moving average, deflated by CPI. Source: Banco de la República.

Test of Stationarity (KPSS)

Null Hypothesis: Series is stationary

Series	Time Trend with A Drift	eta mu / eta tau 8-Lagged	Crit. Value at 5%	Reject Ho
Log New House Sqr. Meters	Yes	0.099	0.146	No
Log House Price Index	No	0.174	0.463	No
Log Real Income	No	0.181	0.463	No
Log Unemployment Rate	Yes	0.105	0.146	No
Log Real Interest Mortgage Rate	No	0.343	0.463	No
Log Stock Exchange Index	Yes	0.131	0.146	No
Log Input Cost Index	No	0.103	0.463	No
CD Real Interest Rate	No	0.157	0.463	No

Data Used in Econometric Estimates for Colombia

	New House Licenses (Square Meters)	New House Price Index (Dec. 2003 = 100)	Real Household Disposable Income	Un-employment Rate	Real Interest Mortgage Rate	Stock Exchange Index	Construction Input Cost Index	CD Real Interest Rate
Mar-90	417,152	84.064	0.575	10.1	4.447	N.A.	101.001	6.557
Jun-90	464,242	84.149	0.587	10.9	6.185	N.A.	99.687	6.152
Sep-90	438,654	84.859	0.569	10.2	6.327	N.A.	98.362	6.018
Dec-90	314,142	84.193	0.533	10.6	5.703	N.A.	94.820	5.731
Mar-91	366,419	86.729	0.569	10.7	6.796	12.651	97.772	5.096
Jun-91	511,355	87.321	0.571	10.7	7.472	14.457	94.770	4.747
Sep-91	527,951	87.769	0.546	9.8	8.664	15.413	93.613	4.599
Dec-91	533,044	88.156	0.545	9.4	11.048	32.996	92.523	5.196
Mar-92	668,917	98.669	0.552	10.8	8.929	46.968	94.659	4.924
Jun-92	728,481	96.909	0.549	11.2	4.289	48.649	90.800	3.234
Sep-92	806,026	98.157	0.554	9.1	3.683	59.218	92.606	1.266
Dec-92	1,151,199	99.779	0.554	9.8	7.566	53.335	92.736	-0.289
Mar-93	602,551	111.165	0.585	9.7	8.429	49.400	98.441	-0.433
Jun-93	706,425	113.899	0.606	9.1	11.959	50.476	96.280	1.025
Sep-93	551,779	116.888	0.708	7.8	11.803	63.960	97.905	2.346
Dec-93	994,451	118.184	0.696	7.8	10.360	80.368	96.190	2.725
Mar-94	540,693	136.026	0.803	10.2	9.673	115.296	98.995	2.855
Jun-94	982,281	141.593	0.724	9.8	9.450	114.605	98.911	2.571
Sep-94	936,718	144.094	0.724	7.6	11.383	111.972	100.385	3.387
Dec-94	1,194,758	144.251	0.715	8.0	15.909	95.997	99.667	5.347
Mar-95	564,743	139.104	0.662	8.1	19.882	97.407	101.099	7.489
Jun-95	575,410	140.430	0.682	9.0	20.299	93.362	98.573	9.660
Sep-95	619,988	146.238	0.693	8.7	17.306	88.633	98.343	9.862
Dec-95	595,166	144.488	0.660	9.5	18.558	81.157	97.177	9.453
Mar-96	413,751	136.356	0.630	10.2	20.226	87.857	101.392	9.433
Jun-96	286,449	131.745	0.690	11.4	19.964	98.428	97.308	9.340
Sep-96	436,692	126.410	0.641	11.9	16.965	97.562	96.126	9.476
Dec-96	467,302	128.621	0.607	11.3	14.502	94.822	95.257	8.594
Mar-97	499,966	127.847	0.682	12.3	14.384	120.853	96.077	7.237
Jun-97	340,409	122.314	0.679	13.3	12.940	134.873	93.651	5.665
Sep-97	655,807	120.567	0.661	12.1	12.511	161.102	92.772	4.811
Dec-97	615,556	117.344	0.658	12.0	12.287	159.833	93.295	4.742
Mar-98	557,763	112.040	0.677	14.4	11.250	131.595	93.627	5.052
Jun-98	414,735	107.855	0.657	15.9	16.282	126.232	88.446	6.488
Sep-98	381,891	110.424	0.670	15.0	23.037	92.435	90.296	8.863
Dec-98	336,207	107.482	0.622	15.6	26.761	119.608	91.865	11.714
Mar-99	317,421	100.597	0.621	19.5	23.479	103.843	90.802	13.213
Jun-99	332,774	100.258	0.585	19.9	18.057	116.360	90.907	12.854
Sep-99	270,309	98.918	0.580	20.1	16.758	103.935	91.357	11.597
Dec-99	187,765	97.662	0.623	18.0	16.690	113.486	93.189	9.277
Mar-00	311,721	91.993	0.649	20.3	13.315	109.493	91.747	6.719
Jun-00	476,068	93.492	0.649	20.4	12.902	87.156	92.230	4.953
Sep-00	345,241	96.218	0.618	20.5	12.508	85.757	94.980	3.529
Dec-00	499,043	95.179	0.629	19.5	12.423	80.717	100.428	2.682
Mar-01	414,566	97.568	0.616	20.1	12.399	93.227	97.376	3.351
Jun-01	294,653	96.548	0.605	18.1	12.276	99.118	96.263	4.047
Sep-01	289,781	98.867	0.615	18.0	11.948	95.884	96.351	4.267
Dec-01	586,727	94.097	0.623	16.8	12.736	96.717	97.009	4.135
Mar-02	595,188	93.298	0.646	19.1	12.535	109.939	96.990	3.927
Jun-02	662,760	87.977	0.635	17.9	13.016	124.378	95.974	3.582
Sep-02	678,506	88.734	0.688	18.0	13.662	121.534	96.161	3.036
Dec-02	557,343	86.667	0.644	15.7	13.598	155.561	96.932	2.433
Mar-03	492,055	90.873	0.659	17.5	13.666	161.230	99.968	1.524
Jun-03	432,481	97.715	0.619	17.0	13.428	202.813	99.523	0.795
Sep-03	611,514	99.274	0.640	17.0	12.687	212.858	100.114	0.514
Dec-03	752,861	100.000	0.685	14.6	13.252	226.267	102.030	0.625
Mar-04	685,874	100.697	N.A.	16.9	13.606	312.784	106.941	0.938