

WP/17/190

IMF Working Paper

Housing Finance and Real Estate Markets in Colombia

by Francisco Roch

***IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Western Hemisphere Department

Housing Finance and Real Estate Markets in Colombia

Prepared by Francisco Roch

Authorized for distribution by Jorge Roldós

August 2017

IMF Working Papers describe research in progress by the author(s) and are published to elicit comments and to encourage debate. The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

Abstract

Colombian house prices have increased significantly between 2005 and 2016. This paper estimates the extent of misalignments in house prices relative to fundamentals and evaluates the overall risk to the economy from the housing sector. The results suggest a moderate house price misalignment relative to fundamentals which is, however, mitigated by housing finance characteristics.

JEL Classification Numbers: E44, R21, R31

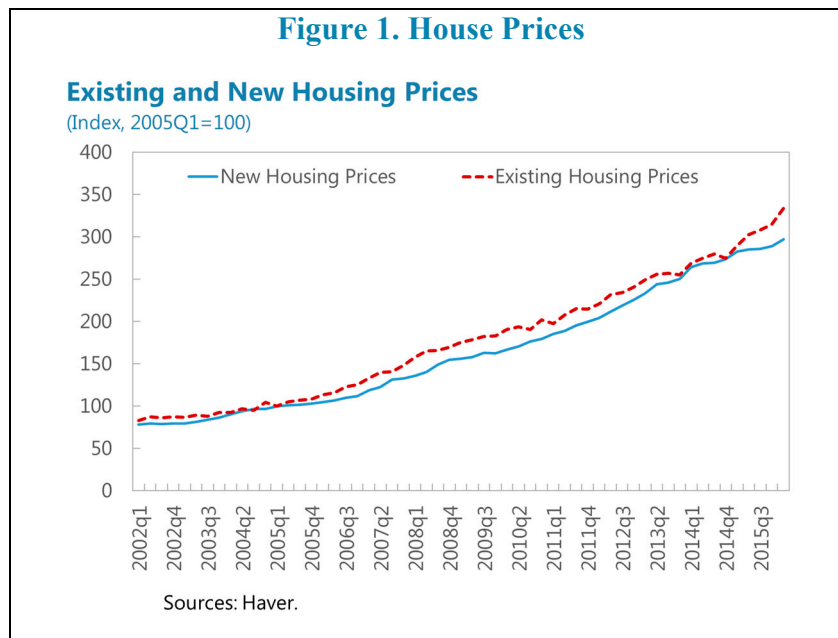
Keywords: House price, price misalignment, financial stability, mortgage markets.

Author's E-Mail Address: froch@imf.org

Contents	Page
Abstract _____	2
I. Introduction _____	4
II. Recent Developments in the Housing and Mortgage Markets _____	5
III. Housing Finance Characteristics _____	8
A. Maximum observed LTV _____	8
B. Term to maturity _____	8
C. Funding model _____	8
D. Degree of lender recourse on mortgages _____	9
E. Interest type _____	9
F. Prepayment penalties _____	10
IV. House Price Determinants _____	10
V. Macroeconomic Effects of Housing Shocks _____	12
VI. Conclusions _____	14
References _____	15
Figures	
1. House Prices _____	5
2. Housing Deficit (Percent of Households) _____	7
3. Construction Act _____	7
4. House Prices by Region and by Income Level _____	8
5. Mortgage Credit _____	8
6. Cross-Country Housing Finance Characteristics _____	10
7. Traditional Valuation Ratios _____	13
8. Response of Macro Variables to a House Price Shock (± 2 S.E.) _____	14
Tables	
1. Econometric Results _____	12
2. Estimated Price Gaps _____	12
Annexes	
I. Government Housing Programs _____	16
II. The 1998–99 Financial Crisis _____	18

I. INTRODUCTION

Colombian house prices have increased significantly between 2005 and 2016. In the main three cities of Colombia (Bogota, Cali, and Medellin), house prices rose by around 200 percent in nominal terms (110 percent in real terms) from 2005 to mid-2016 (Figure 1). In addition, some housing indicators (including the housing affordability ratio, the ratio of house prices to rent, and mortgage debt) have reached historically high levels. These developments generate questions about the sustainability of these price increases, and the macro-financial risks associated with potential reversals in the housing and mortgage markets.



This paper estimates the extent of misalignments in house prices relative to fundamentals in Colombia and evaluates the overall risk to the economy from the housing sector. First, the paper documents recent developments in mortgage credit and the housing sector in Colombia. Second, it examines the extent to which characteristics of the Colombian housing finance system could lead to potential fragilities. Third, misalignments in house prices relative to fundamentals are estimated using an error-correction model, relating short-term changes in house prices to a long-term equilibrium relationship, interest rates, and to changes in income per capita and credit growth.

We find some degree of house price misalignment relative to fundamentals which is, however, mitigated by housing finance characteristics. The model results suggest that house prices are around 13 percent above equilibrium. Nevertheless, after the financial crisis of 1999, the authorities have addressed possible mortgage financing vulnerabilities from the housing market. In particular, there is a ceiling on loan-to-value ratios of 70 percent, mortgages are usually contracted at a fixed interest rate, and there is full recourse on mortgages. Thus, the soundness in housing finance contracts and regulations would mitigate the negative spillovers from a potential correction in house prices.

The paper is organized as follows. Section B presents recent developments in the housing market. Section C describes the characteristics of housing finance in Colombia. Section D examines the misalignment of house prices relative to fundamentals, and Section E concludes.

II. RECENT DEVELOPMENTS IN THE HOUSING AND MORTGAGE MARKETS

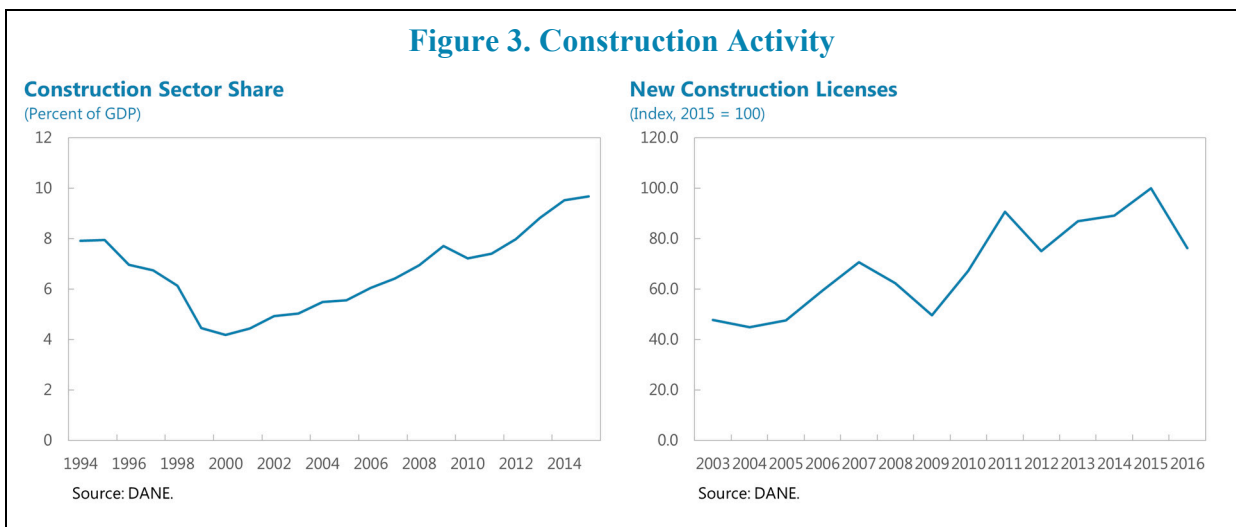
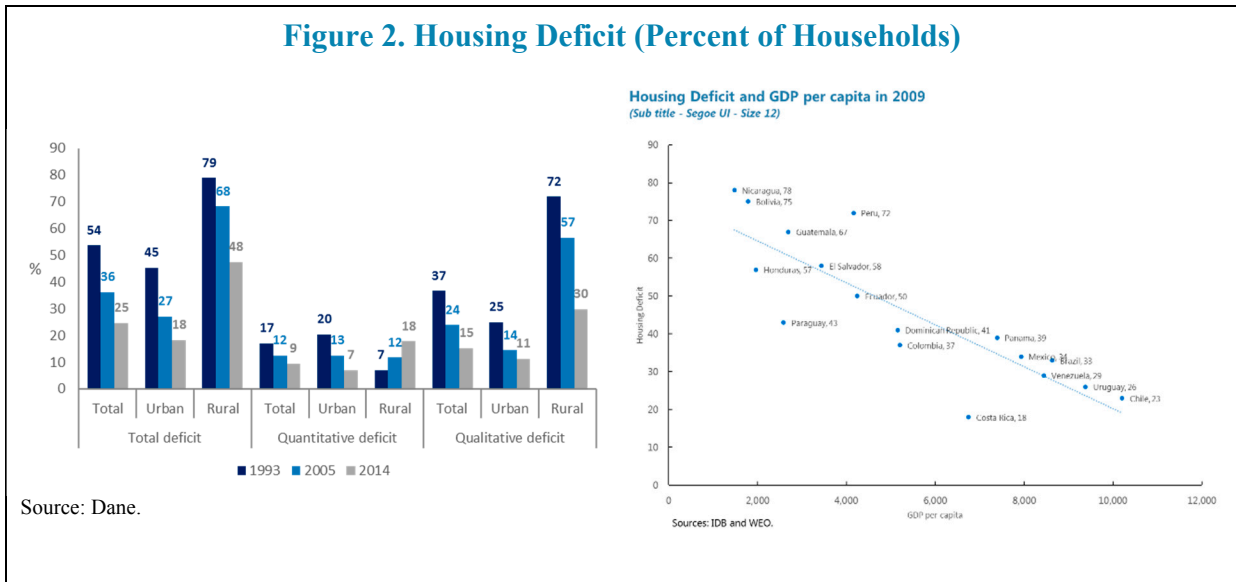
While the total housing deficit has been steadily declining, home ownership is still low. Out of 14 million households in 2015, 46 percent live in their own homes, 38 percent rent the house where they live, and 16 percent enjoy free usufruct.¹ Home ownership in Colombia is among the lowest in the region. The total housing deficit was estimated at 25 percent of the total number of households in 2014, down from 54 percent in 1993 (Figure 2). The total housing deficit is usually split between quantitative and qualitative deficit.² In 2014, the total quantitative and qualitative deficit were estimated at 9 and 15 percent of the households, respectively. Not surprisingly, the total housing deficit is much larger in rural areas (48 percent in 2014) than in urban areas (18 percent in 2014). The dynamics of the housing deficits have been positive except for the quantitative deficit in rural areas, where it has increased from 7 percent in 1993 to 18 percent in 2014. However, estimates by the IDB suggest that Colombia stands well in the region with a similar housing deficit to higher income per capita countries (Figure 2).³

Construction activity has recovered from the financial crisis of the late 1990s and has reached historical levels. Construction activity declined sharply during the Colombian financial crisis, bottoming out in 2000 with a share of construction in GDP of around 4 percent (Figure 3). Since then, the participation of construction has increased steadily, with a minor deceleration during the global financial crisis, reaching 9.7 percent in 2015. The construction licenses index provides a measure of the potential of construction activity at the country level. The dynamics of this index has been in line with that of the construction share in GDP, showing strong growth except during the 2008 financial crisis. However, construction licenses have declined in 2016 suggesting that construction activity might start slowing down, in line with overall economic activity (Figure 3).

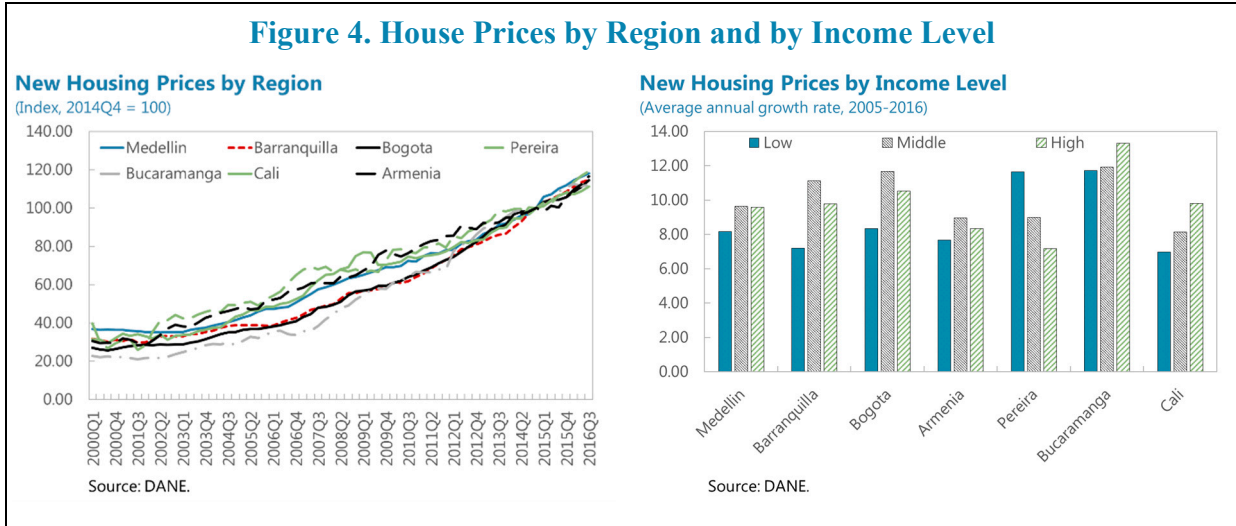
¹ DANE and staff calculations.

² The quantitative deficit is measured by the number of households that do not have an independent house while the qualitative deficit takes into account the quality and condition of houses and their access to basic services.

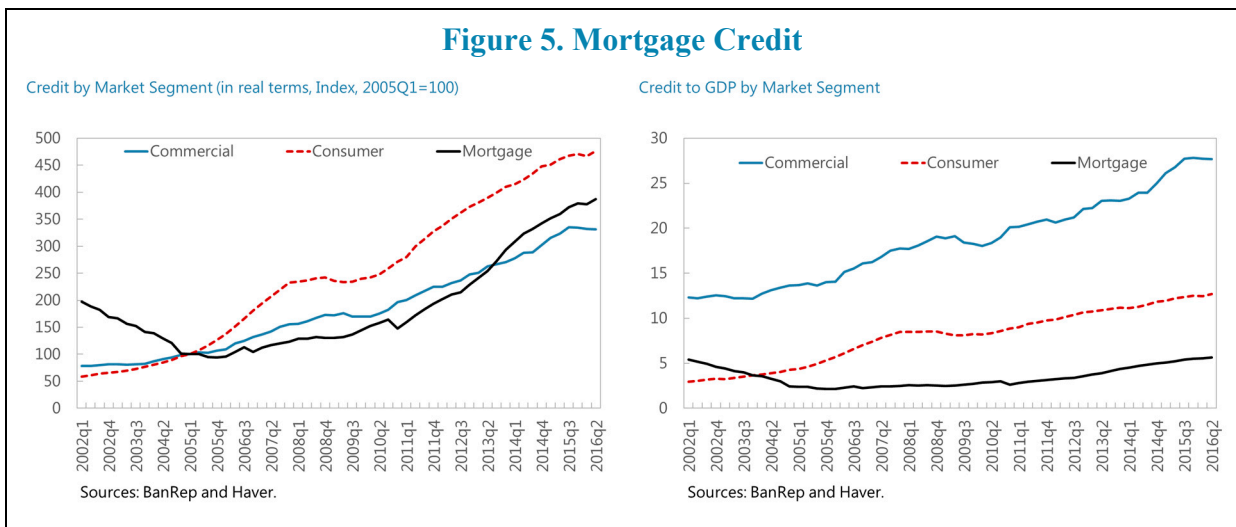
³ The IDB uses a homogeneous approach to estimate housing deficits across Latin American countries. However, the latest estimations are from 2009, and will be updated only in 2018.



The increase in house prices has been widespread across the country. Figure 1 shows that prices for both new and existing houses have increased in the main three cities of Colombia. Figure 4 shows the evolution of prices for new houses in additional cities. Interestingly, house prices grew at high and similar rates in the seven cities considered: the average home-price index grew by an annual real rate of 5.18 percent between 2005 and 2016, with Bucaramanga having the highest average annual real growth rate (8 percent) and Armenia the lowest (3.4 percent). Notwithstanding, in all the cities house prices tended to show stronger growth for middle and upper income levels (Figure 4).



Mortgage credit experienced a significant expansion during the past decade. While all types of credit (consumption, commercial, and mortgage) increased substantially in real terms since 2005, growth in mortgage credit has been particularly strong since 2011 (Figure 5). As a consequence of favorable external conditions, strong fundamentals and mortgage credit subsidies, real mortgage credit has grown by an annual average of 13 percent since 2011. The expansion in mortgage credit is in line with the growth of the construction sector described above. However, despite the rapid credit growth, mortgage credit in Colombia is still low and stands at about 5 percent of GDP (Figure 5), below the levels of other emerging economies. Government subsidies have also played a role in the recent mortgage expansion (see Annex I).⁴



⁴ Around 30 percent of the mortgages originated in 2016 were subsidized.

III. HOUSING FINANCE CHARACTERISTICS

Housing finance systems differ considerably across countries and several mortgage markets characteristics are associated with deeper and/or more stable markets. This section presents the existing empirical evidence of the following house financing characteristics on financial stability: maximum observed loan-to-value (LTV), term to maturity, funding model, degree of lender recourse on mortgages, interest type, and prepayment penalties. Moreover, for each characteristic, Colombia is compared to advanced and emerging economies.⁵

A. Maximum observed LTV

LTV ratios on new loans vary widely across countries, and a number of countries have used regulatory LTV ceilings to mitigate housing booms or increase resilience against a bust. Recent empirical studies support the effectiveness of LTV limits as a macroprudential tool. Crowe et al. (2011) find that house prices decline between 8 and 13 percentage points after a 10 percentage-point reduction in the LTV ratio. According to Claessens et al. (2012), emerging markets should impose lower LTV limits given that they tend to experience more severe financial downturns than advanced economies. Almeida et al. (2006) indicate that LTV ceilings affect the financial accelerator mechanism by reducing the transmission from increases in income to increases in house prices. Figure 6 shows that the maximum observed LTV ratios in the majority of countries seem to be between 70–80 and 90–100, with a median of 83 percent. It ranges from 70 percent (Colombia, Hong Kong SAR, and Hungary) to 125 percent (the Netherlands). Colombia actually has two limits: the LTV ratio for a loan targeted towards the financing of Social Interest Housing (VIS in Spanish) is of 80 percent, and all other mortgage loans have an LTV limit of 70 percent.⁶ In Colombia, the LTV ratio is at 53 percent, below the regulatory ceiling.

B. Term to maturity

The maturity of mortgage loans could affect the depth of mortgage markets and house prices by influencing affordability. Intuitively, the possibility of opting for longer maturity loans could increase affordability (through lower monthly payments) leading to an increase in the demand for mortgages and homeownership. Figure 6 shows that the maturity of mortgages ranges from 7 years (Turkey) to 45 years (Sweden), with a median of 25 years. In the case of Colombia, the average maturity of a mortgage loan is 15 years. However, the effective duration is around 6–7 years due to early prepayments.

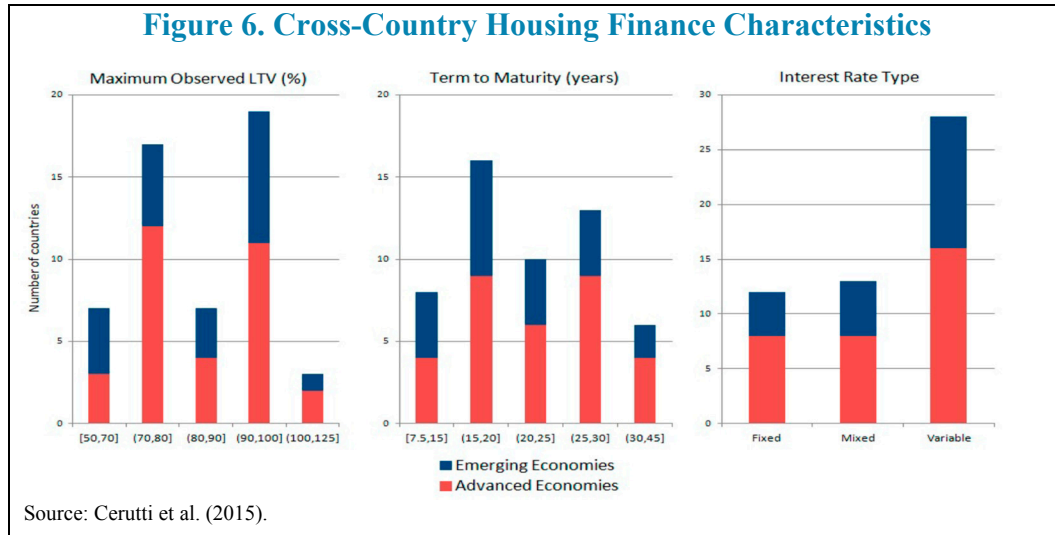
C. Funding model

The way that banks fund the origination of mortgage loans tends to play a role in the rate of credit growth and, consequently, affects house prices and financial stability. For instance,

⁵ The international comparison is based on Cerutti et al. (2015).

⁶ VIS is defined as a house or apartment whose value is below 135 monthly minimum wages: around USD\$31,000 in 2016.

credit growth is usually stronger in an economy in which securitization plays a bigger role than in an economy dominated by bond financing. Mortgage securitization was associated with a deterioration in underwriting standards in the United States, while covered bonds have contributed to safer mortgages in Europe. However, while there is heterogeneity across countries' funding models, in most countries banks use retail deposits as the primary source of financing. This is also the case for Colombia.



D. Degree of lender recourse on mortgages

A full-recourse mortgage loan allows the lender to pursue deficiency judgments, i.e., to pursue a borrower's assets (other than the house securing the mortgage) in case of a default. In contrast, a nonrecourse mortgage implies that the lender has recourse only to the underlying property. Dugyan-Bump and Grant (2008) document that the use of full-recourse mortgage loans has been associated with lower default rates in Europe. Moreover, Ghent and Kudlyak (2011) and Jagtiani and Lang (2010) show that strategic default rates were higher in those states of the United States where mortgage loans are treated as nonrecourse debt. In the case of Colombia, there is full recourse on mortgages.

E. Interest type

Figure 6 shows that there is also heterogeneity in interest determination across countries. In the sample collected by Cerutti et al. (2015), variable-rate mortgages are the dominant instrument in 30 countries, and fixed-rate mortgages in 12 countries; while both types are observed in 14 countries. Moreover, variable rates are more common in emerging economies. In the case of Colombia, both variable- and fixed-rate mortgages are offered. However, given the role that mortgage interest rates played in the Colombian financial crisis (see Annex II), most households tend to choose fixed-rate mortgages.

F. Prepayment penalties

Ellis (2008) suggests that the lack of prepayment penalties in the United States contributed to the increase in household leverage and mortgage indebtedness through cash-out refinancing and second mortgages, which could lead to mortgage market volatility. Most countries allow a partial repayment (typically 20 percent) without penalty. There are no prepayment penalties in Colombia and borrowers frequently make partial repayments.

IV. HOUSE PRICE DETERMINANTS

Standard models of house price determinants postulate that the growth rate of real house prices is explained by the following factors:

- Past growth rates of real house prices. This would capture the persistence in the growth rate of house prices.
- Past housing affordability ratio. The long-term equilibrium relationship is measured using the ratio of house prices to income which is a measure of affordability.
- Economic fundamentals. The growth rate of house prices should be positively affected by per capita real income growth (which increases households' purchasing power and borrowing capacity) and mortgage credit growth (as households are less credit rationed), while negatively affected by interest rates (as lower rates increase households' capacity to borrow). Finally, the growth rate of households (proxied by population growth) should also affect the growth rate of house prices positively.

Misalignments in house prices relative to fundamentals are estimated using an error-correction model. In the regression model changes in house prices serve as the dependent variable, and the explanatory variables are meant to capture mainly demand-side factors. The regression takes the following form:

$$HPG_t = C + \theta A_{t-1} + \beta_1 HPG_{t-1} + \beta_2 YPC_t + \beta_3 credit_t + \beta_4 i_t + \beta_5 population_t + \epsilon_t$$

where HPG_t is the change in real house prices over the last quarter, YPC_t is the change in real GDP per capita over the last quarter, A_{t-1} is the affordability level of housing in the previous period, $credit_t$ is the change in real mortgage over the past year, i_t is an average lending interest rate, and $population_t$ is the change in population over the past year.

The estimation uses quarterly data from the first quarter of 1994 until the first quarter of 2016. The price measure used is the existing home price index from the BanRep database, and is deflated by the consumer price index (CPI).⁷ The index measures the quarterly and

⁷ The results could change if the new home price index is used due to the historical gap between the existing and new home price indices. This robustness check is left for future work.

annual evolution of existing houses in Bogota, Medellin, Cali, Barranquilla, Bucaramanga, Cucuta, Manizales, Neiva, Villavicencio and Soacha. Housing affordability is measured as the ratio of house prices to real GDP per capita.

The econometric results show that real house prices in Colombia show long-run reversion to fundamentals (Table 1). Affordability is negatively related to changes in house prices and is statistically significant: if house prices are out of line with income, there is a gradual tendency for this misalignment to be corrected (about 13 percent every quarter). All of the economic fundamentals have the expected sign and are significant. Better mortgage credit availability and higher income per capita promote higher house prices. Demographic factors do also have a positive effect on house prices. In contrast, the sign of the coefficient for the past growth rate of real house prices is not as expected and suggests that the current growth rate is negatively correlated with the past growth rate. Finally, the regression model seems to fit the data well given that the R-square stands at 0.45.

The analysis suggests that house prices are moderately misaligned with respect to economic fundamentals (Table 2). The levels of house prices as of the first quarter in years from 2005 to 2008 are used as alternative base levels from which the fitted values of the house price increases are accrued. The approach is to assume that house prices were at the equilibrium level at an arbitrarily assigned date and set the house price index to 100. Then, the index values from that date onward are computed using the predicted house price changes from the regression analysis. Then, the estimated price gap is the difference between the actual index value and the predicted one. The estimated price gap would depend on when house prices are chosen to be at their equilibrium level implied by fundamentals. Thus, to ensure robustness, the misalignment is calculated as the average over these base years. Prices are considered misaligned if the average estimated gap is above 10 percent of the equilibrium price, and the average estimated price gap is at 13.5 percent.

Source	SS	df	MS	Number of obs	=	85
Model	.034456584	6	.005742764	F(6, 78)	=	10.92
Residual	.04102643	78	.00052598	Prob > F	=	0.0000
				R-squared	=	0.4565
				Adj R-squared	=	0.4147
Total	.075483014	84	.000898607	Root MSE	=	.02293

hpi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
hpi1	-.4009662	.0926514	-4.33	0.000	-.5854208 -.2165115
lnafford1	-.132468	.0315063	-4.20	0.000	-.1951922 -.0697437
dlnypc	.2093321	.1252894	1.67	0.099	-.0401 .4587642
rate	-.0017835	.0008625	-2.07	0.042	-.0035006 -.0000665
dlnc	.1200901	.0214842	5.59	0.000	.0773184 .1628619
dlnpop	5.079725	2.821283	1.80	0.076	-.5370173 10.69647
_cons	.1242847	.0373041	3.33	0.001	.0500179 .1985514

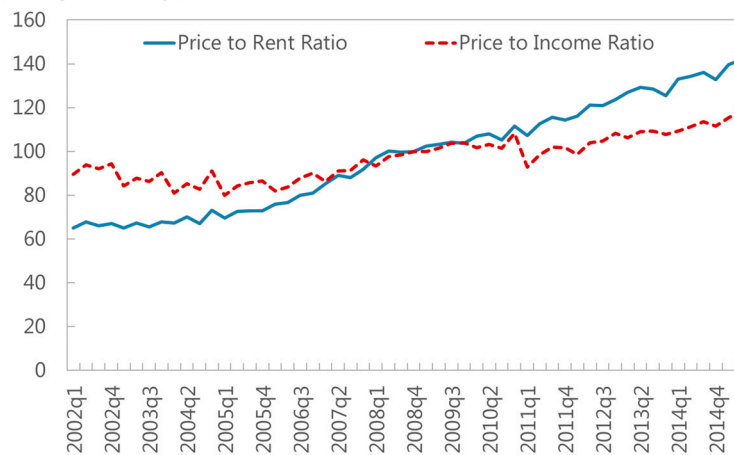
Table 2. Estimated Price Gaps

	2005	2006	2007	2008
Gap	17.76	15.40	10.96	9.89

Among traditional valuation measures, only the price-to-rent ratio suggests overvaluation. The analysis of the price-to-income ratio relies on the supposed cointegration relationship between income and house prices. The idea behind the price-to-rent ratio is that the price of real estate, as an asset, should be in line with returns, revealed as market rent. For both ratios, the historical averages are calculated over the entire period for which data are available. House prices are considered overvalued if the ratio is at least one standard deviation above its historical average. Figure 7 shows that both valuation measures have been increasing steadily since 2011. However, only the price-to-rent ratio is above the overvaluation threshold.

Figure 7. Traditional Valuation Ratios**Price-to-income and Price-to-rent ratios**

(2002Q1 to 2015Q2)



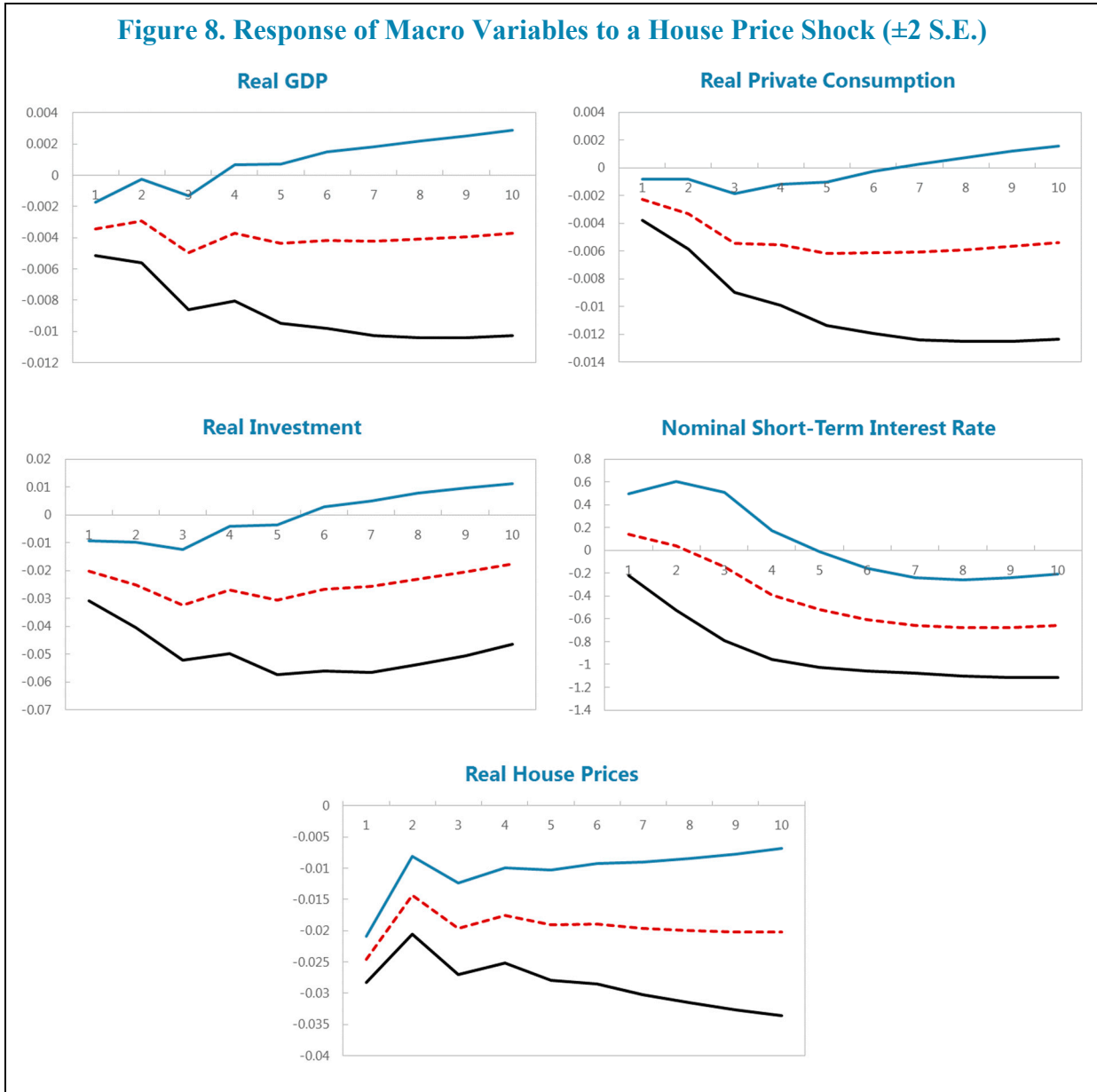
Sources: Fund Staff Calculations.

V. MACROECONOMIC EFFECTS OF HOUSING SHOCKS

The macroeconomic implications of a potential house price correction can be assessed using a VAR model. Following Aspachs-Bracons and Rabanal (2011) and Igan and Loungani (2012), the implications of movements in real house prices on GDP, private consumption, investment, and a nominal short-term interest rate are analyzed. House price shocks are identified using the generalized impulse response approach, which has the advantage of being invariant to the ordering of the variables.

The estimation uses quarterly data from the first quarter of 1994 until the second quarter of 2016. The domestic variables of interest are real GDP, real private consumption, real

investment, the 90-day certificates of deposit interest rate, and the real existing house price index. All variables are introduced in the VAR in levels after taking natural logarithms, except for the nominal interest rate that is introduced directly in levels. The VAR is estimated using 3 lags.



A house price correction could have significant spillovers to the rest of the economy. Figure 8 shows the impulse responses of the five variables to a negative house price shock. The housing shock leads to a decline in real house prices of 2.5 percent after one period, and a cumulative decline of about 15 percent after two years. Real investment is the macroeconomics variable of highest sensitivity to the shock with an initial decline of 2 percent, and a cumulative impact of -21 percent over two years. Both real GDP and private

consumption decline by more than 3 percent (cumulative) after 8 quarters. However, the confidence intervals reported imply that the effect is not statistically different from zero after the 5th quarter for investment, 3rd quarter for GDP and 6th quarter for consumption.

VI. CONCLUSIONS

Overall, risks from the housing market seem to be contained. While the results from the VAR model suggest that a negative house price shock could have sizable implications on activity (GDP, consumption and investment), house prices do not seem to be largely above levels justified by economic fundamentals (the average estimated gap is at 13 percent). Moreover, after the 1999 financial crisis the authorities have adopted macroprudential measures such as the use of LTV limits, which together with other housing financing characteristics, limit the vulnerabilities stemming from the housing market. At the same time, the current slowdown in economic activity should decelerate mortgage growth and impact the growth of house prices, which has started to show some signs of weakening. However, the authorities should continue to monitor closely the developments in credit and house price growth.

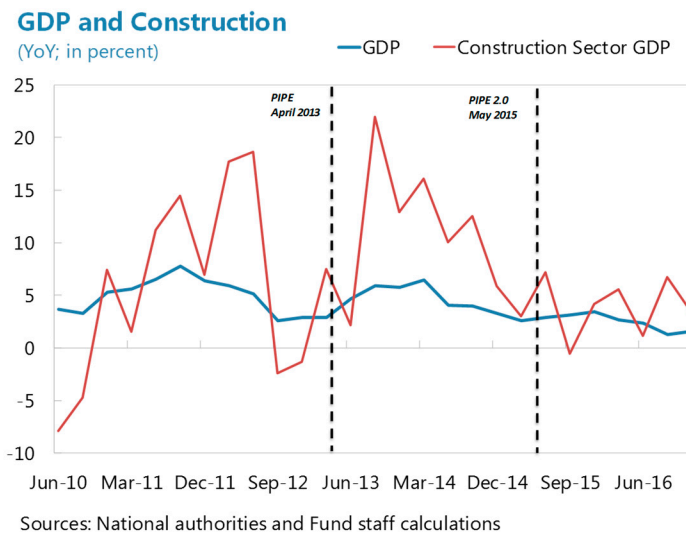
REFERENCES

- Almeida, H., M. Campello, C Liu, 2006, “The Financial Accelerator: Evidence from International Housing Markets,” *Review of Finance*.
- Aspachs-Bracons, O. and P. Rabanal, 2011, “The Effects of Housing Prices and Monetary Policy in a Currency Union,” IMF Working Paper No. 11/6 (Washington: International Monetary Fund).
- Cerutti, E., J. Dagher, G. Dell’Ariccia, 2015, “Housing Finance and Real-Estate Booms: A Cross-Country Perspective,” IMF Staff Discussion Note (Washington: International Monetary Fund).
- Claessens, S., M. Kose, M. Terrones, 2012, “How do Business and Financial Cycles Interact?” *Journal of International Economics*.
- Crowe, C., G. Dell’Ariccia, D. Igan, P. Rabanal, 2011, “How to Deal with Real Estate Booms: Lessons from Country Experiences,” *Journal of Financial Stability*.
- Duygan-Bump, B. and C. Grant, 2008, “Household Debt Repayment Behaviour: What Role do Institutions Play?” *Economic Policy*.
- Ellis, L., 2008, “The Housing Meltdown: Why Did it Happen in the United States?” unpublished.
- Ghent, A., and M. Kudlyak, 2010, “Recourse and Residential Mortgage Default: Evidence from U.S. States,” *Review of Financial Studies*.
- Igan, D., and P. Loungani, 2012, “Global Housing Cycles,” IMF Working Paper No. 12/217 (Washington: International Monetary Fund).
- Jagtiani, W., and J. Lang, 2010, “The Mortgage and Financial Crises: The Role of Credit Risk Management and Corporate Governance,” *Atlantic Economic Journal*.

ANNEX I. GOVERNMENT HOUSING PROGRAMS

Government housing programs have expanded in recent years, partly in response to the economic slowdown. Traditionally, government housing programs have aimed to reduce gaps in home ownership and improve social conditions. At the same time, in recent years, new housing programs have been used as a countercyclical response to country-wide economic slowdown exploiting the spillovers that construction activity has into other sectors (official estimates suggest the construction sector is interconnected with 25 percent of the industrial sector). Examples of the latter are mortgage subsidies targeting middle-income households included in the government programs PIPE (Plan to Boost Productivity and Employment) in 2013 and PIPE 2.0 in 2015. The number of houses sold with mortgage subsidies increased from about 21,000 in 2013 to about 33,000 in 2016.¹

Existing housing programs combine support for down payments and subsidized mortgage interest rates. The government has a standing program to provide free housing to the most vulnerable including people displaced by the conflict with the FARC. Further, the program *Mi Casa Ya* targets households with income between 2 and 4 minimum wages and for houses worth up to US\$30,000.² The program offers support for down payments and a subsidy for interest payments. Another program, FRECH, offers only interest rate subsidies (4–5 percentage points) and targets households earning up to 8 minimum wages and houses worth up to US\$50,000. The FRECH program is also included in *Mi Casa Ya* through the program *Mi Casa Ya subsidio a la tasa*. Finally, FRECH No-VIS is aimed at middle-income households providing interest rate subsidies (2.5 percentage points) for houses worth up to US\$82,378 and is open to any household regardless of its income level.³ The government



¹ Excludes houses worth more than US\$30,000.

² *Mi Casa Ya* also includes an extension for households with an income lower than 2 minimum wages, known as *Mi Casa Ya para Ahorradores*.

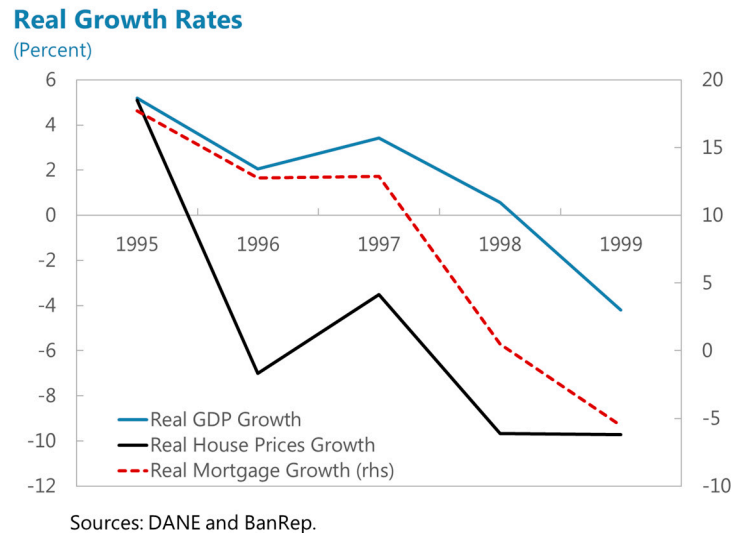
³ House values limits are defined in number of minimum wages. For 2016, the values are converted using the official monthly minimum wage of US\$230.

sets annual ceilings (*cupos*) for the number of houses to be subsidized under each program; the programs are only for new houses.

Data suggest housing programs have contributed to Colombia's relatively strong economic performance over the last few years. The construction sector has outpaced total GDP growth during most of the last years, supported in part by an increase in residential construction. The data shows a clear boost to construction exactly at the time of PIPE in 2013; at the same time, the response to PIPE 2.0 has been more muted (other key drivers of construction activity include subnational expenditure execution, and the authorities' infrastructure agenda). Official estimates suggest the fiscal multipliers of the housing program varies from 10 for FRECH No-VIS to 1 for the free housing program.

ANNEX II. THE 1998–99 FINANCIAL CRISIS

The origins of the financial crisis in 1998–99 can be traced to events in the early 1990s, when Colombia underwent a process of financial and trade liberalization, together with a considerably reduction in public and private savings. Public spending increased substantially because of the constitutional reform of 1991, which introduced large social programs and higher expenditure by regional and municipal governments. As a result, the public deficit deteriorated from near balance in 1992 to around 4 percent in 1998. At the same time, the combination of the financial deregulation process and favorable external financing conditions triggered large capital inflows that were intermediated by the domestic financial system, which contributed to the decline in private savings from 14.1 percent of GDP in 1990 to 8.7 percent of GDP in 1998. Thus, the current account worsened from a 2 percent surplus in 1992 to a 6 percent deficit in 1998, giving rise to a large credit expansion that fueled a boom in asset prices (particularly in the real estate sector). Bank credit as a share of GDP doubled between 1991 and 1997, making the financial system vulnerable due to weak regulatory and supervisory systems.



Between 1997 and 1999, growing concerns about the sustainability of these macroeconomic imbalances together with a reversal in capital flows due to the Asian crisis resulted in speculative attacks on the domestic currency. The authorities responded by depreciating the exchange rate band and tightening monetary policy. The monetary policy tightening and the reversal in capital flows affected the financial system through a reduction in liquidity and a subsequent increase in the cost of funds. Moreover, in 1993 the indexation of mortgage loan rates switched from the UPAC (an inflation index) to a market interest rate (the 90-day deposit rate). Thus, the rise in real interest rates, coupled with the fall in house prices, affected the financial burden of households, thereby leading to higher NPLs and worse solvency ratios of intermediaries. In the end, output fell by more than 4 percent in 1999, and real estate prices contracted by nearly 27 percent in real terms.