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MORTGAGE INTEREST RATES, COUNTRY RISK AND MATURITY MATCHING IN COLOMBIA

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January 2008

Abstract

In this paper, we examine the determinants of mortgage loans interest rates in Colombia during the period January 2002 - June 2006. We find that the main macroeconomic determinant is public debt interest rates. At the micro level, we find that credit risk is the main determinant. We demonstrate and analyze the tight relationship between country risk and mortgage debt interest rates. This relationship has been growing over time, as banks have increased their share of long-term liabilities in an effort to reduce the maturity mismatch that characterized their balance sheets prior to the 1998-99 financial crisis. Nevertheless, the reduction in the maturity mismatch has left mortgage rates more exposed to country risk variations.

Keywords: Country Risk, interest rates, mortgage debt, credit risk
JEL Classification Codes: G12, G15, G18, G21 and G32.

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TASAS DE INTERÉS HIPOTECARIAS, RIESGO PAÍS Y CALCE DE MADURACIÓN EN COLOMBIA

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Enero de 2008

Resumen

En este artículo, investigamos los determinantes de las tasas de interés hipotecarias en Colombia para el periodo enero de 2002 a junio de 2006. Encontramos que el principal determinante a nivel macroeconómico es la tasa de interés de la deuda pública. A nivel micro, el riesgo crediticio es el principal determinante de las tasas hipotecarias. En el artículo mostramos y analizamos a profundidad el estrecho vínculo entre el riesgo país y las tasas hipotecarias. Esta relación ha venido creciendo a medida que los bancos han incrementado sus captaciones a largo en plazo, en un esfuerzo por reducir el descalce de plazos entre captaciones y colocaciones que caracterizó los balances de los bancos durante la crisis de 1998-99. Sin embargo, la reducción en los descalces de maduración ha dejado a las tasas hipotecarias más expuestas a variaciones en el riesgo país.

Palabras clave: Riesgo país, tasa de interés, deuda hipotecaria, riesgo crediticio
Clasificación JEL: G12, G15, G18, G21 and G32.

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1. INTRODUCTION

As many other emerging market economies, Colombia was hit by a strong financial crisis in the late 1990s. The country faced a strong credit contraction, particularly noticeable and prolonged in the mortgage market. The stock of mortgage credit fell 70% in real terms between December 1998 and December 2005. Mortgage credit only started to recover 7 years after the crisis hit. This recovery was accompanied by a sharp decrease in mortgage interest rates. Figure 1 shows the evolution of the average interest rate of mortgage loans and the twelve month real growth rate of mortgages since May 2002. The strong recovery of credit took place in the midst of a reduction of interest rates of over 400 basis points.

Many analysts have argued that the mortgage market crisis was closely related to the characteristics of the mortgage loan contracts prevailing in Colombia during the 1990s. Mortgage loans were issued mostly at floating or variable rates. In the late 1990s, a hike in the real interest rates in emerging economies greatly increased the cost of mortgage credits relative to family incomes. As a consequence—particularly in light of the rulings of the high courts which encouraged lenders not to pay—nonperforming mortgage loans reached nearly 25% of total mortgage loans.[1] The crisis was worsened by the fact that most mortgage loans had been funded with short-term deposits. The banking system faced a run on deposits, and those banks with a high concentration of long-term mortgages faced severe liquidity problems.

In order to avoid a repetition of these events in the future, in 1999, the Congress enacted law 564, known as the Housing Law. This law stated that mortgage loans had to be either fixed or inflation indexed. Moreover, it stated that financial institutions providing housing loans had to limit the mismatch between the maturity of their mortgage loans and that of their funding, either by issuing long-term bonds, or by securitizing mortgages.

These important changes in legislation may have a far-reaching impact on the way mortgage markets are determined. Aside from the traditional determinants of mortgage rates as noted in the literature[2], one might now expect that, given the reduced mismatch requirement, mortgage interest rates will henceforth be strongly associated with the rates of other long-term economic funding instruments. Both securitized loans and banks' bonds for financing mortgages will

[1] A discussion of the Colombian mortgage market crises can be found in ICAV (2006) and IADB (2005).
[2] Discussions of this matter with respect to industrialized countries can be found in McGibany and Nourzad (2004), Feldman (2002), and Nothaft and Perry (2002), among others.

compete for long-term funding; this in an economy where the long-term funding market was mostly absorbed by government debt.

Of course, one would expect that mortgage interest rates reflect many other underlying factors. On the one hand, interest rates must incorporate crucial elements of the market's microstructure, among them, competition in the mortgage loans markets as well as the financial conditions of banks and borrowers. On the other hand, it also reflects macroeconomic pressures, namely those related to the overall cost of funds and the economy's risk exposure.

The purpose of this paper is to understand the role of each of these components as determinants of mortgage loan interest rates. For this purpose, we have constructed a novel dataset consisting of mortgage interest rate data, bank-level and market characteristics, and country-wide characteristics. We test the strength of the links between mortgage interest rates and public debt interest rates in two ways: first, in the context of a time series exercise, wherein we find evidence of the cointegration of mortgage rates and long-term government debt rates; and second, in the context of a panel data exercise, using bank-level information, and controlling for bank and mortgage loan markets characteristics, and country-wide characteristics.

Previewing our results, we find that mortgage rates are strongly determined by government debt rates, the business cycle, and by bank-specific credit risk measures. We show that the link between mortgage loan interest rates and government debt rates grows stronger as banks increase the share of long-term funding on their balance sheets. This finding raises interesting questions, both for banks and regulators. The good news is that, inasmuch as banks have increased their long-term funding, they have reduced the maturity mismatch that proved so fatal during the 1998-99 crisis. The bad news is that mortgage rates now follow more closely long-term government bond rates; that is, mortgage rates are more exposed to country risks, which are difficult to hedge. We explore this trade-off in depth throughout the paper.

The rest of the paper is organized as follows. Section 2 presents a detailed description of the international literature, with an emphasis on the determinants of mortgage loan interest rates as have been examined in other countries. In section 3, the characteristics of the Colombian market are described. The main trends evident in the data and the institutional peculiarities of the Colombian mortgage market are reported. A first look at the data suggests several relationships and determinants of mortgage loan interest rates; these are explored in section 4 in depth, both using a time series as well as a panel data approach. Section 5 concludes.

2. A REVIEW OF THE LITERATURE

The economic literature identifies several factors as determinants of mortgage loan interest rates. To summarize the findings from the literature in a coherent manner, we split the factors into three categories—macroeconomic factors, institutional aspects and those related to the market structure.

Macroeconomic factors: There is strong evidence establishing direct links between mortgage loan interest rates and macroeconomic performance. Ramchander, Simpson and Webb (2003), for example, show a significant relationship between economic growth and inflation expectations, and the level of mortgage loans rates in the U.S.; Mitusch and Nautz (1995) show similar evidence for Germany. The authors show how in these countries, long-term rates are particularly sensitive to changes in long-term inflation expectations.

The link between macroeconomic fluctuations and interest rates is particularly important in markets where securitization is frequent, and where mortgage-backed securities compete with other long-term funding options, such as government bonds and other long-term corporate securities (Sa-Aadu, Shilling and Wang (2000)). Competition for long-term funding makes mortgage rates highly sensitive to any type of shocks that affects other long-term markets, such as changes in inflation expectations or possible economic slowdowns.

The evidence in emerging markets is mostly anecdotal. The Argentine crisis documented in IADB (2005) shows that there is an important correlation between the evolution of country risk and mortgage interest rates. The same kind of evidence, as will be shown later, is also relevant in the case of Colombia. Inasmuch as country risk is influenced not only by idiosyncratic factors that can potentially be affected by internal economic policy, but also by such external factors as financial contagion or changes in international financial markets conditions, this leads to some interesting policy dilemmas discussed along the paper.[3]

Institutional factors: International evidence suggests that institutional factors are also important determinants of interest rates. The role of certain kinds of public and semi-public institutions that support the operation of mortgage markets has been widely studied. Feldman (2002), Nothaft and Freund (2003), and Passmore, Sherlund and Burgess (2005) have shown how diverse public programs in the U.S.—inclusive of tax stimuli and the strengthening of organizations that support securitization—have contributed to reducing the cost of long-term financing.

[3] See Calvo, Izquierdo and Talvi (2004).

Additionally, Heuson, Passmore and Sparks (2001) have shown how the development of a credit information infrastructure and the development of credit scoring technologies have had a remarkable impact on financing costs.

The impact of securitizations on mortgage loan interest rates has also received attention, particularly in the U.S., where this market has developed dramatically over the past 25 years. Kolari, Fraser and Anari (1998) show that there is an inverse long-term relationship between mortgage loan interest rates and the breadth of securitizations. According to them, a 10% increase in securitizations (as a percentage of mortgage debt) reduces interest rates by 20 basis points. The explanation given for this phenomenon is that interest rates implicitly reflect the liquidity risk faced by lenders. A greater exposure to liquidity risk, via the greater short-term leverage of long-term loans, is translated into higher interest rates. Securitization reduces the maturity mismatch of assets and liabilities, reduces liquidity risk, and hence helps to diminish mortgage interest rates.[4]

Research has also emphasized the link between protecting creditors' rights and the cost of credit. Laeven and Majnoni (2005) and IADB (2001, 2005) provide empirical evidence regarding the tight correlation between these variables. The greater the protection of creditors' rights, the lower the costs associated with potential defaults and the actual default rates; this in turn brings about a reduction in interest rates. Bianco, Japelli and Pagano (2001) demonstrate why this is particularly important for mortgage loan markets. IADB (2005) also documents the importance of greater judicial efficiency in reducing the cost of mortgage loans in six Latin American countries. Cardenas and Badel (2004) analyze this in the case of Colombia, and conclude that judicial inefficiency is particularly harmful for the development and cost of housing finance.

Market Structure: Finally, we find in the literature studies concerning the impact different market structures have on the cost of mortgage loans. Although banking concentration has been associated with less competition, diverse studies have shown that it can also stimulate competition in credit markets. Levy-Yeyati and Micco (2005) provide evidence regarding how concentration has, in some cases led to greater competition, and how this has led to reductions in interest rates in Latin America. Although the study is not exclusively concerned with mortgage

[4] For the economies of emerging markets, the evidence is mostly anecdotal. There is little evidence concerning the impact of securitizations on financing costs. This is probably explained by the fact that developments in this area are very recent. Evidence with respect to the role played by credit information is fragmented. Miller (2003) presents some evidence concerning the impact in Latin America of the development of credit bureaus on the cost of credit, but does not present specific evidence with respect to mortgage loan credit.

loans, it is inclusive of the cost of mortgage loans as a component of interest rate measures. Nothaft and Perry (2002), and Avery, Beeson and Sniderman (1994) have examined similar issues, though focusing exclusively on mortgage loans in the U.S. They reached similar conclusions—higher banking concentration is not associated with higher interest rates.

In Colombia, very little research has been done on the determinants of long-term interest rates. This paper fills this gap by deeply analyzing the determinants of mortgage loan interest rates.

3. STYLIZED FACTS

Following the 1998 crisis and the Housing Law that was enacted as a consequence (law 546 of 1999), financial intermediaries have been required to reduce the maturity mismatch between housing loans and their liabilities, either through a non-intermediated system (securitizing), or by issuing long-term securities in the capital markets.[5] The main objective of this policy has been to reduce the high levels of maturity risk that have characterized the system since the mid-1970s. These law requirements have turned out to be effective. Up through December of 2005, 31% of the housing debt was securitized–a notable achievement considering that securitization on a large scale only started in 2002–and on average, around 10% of the liabilities of financial institutions were long-term. On average, during the latter half of the 1990s, long-term liabilities only constituted 2% of total liabilities. As shown in Figure 2, a significant rise in the share of long-term liabilities of financial institutions' total liabilities has been taking place. Between 2002 and June of 2006, the average share was 9%. By June of 2006 this figure reached 12%.[6]

Figures 3 and 4 document a strong correlation between mortgage interest rates and long-term public debt rates. Figure 3 plots the mortgage interest rates for non-social interest housing mortgages (NON-SIH) [7] as well as several economy-wide interest rates for the period January 2002 through June 2006. More specifically, the interest rates against which the mortgage rate is graphed are those of government bonds (TES) with 7 and 10 year maturities, a short-term rate known as the DTF (the average of the short-term CDs of banking institutions) and the interbank

[5] Law 546 created mechanisms for financing mortgage loans, among them, mortgage bonds and other mortgage backed securities.

[6] The variance among financial institutions is large. During the period noted above, for the institution with the greatest number of long-term liabilities, the percentage of total liabilities that were long term was 20%; for that with the least number, the percentage was was close to 1%.

[7] Law 546 also established a differentiation between two types of housing loans—social interest housing loans and non-social interest housing loans. Social interest housing loans are loans up to 125 times minimum wages (around USD 20,000 as of 2007). The financial conditions of these loans are different from those for the rest; by law, they entail lower interest rates.

rate. We find a very strong relationship between mortgage rates and 10 and 7 year government bonds,[8] and an almost null relationship between the mortgage rates and short-term rates of the economy (the DTF and the interbank rate, respectively). Figure 4 shows similar information, but for social interest housing (SIH) loans. As in the previous Figure, the relationship between mortgage rates and the interest rate of long-term public debt is much stronger than that between mortgage rates and short-term rates.

As the share of long-term finance of total liabilities grows, the maturity risk is reduced, thus easing pressure on interest rates. Nevertheless, at the same time, a term premium is introduced, which partially raises rates. Moreover, Colombian financial institutions issuing long-term debt have to compete with the main player in that field—the government. This introduces an additional premium on long-term mortgage rates—a country-risk premium (inasmuch as the cost of sovereign debt is partly determined by the perception that markets have regarding possible government default). In this sense, issuing long-term liabilities brings new risks and challenges for mortgage financiers, inasmuch as it exposes domestic mortgage rates to shifts in the perception of country risk possibly brought about by exogenous events, such as a financial crisis somewhere else. In the empirical models in section 4, we explore the relationship between government and mortgage rates, and check to see whether this association has grown stronger as banks switch to long-term liabilities in order to reduce the maturity mismatch.

In addition to considering the role played by public debt interest rates in determining mortgage rates, we also explore that played by certain microeconomic determinants. Among these are the role played by credit risk, as both economic theory and the empirical evidence suggest that it is a main variable in explaining interest rates. In connection with this idea, and with an eye toward getting a first look at the evidence from Colombia, Figure 5 depicts scatter plots between mortgage interest rates (both SIH and NON-SIH) and a measurement of credit risk. We use an *ex post* measure of credit risk—the fraction of the mortgage debt that is classified as type "A" debt (loans with no repayment problems). A visual inspection of the data suggests a very strong correlation between the percentage of "type A" mortgage debt and the average level of mortgage interest rates. In the following section, we explore more formally the importance of these and other factors in the determination of mortgage loan interest rates.

[8] Details on the construction of public debt interest rates can be found in Appendix 1.

4. THE EMPIRICAL EVIDENCE

We explore in detail the link between mortgage interest rates and the determinants discussed in the previous sections or suggested in the relevant literature. The empirical analysis is divided into two parts. First we study the association between mortgage rates and economy-wide interest rates using time series cointegration techniques and aggregate series. Later, we use panel data methods and a bank level dataset to explore the role of economy-wide interest rates as well as other relevant factors in determining mortgage interest rates.

4.1. Cointegration Analysis

The main goal of this section is to establish whether there exists a long term relationship between mortgage rates and government debt (TES) interest rates. If this is the case, we then attempt to characterize the relationship. In section 4.1.1., the time series are described and general trends illustrated using graphical tools. In section 4.1.2., we established which series have common long-run trends using cointegration techniques, and deepen the analysis of the time series that have common long-term trends.

4.1.1. The series and their characteristics.

We build a monthly dataset for January of 2002 to May of 2006 for mortgage rates and government bonds.[9] For the treasury securities (TES), we construct five monthly average rates for bonds with two-, three-, five-, seven-, and ten-year maturities, using information provided by the Ministry of Finance. For mortgage rates, we construct two different rates—NON-SIH mortgage rates and SIH mortgage rates. Appendix 1 reports the details on the construction of these series.

Figure 6 reports the behavior of the different time series for the period 2002:1 - 2006:4. In addition to mortgages and TES rates, we report short-term rates (the DTF rate, the interbank rate, and a REPO rate) and the EMBI spread. Several general trends are evident in the Figure. On the one hand, the TES rates follow a decreasing trend, very similar to the one from the EMBI. It is interesting to note that this coincidence does not only occur in the case of the Colombian EMBI (which would be tautological), but also for the average EMBI Plus, suggesting that external factors are of great importance in determining domestic government bond rates.

[9] Our sample is restricted so as to start in January of 2002, based on the availability of time series of government bond rates.

On the other hand, the mortgage rates also show a decreasing trend, similar to the one found with government bonds. As mentioned previously, the correlation between short-term rates (the DTF rate, the interbank rate, and the REPO rate) and the mortgage and TES rates is much weaker. This is hardly surprising, given the long-term nature of the mortgage market.

Figures 7 and 8 show a set of scatter plots that allow us to see in a more precise way the correlations between the different variables included in Figure 6. A glance at Figures 7 and 8 suggests at least two main findings. First, and as expected, the different government bond rates have very similar trends; moreover, there is a very close link between government bond rates and external factors. Second, the correlation between mortgage rates and long-term government debt rates is much stronger than that between mortgage rates and short-term government debt rates. This is explored in detail below.

4.1.2. Mortgage rates and government debt rates—a long-term relationship?

Here, we formally test whether there exists a long-term relationship between mortgage interest rates and government bond rates. To do this, we use cointegration techniques. In what follows, we report the regression results of a series of bivariate models—for each mortgage rate against each TES rate—and establish whether they are cointegrated, that is, whether there exists a long-term relationship between the two. In particular, we look at the two mortgage rates (the SIH and NON-SIH) and test for each of them its potential long-term relationship with the five government bond rates (TES 2, TES 3, TES 5, TES 7 and TES 10). Altogether then, we estimate 10 equations of the form:

$$Y_t = \beta_0 + \alpha X_t + \varepsilon_t ,$$

where Y is the mortgage rate and X the government bond rate. If Y and X are non-stationary and cointegrated, the residuals of this regression, ε_t, must be stationary. In Appendix 2, we show that all the time series (Y and X) have unit roots—that is, all of the series involved in the tests in this section are, in fact, I(1). In Tables 1 and 2, we then test whether each mortgage rate is cointegrated with government bond rates.

Two main conclusions can be drawn from Tables 1 and 2. The first is that short- and medium-term government bond rates (2-, 3-, 5-, and 7-year bond rates) are not cointegrated with the mortgage rates. This result is not surprising given the long-term nature of mortgage markets and the law requiring that financial institutions match the maturity of assets and liabilities. The second conclusion is that mortgage rates are cointegrated with government bond long-term rates

(that is, 10-year bond rates). This result holds for both NON-SIH and SIH rates. This it is an interesting finding, and it goes in the anticipated direction.

What kind a coeffcient (α) links mortgage rates and long-term (10 yr) government bond rate? Table 3 reports this information and the respective standard errors.[10] The coefficients that link the SIH and NON-SIH rates with the TES rates are slightly below ½. In other words, a one point increase in the rate of a long-term government bond is associated with a nearly half a point increase in the mortgage rates over the long run. The standard errors indicate that these effects are highly statistically significant. Moreover, the SIH coefficient is smaller, a fact consistent with current regulations forcing banks to assign lower rates to SIH mortgages.

In the following subsection, we take advantage of the available microeconomic information to further investigate the determinants of mortgage rates. This strategy allows us to explore additional factors, to control for particular features of each banking organization, and to analyze specific aspects left aside by the cointegration analysis. Moreover, we are able to verify if the relationship between government bond rates and mortgage rates holds once we include several additional controls and make use of the microeconomic data.

4.2 Panel Data Evidence

The main conclusion of the cointegration analysis is that there there exist long-run relationships between treasury securities rates (in particular, 10 yr bond rates) and mortgage rates. In this section the same analytical line is followed though we include a relevant refinement—that is, we account for the role of microeconomic factors in studying the determinants of mortgage interest rates. We analyze the link between mortgage rates and economy-wide interest rates (government bond rates, DTF rates, interbank rates, etc.), other macroeconomic determinants such as economic activity (in line with the works of Ramchander, Simpson and Webb (2003), and of Mitusch and Nautz (1995)), and market and bank specific characteristics.

In order to test if market concentration has an impact on the level of interest rates, and in line with the works of Levy-Yeyati and Micco and others that have analyzed similar features, we construct a Herfindahl-Hirschman index for the mortgage loans market (HHI).[11]

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[10] The coefficients reported were estimated using dynamic least squares (DLS); the standard errors are corrected to solve serial correlation problems.

[11] The HHI Index is an index commonly used to measure the concentration of markets. The index is the sum of the participation of each institution in the market. In this case, participation is the percentage of the stock of mortgage loans granted by each bank with respect to all mortgage loans in the financial system. If a single bank were to have

Additionally, the role of microeconomic—that is bank-level—factors is estimated. Bank specific credit risks of mortgages, assets diversification, and the cost of capital induced by prudential regulation are controlled for in all specifications.

Credit risk should play a central role in determining the cost of credit. As credit risk increases, interest rates adjust to incorporate the expected loss associated with it. Ideally, we would like to use an *ex-ante* measure of credit risk. Unfortunately, the only measures of credit risk available are *ex-post* figures. Our information comes from banks' balance sheets as reported to bank supervisors. Given the source, the only derivable measure of credit risk is based on non-performing loans. This is because the risk classification defined by regulators is based on the ex-post, rather than the ex-ante features of debtors. For our estimations, we classify any debt that does not fall under the top classification ("A") as risky.[12]

Another bank specific characteristic which we control for is the extent to which the intermediary is diversified. More diversified intermediaries could charge lower interest rates on their mortgage loans, inasmuch as they are able to spread risks across other assets. For example, if there is a greater concentration of loans in a safer type of loan (high-tier corporate credit) this could contribute to a smaller general level of credit risk for the intermediary; this in turn would result in a lower level of interest rates. We would expect the opposite if there are high concentrations in riskier tiers such as consumer credit.

Finally, at the micro-level, we also include the ratio of capital to assets as a control. Banks with greater capital requirements face higher opportunity costs on capital; this may translate to higher lending rates.

All of the estimations include bank-fixed effects. These should capture any particular time-invariant characteristic of the financial institution that could affect the cost of credit—for example, the institution's property structure or some long-term factor associated with the institution's internal organization and operational costs.

Formally, we estimate the following regression:

$$i_{j,t}^{mortgage} = \beta_1 i_{t_t}^{econ} + \beta_2 g_t + \beta_3 HHI_t + \beta_4 Risk_{j,t} + \beta_5 Sh.Consumer_{j,t} + \beta_6 Sh.Corporate_{j,t} + \beta_7 K/A + \mu_j + \varepsilon_{j,t},$$

an absolute monopoly over the market, the index would have a value of 10,000. Were there to exist a perfect competition, with an infinite number of agents, each one only participating a little, the index would tend toward zero. For any other type of market structure, the index value falls between these two extreme cases.

[12] In other exercises, we only used the percentage from the C, D and E classifications. The results are similar to the ones reported in the text.

where $i_{j,t}^{mortgage}$ is the interest rate that intermediary *j* charges on NON-SIH loans and SIH loans at time *t*; i^{econ} is some interest rate of the economy at time *t*; *g* is the growth rate of the industrial production index (our measure of economic activity); HHI is the industry's concentration index; *Risk* is the fraction of mortgage debt different from "A" debt for each intermediary *j* at every moment *t*; *Sh.Consumer* and *Sh.Corporate* are the shares of consumer and corporate debt of the total loans of each intermediary *j* at every moment *t* respectively, *K/A* is the rate of capital to assets of each intermediary at every moment in time, and μ is the bank-fixed effect.

For our estimations, we use monthly data from January of 2002 to June of 2006. The sample is restricted by the availability of data concerning the public debt interest rate. In our estimations, the standard errors are clustered, since many of the variables included do not vary at the bank level. Clustering the standard errors corrects for the downward bias in the estimation of the standard errors of the coefficients.

Table 4 shows the results of the estimations using the interest rate on non-social interest housing loans (NON-SIH) as a dependent variable. Each column reports a specification with a different economy-wide interest rate as an independent variable.

The results of the estimations are easy to interpret. The economy-wide interest rates that have a statistically significant impact on NON-SIH mortgage interest rates are exclusively the long-term interest rates of public debt. Columns 1, 2 and 3 show that the estimated coefficients for the 10-, 7-, and 5-years government bond interest rates are statistically significant. The rest of the interest rates—in particular, the rate for shorter-term government debt, the DTF rate, and the interbank rate—are not significantly different from zero.[13]

These coefficients are not only statistically significant, but also economically relevant. The size of the coefficients reflects the importance of long-term government debt on mortgage rates. If we take as a reference the average values of the independent variables during the period of estimation (see Appendix 3), we find that, on average, long-term public debt rates explain between 6 to 8 points of the NON-SIH mortgage rates. According to these estimations, a 1 point (100 bps) increase in the interest rate of public debt leads to a 50 to 60 basis points increase in

[13] It is important to take into account, that this result may be only applicable to the period of estimation. This was a period of strong economic performance. It is feasible that short-term rates do not capture the probabilities of financial difficulties experienced by the economy during the slowdown phase. These results could change for other periods; nevertheless, the lack of available information does not allow us to test this.

the NON-SIH mortgage interest rates. This is consistent with the findings of the cointegration exercises.[14]

With respect to other economy-wide controls, our estimations suggest that industrial production growth is also a relevant determinant of mortgage rates. During periods of growth, interest rates tend to fall; the opposite happens during recessions. We did not find any significant evidence to suggest that market concentration has had any relevant impact on the level of interest rates.

At the bank level we find that credit risk is the main determinant of interest rates. In all the specifications, credit risk is both positive and significant. Again, the impact is both statistically significant and economically relevant. According to our estimations, during our sample period, credit risk explains around 250 bps of the NON-SIH mortgage interest rates on average.

Although the signs of the coefficients estimated for the rest of bank level determinants are the expected ones, they are not consistently significant throughout the specifications. Thus, it is necessary to be cautious in interpreting them. We do not find any evidence that greater levels of capital relative to assets ratios has an effect on interest rates. Nevertheless, we find some evidence that the risks between different types of credits are shared in a partial way. For example, columns 1 and 2 suggest that banks with a greater exposition relative to consumer loans transfer part of this risk to mortgage loans in the form of higher mortgage interest rates.

Table 5 shows similar results for the SIH mortgages. The results are qualitatively similar to the ones found in the previous table. Again, we find that there exists an important relationship between long-term government bond interest rates, credit risk and mortgage interest rates.

Quantitatively, however, for the SIH loan interest rates, we find a smaller response to long-term government bond rates. The size of this effect is again consistent with the results of the cointegration analysis, where the relationship between SIH rates and government bond rates was found to be weaker than that between NON-SIH rates and government bond rates. In these exercises, the sensitivity of NON-SIH rates to an increase of 100 bps on the government bond rate is close to 50-60 bps, while that for SIH rates is only 35 bps. Our conjecture is that this must be due to the legal restrictions that exist with respect to SIH loan rates; these establish a lower ceiling for this type of loan.[15]

[14] Although the cointegration evidence suggests slightly smaller point estimators, if we consider the confidence intervals suggested by the standard errors reported, the differences are not statistically relevant.

[15] See ICAV (2006) for discussion.

During the sample period, and taking as reference the averages between 2002 and 2006, we find that the public debt rates explain from 4 to 5 points of the SIH loan rate. We also find a smaller response in the public debt rates to changes in economic activity. Again, this could be due to the fact that SIH rates are much more regulated than NON-SIH rates.

With respect to bank-level determinants, we again find that the main determinant is credit risk. Throughout the specifications, the estimated coefficients are again consistently statistically significant. As with the previous results we find that credit risk explains roughly 2.5 points of the interest rate of SIH loans.

Two reasons explain the close correlation between government debt rates and mortgage rates. One of them is due to securitization. Securitized loans need to compete with long-term government bonds; hence shifts in government bond valuation should have on impact on the rate of return of securitized loans. The other reason is that non-securitized loans are financed by long-term liabilities that are competing with government bonds for long-term resources. As mentioned in the section dealing with stylized facts, the share of long-term liabilities relative to total bank liabilities has recently been on the rise. This rise in long-term liabilities might be the driving force behind the noted correlation. Although the average share of long-term liabilities of total liabilities exceeds 10%, for some banks it is closer to 20%, whereas for others, it does not surpass 5%. This variability should be reflected in the way long-term government bond rates affect mortgage rates. Banks with a greater share of long-term liabilities relative to total liabilities should be more sensitive to changes in long-term government bond rates. Banks that fund their long-term loans with short-term deposits should be less sensitive to fluctuations in long-term rates, but should also charge higher interest rates to compensate for maturity risk.

In order to test this, we estimate an additional empirical specification, one which allows for a differential impact of long-term government bond rates, depending on the structure of the liabilities of each bank. Formally, we estimate the following regression:

$$i_{j,t}^{mortgage} = \beta_1 i_{t_t}^{econ} + \beta_2 g_t + \beta_3 HHI_t + \beta_4 Share\ LTLiab_{j,t} + \beta_5 Risk_{j,t} + \beta_6 Sh.Consumer_{j,t} + \beta_7 Sh.Corporate_{j,t} + \beta_8 K/A + \beta_9 i_t^{econ} * Share\,LTLiab_{j,t} + \mu_j + \varepsilon_{j,t}$$

This specification includes two additional components over the previous one—*ShareLTLiab,* the percentage of long-term liabilities with respect to total liabilities for each bank at every moment in time, and i^{econ}**ShareLTLiab,* the interaction between the share of long-term liabilities and the

government bond interest rate. The sum of β_1 and β_9 multiplied by the share of long-term liabilities captures the impact of long-term government rates on mortgage loan interest rates. The impact now depends on each bank's share of long-term liabilities relative to total liabilities. The results are reported in Table 6. The first three columns report the results for NON-SIH loan rates; the last three, the results for the SIH loan rate.

The results reported in Table 6 confirm the hypothesis that the impact of long-term government bond rates depends on a bank's share of long-term liabilities relative to total liabilities. For both SIH loans and NON-SIH loans, the interaction between government bond interest rates and a bank's long-term liabilities share of total liabilities is statistically significant. Again, the impact is not just statistically significant but also economically relevant. For example, columns 1 and 4 suggest that for a bank with an average share of long term liabilities relative to total liabilities (8.5%), the 10-year government bond rate explains nearly 4 points of NON-SIH loan rate and 3.5 of the SIH loan rate. For a bank with the maximum share of long-term liabilities relative to total liablities (18.5%), the 10-year government bond rate explains nearly 7.8 and 7.1 points of NON-SIH and SIH rates, respectively.

In other words, for a bank with an average share of long-term liabilities relative to total liabilities, a 100 bps increase on the 10-year government bond rate represented an increase of nearly 50 bps in the NON-SIH loan rate. For a bank with the highest share of long-term liabilities relative to total liabilities, the same 100 bps increase represented a rise of 80 bps in the NON-SIH rate. The same calculation for SIH loans gives us a rise of 33 and 62 bps, respectively.

5. CONCLUSIONS

Both the cointegration analysis as well as the microeconometric results corroborate our hypothesis that there exists a very close relationship between long-term public debt rates and mortgage interest rates. The exercises utilizing the micro data show that the strength of this relationship grows with the weight of long-term liabilities—that is, the greater the share, the greater the competition with the government for long-term resources, and thus, the higher the sensitivity of mortgage loan rates to changes in government debt interest rates. The Housing Law encouraged banks to increase their long-term funding, a measure designed to reduce the risk associated with maturity mismatches. As a result, banks increased their long-term liabilities, with

the result that mortgage interest rates have become more closely related to long-term government debt instruments.

The downside is that mortgage interest rates are now more vulnerable to country risk, as captured, for instance, by the EMBI spread. In other words, if banks increase their share of long-term liabilities, they must pay not only a term premium but also a country risk premium. Unfortunately, hedging this risk is complicated, inasmuch as it is not domestically diversifiable. It is possible nevertheless to adopt schemes in order to protect countries with healthy fundamentals from crises occurring in other emerging market economies. For instance, Calvo (2002, 2005) proposed the creation of an Emerging Markets Fund (EMF) that would inject liquidity into non-crises countries during an episode of international financial turmoil. This would constitute an alternative to smooth credit market fluctuations when a country is exposed to international financial shocks. A fund of this nature, for example, could have contributed to a lessening of the negative effects observed in countries like Colombia in 1998, during the Russian crisis. An alternative hedging mechanism was proposed by Caballero and Pangeas (2004). They construct a simple quantitative hedging model, whereby Central Banks could use options and futures on the S&P100's implied volatility index (VIX), thus increasing the expected reserves available during sudden stops by as much as 40 percent. The advantage of this mechanism, compared to Calvo's proposal, is that countries could adopt such a strategy unilaterally over the very short run.

Of course, banks could act on their own by diminishing the sensitivity of mortgage rates to long-term government bond rates through a reduction in the volume of long-term liabilities. Such a course of action, however, could lead to rises in mortgage rates, on account of the associated increase in the maturity mismatch risk.

In summary, the *trade off* between the risks associated with the transformation of short-term liabilities into long-term assets, and country and term risks are evident. Law 546 is designed to reduce the first; nevertheless, this leads to a stronger transfer to the second type of risk. Legislators had anticipated that eliminating the maturity risk would lead to less expensive mortgage rates. We show that this is not necessarily the case, and that in fact new challenges emerged for banks and policymakers.

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Appendix 1

(i) The Construction of Government Bond Interest Rates

The primary source for the government bond rates is the "Summary of Monthly Closing" report of the Sistema Electrónico de Negociación (SEN) elaborated by the Central Bank. The data has a daily frequency and has been available since January 2002. It includes five types of bonds: fixed rate, variable rate, inflation indexed (UVR), short-term and denominated in dollars. As the relevant rate for each bond, we use the one resulting from each day's first trading session. This session has the greatest liquidity and it is where market makers fix prices. We separate the bonds on the basis of their maturities into seven categories: one, two, three, four, five, seven, and ten or more years till maturity. Based on daily negotiations, we compute the relative weight of each bond within its category, and compute the weighted average of the interest rate for each category. This gives us a daily weighted average of interest rates for each category. Finally, we compute the monthly average, weighted by the total number of bonds traded daily for each category.

(ii) Mortgage Rates

The mortgage rates were taken from the weekly reports elaborated by the Housing Credit Vicepresidency of the Banking Association of Colombia. These reports present detailed information as provided by banks, and splits loans into two categories on the basis of denomination: local currency (pesos) and as measured by inflation indexed units (UVR). It also splits them into social interest housing (SIH) loans and non-social interest housing (NON-SIH) loans. Weighted averages were constructed by converting UVR loans into their peso equivalents (that is, by adding the lagged rate of inflation) and the volumes of loans for each category granted each month.[16]

[16] The banks included in the sample are: AV Villas, Bancafé, Bancolombia, BBVA, BCH, BCSC, Colmena, Colpatria, Conavi, Davivienda, Granahorrar, and Granbanco.

Appendix 2

ADF Unit Root Tests for Government Bond Rates and Mortgage Rates [17]

Variable	Lags	Accept H0: Series has a unit root
2 Year gov. Bond interest rate	10	Yes**
3 Year gov. Bond interest rate	1	Yes***
5 Year gov. Bond interest rate	1	Yes**
7 Year gov. Bond interest rate	2	Yes**
10 Year gov. Bond interest rate	1	Yes**
SIH Mortgage Interest Rate	1	Yes**
NON-SIH Mortgage Interest Rate	1	Yes**

** Significant at 5% ; *** Significant at 1%

Appendix 3

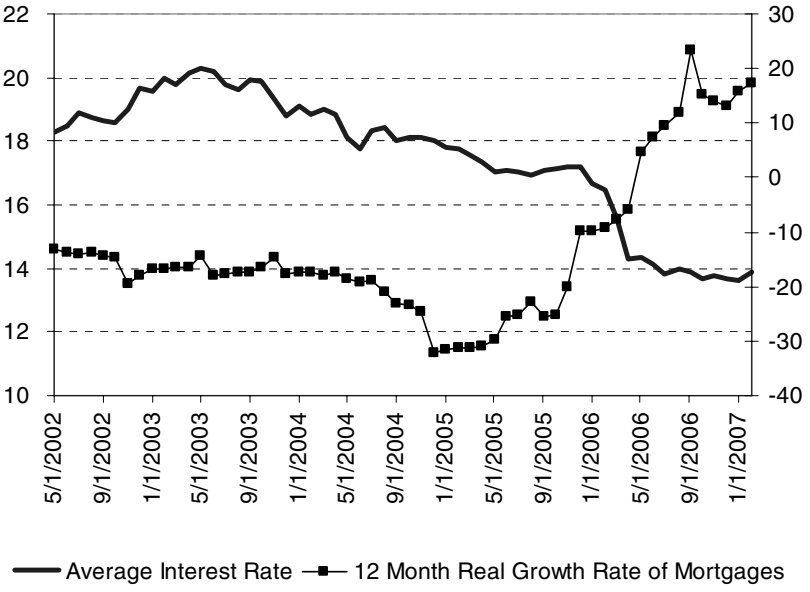
Descriptive Statistics

Variable	Observations	Average	Standard Deviation	Min	Max
Mortgage interest rates					
SIH	302	16.25	1.69	10.33	20.22
NSIH	304	18.03	2.27	11.40	21.77
Macro variables					
10 year government bond interest rates	304	13.05	2.36	7.43	16.33
7 year government bond interest rates	304	11.99	2.93	6.39	16.67
5 year government bond interest rates	304	11.23	2.73	6.37	15.84
4 year government bond interest rates	174	9.60	2.31	6.21	12.97
3 year government bond interest rates	304	9.86	2.37	6.28	14.62
2 year government bond interest rates	304	9.09	1.93	5.55	12.62
1 year government bond interest rates	196	8.68	1.56	5.59	11.54
DTF interest rate	304	7.75	1.06	5.93	11.21
180 days CD interest rates	304	8.36	1.03	6.42	11.62
Interbank rates	304	6.49	0.78	5.11	8.21
Bank level variables:					
Share of long term liabilities (% of total lia	302	8.34	5.54	0.03	18.33
Credit risk (non performing loans/ total loa	304	26.69	9.23	6.13	42.66
Share of consumer loans	304	13.06	9.55	0.86	38.11
Share of corporate loans	304	28.75	12.24	7.21	73.65
Capital/Assets	304	9.62	2.00	5.58	14.05

[17] The sequential method was applied in order to choose the optimal number of lags, beginning with a maximum number of 10 lags.

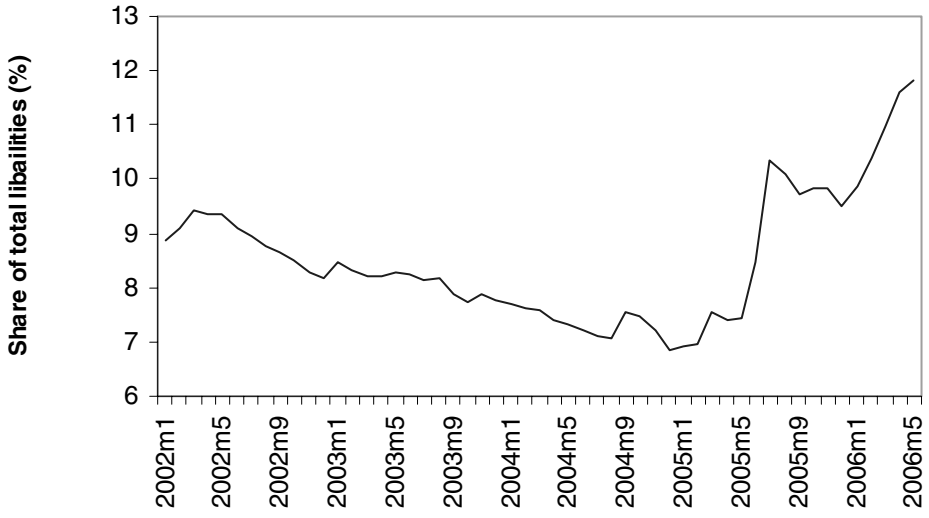
FIGURES

Figure 1: The Average Interest Rate of Mortgage Loans and the 12-Month Real Growth Rate of Mortgage Loans



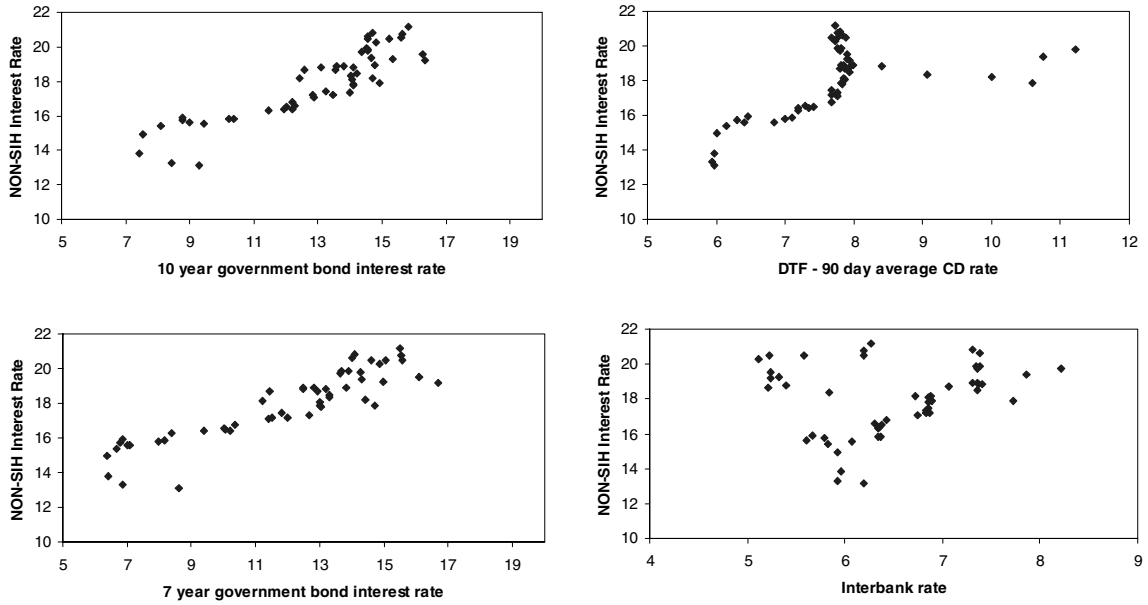
Source: Banking Superintendency

Figure 2: Long-term Liabilities as a Share of the Total Liabilities of Financial Institutions



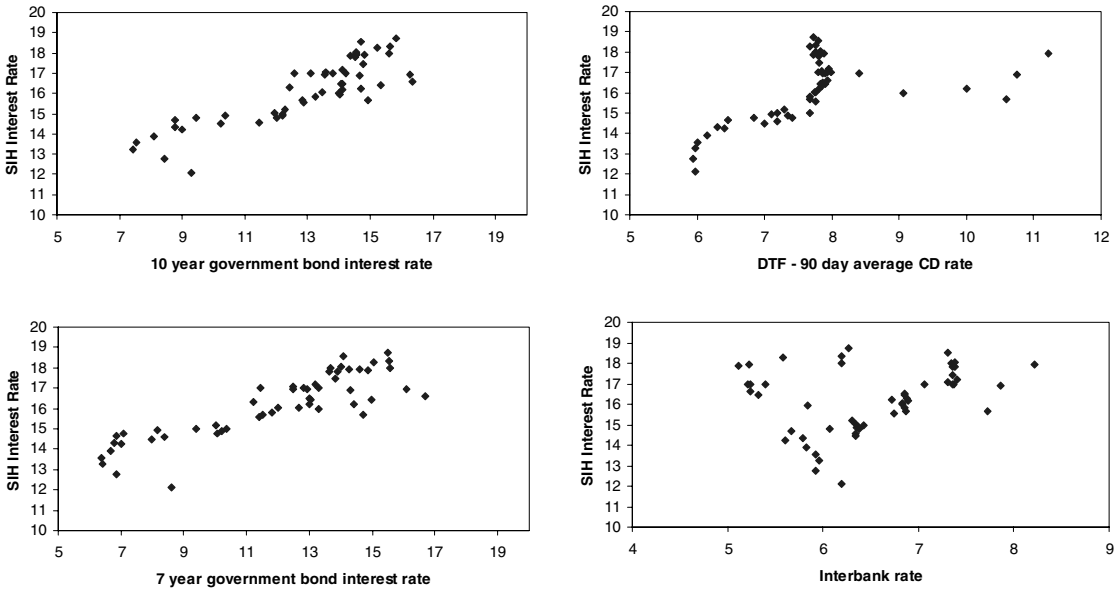
Source: ICAV. Long-term liabilities include: Bonds with maturities greater than 18 months, peso and inflation-indexed CDs with maturities greater than 18 months. Banks included in the sample are: AV Villas, Bancafé, Bancolombia, BCSC, Colmena Colpatria, Conavi, Davivienda, Granahorrar, and Granbanco.

Figure 3: Mortgage Interest Rates for Non-Social Interest Housing Loans and Economy-Wide Interest Rates (January 2002 – June 2006)



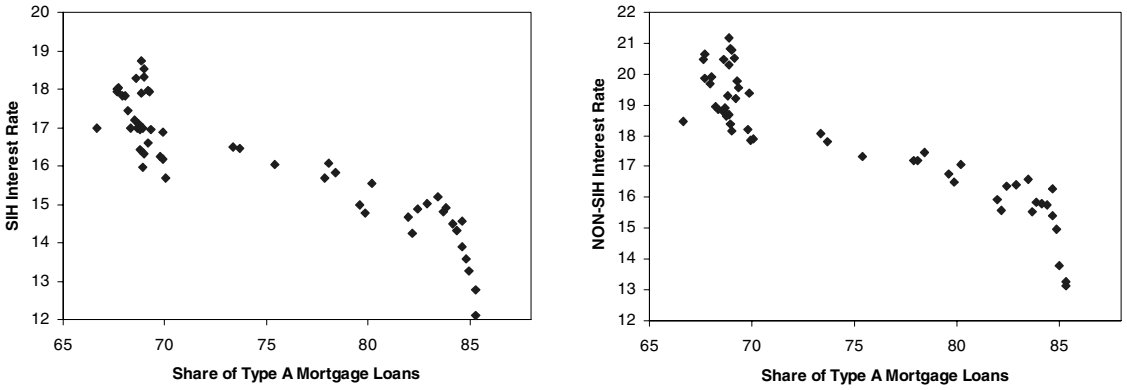
Note: The mortgage interest rates are constructed using bank level information, and are based on the reports of each institution to the Housing Vicepresidency of the Banking Association of Colombia. For each institution, we calculate the simple average of the interest rates charged to individuals on fixed rate loans and inflation indexed (UVR) loans. The rates for the UVR loans are transformed to nominal rates by adding the annual variation of the UVR (which reflects annual CPI inflation). The rate graphed is the average weighed by the loan amounts of each institution of the rates described above. Source: Mortgage interest rates on Non Social Interest Housing Loans: Banking Association. 7- and 10-year government bonds: Banco de la República (see appendix 1). The DTF and the Interbank Rate: Banco de la República. Financial institutions included are: AV Villas, Bancafé, Bancolombia, BCSC, Colmena Colpatria, Conavi, Davivienda, Granahorrar, and Granbanco.

Figure 4: Mortgage Interest Rates for Social Interest Housing Loans and Economy-Wide Interest Rates (January 2002 – June 2006)



Note: The mortgage interest rates are constructed using bank level information, and are based on the reports of each institution to the Housing Vicepresidency of the Banking Association of Colombia. For each institution, we calculate the simple average of the interest rates charged to individuals on fixed rate loans and inflation indexed (UVR) loans. The rates for the UVR loans are transformed to nominal rates by adding the annual variation of the UVR (which reflects annual CPI inflation). The rate graphed is the average weighed by the loan amounts of each institution of the rates described above. Source: Mortgage interest rates on Social Interest Housing Loans: Banking Association. 7- and 10-year government bonds: Banco de la República (see Appendix 1). The DTF and the Interbank Rate: Banco de la República. Financial institutions included are: AV Villas, Bancafé, Bancolombia, BCSC, Colmena Colpatria, Conavi, Davivienda, Granahorrar, and Granbanco.

Figure 5: Mortgage interest rates and Mortgage Loans Classified as "A" as a Share of total Mortgage Loans



Source: Mortgage interest rates: Banking Association. Financial institutions included are: AV Villas, Bancafé, Bancolombia, BCSC, Colmena Colpatria, Conavi, Davivienda, Granahorrar and Granbanco.

Figure 6: Interest rates and EMBI spreads for 2002:1 through 2006:4.

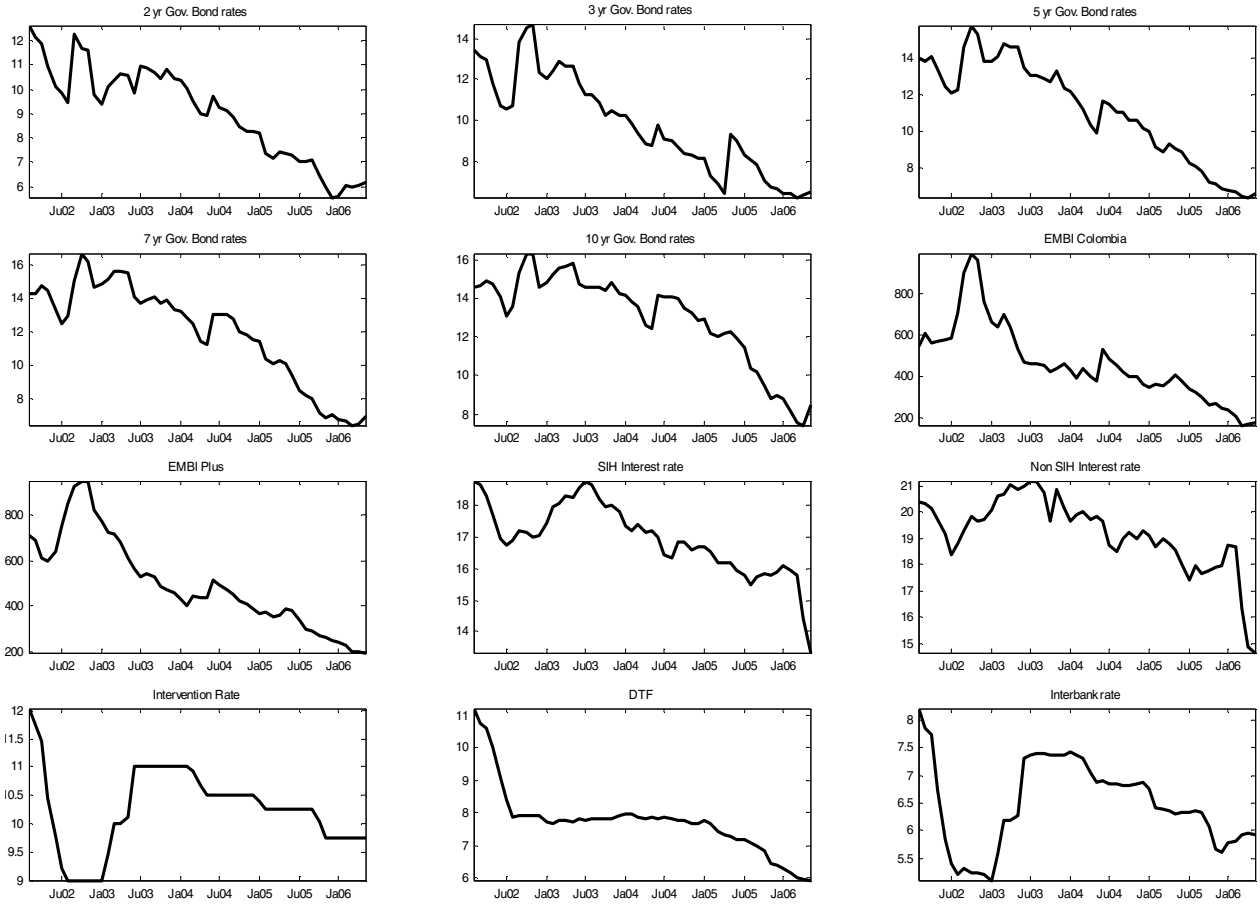


Figure 7. The Correlation between Government Bond Rates and EMBI Spreads

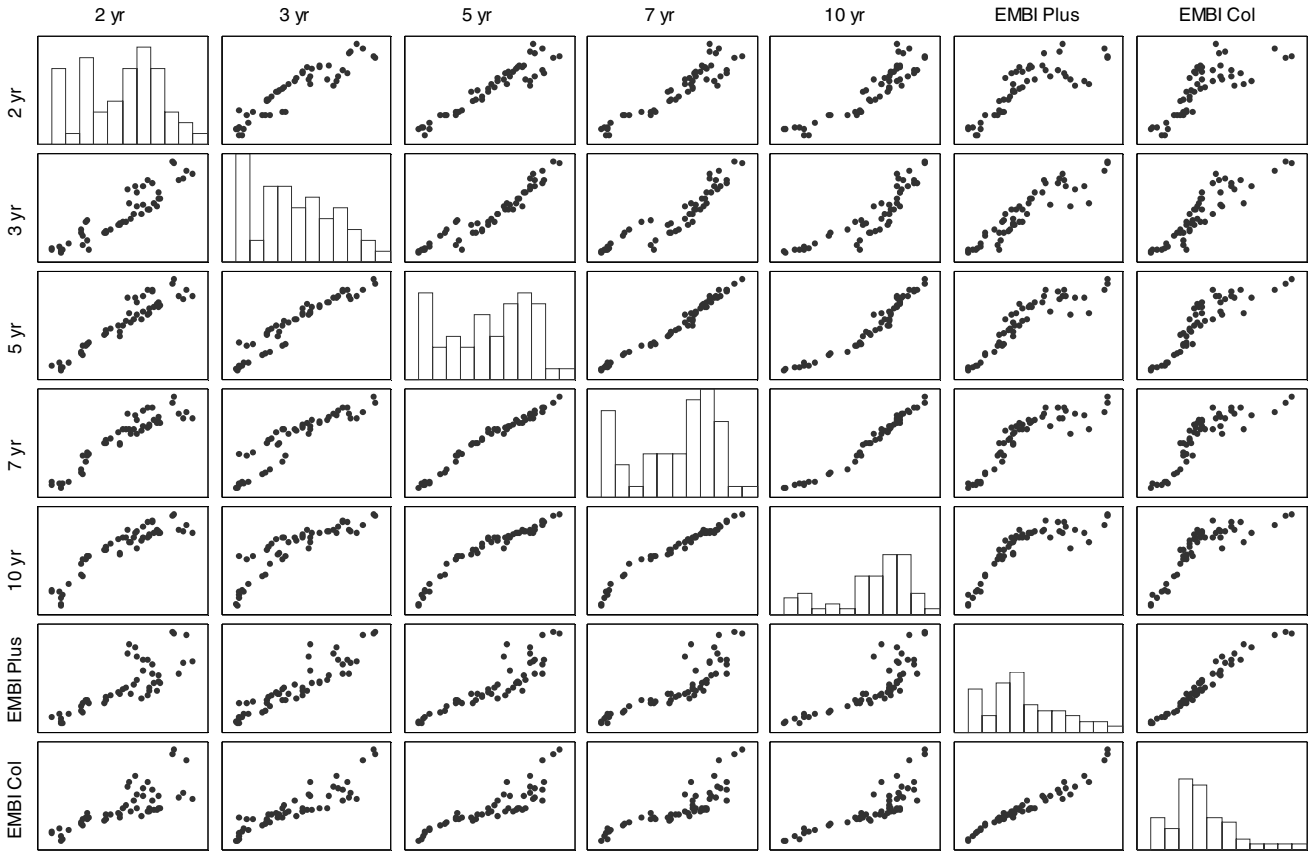
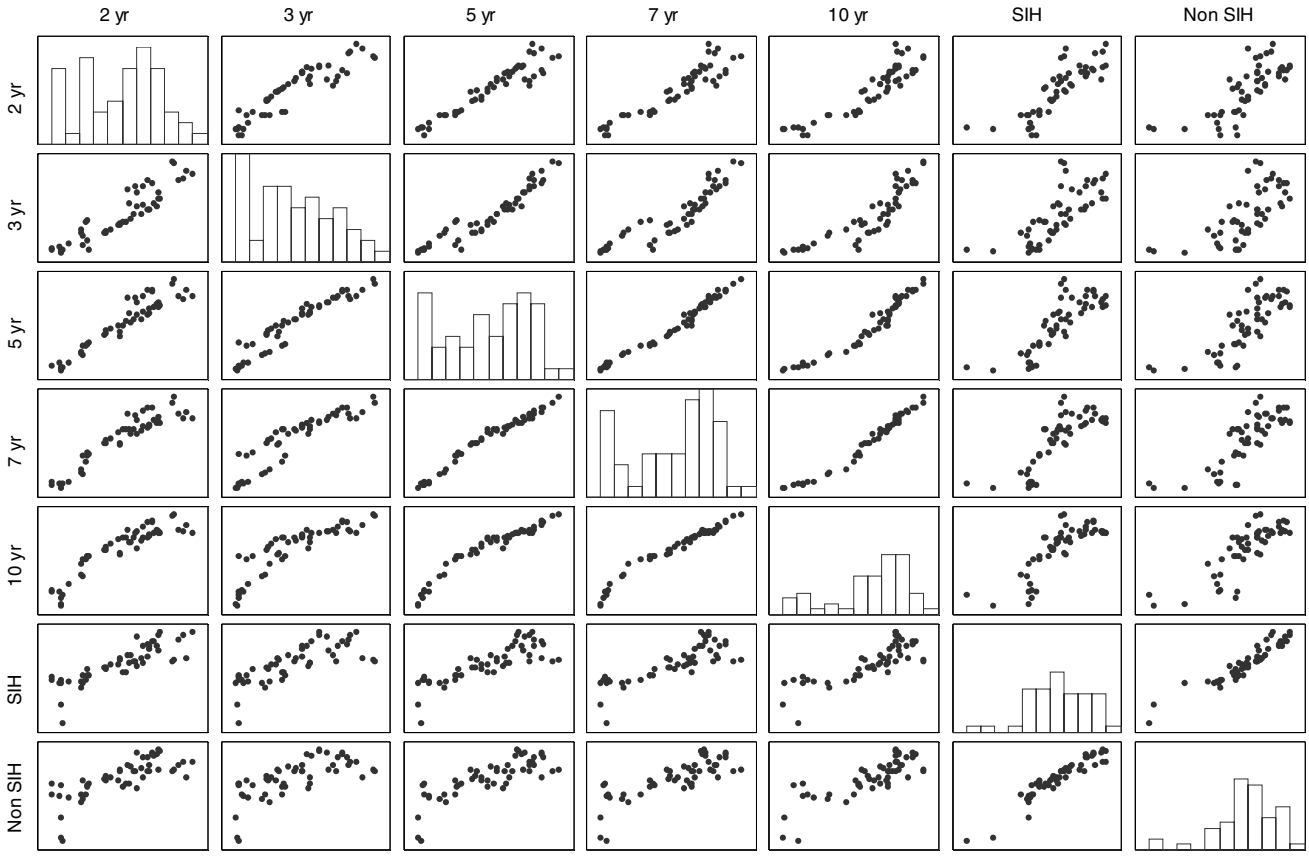


Figure 8. The Correlation between Government Bond Rates and Mortgage Rates



TABLES

Table 1: Cointegration Tests

Dependent Variable: SIH Rate		
Independent Variable	# of lags ADF residuals	Reject H0: No cointegration?
2 Year gov. Bond interest rate	1	No
3 Year gov. Bond interest rate	1	No
5 Year gov. Bond interest rate	1	No
7 Year gov. Bond interest rate	1	No
10 Year gov. Bond interest rate	4	Yes*

* Significant at 10%

Table 2: Cointegration Tests

Dependent Variable: NON-SIH Rate		
Independent Variable	# of lags ADF residuals	Reject H0: No cointegration?
2 Year gov. Bond interest rate	1	No
3 Year gov. Bond interest rate	1	No
5 Year gov. Bond interest rate	1	No
7 Year gov. Bond interest rate	1	No
10 Year gov. Bond interest rate	1	Yes*

* Significant at 10%

Table 3: Cointegration Vectors

	SIH Rate	NON-SIH Rate
10 Year gov. Bond interest rate	0.39	0.48
	[0.14]**	[0.13]***

Standard errors in parenthesis

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Determinants of NON-SIH Mortgage Interest Rates

Dependent Variable: Interest Rate of Non Social Interest Housing Loans										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Macro variables:										
10 year government bond interest rate	0.612									
	[0.085]***									
7 year government bond interest rate		0.507								
		[0.095]***								
5 year government bond interest rate			0.524							
			[0.136]***							
4 year government bond interest rate				0.339						
				[0.182]						
3 year government bond interest rate					0.283					
					[0.120]*					
2 year government bond interest rate						0.133				
						[0.202]				
1 year government bond interest rate							0.204			
							[0.118]			
DTF (Average interest rate of 90 day CDs)								-0.378		
								[0.251]		
Interest rate of 180 days CDs									-0.356	
									[0.259]	
Interbank rate										0.006
										[0.153]
Industrial production (anual growth rate)	-1.703	-1.798	-1.514	-0.867	-1.111	-1.261	-1.792	-1.509	-1.575	-1.251
	[0.519]**	[0.542]**	[0.529]**	[0.461]	[0.532]*	[0.551]*	[0.464]***	[0.572]**	[0.632]**	[0.516]**
HHI (Logarithm)	1.188	2.006	0.961	0.548	-0.389	0.28	-40.173	0.326	0.209	0.223
	[0.900]	[1.043]*	[1.071]	[0.737]	[0.824]	[1.026]	[21.288]	[1.042]	[1.050]	[0.987]
Bank level variables:										
Credit risk (non performing loans/ total loans)	0.094	0.095	0.1	0.021	0.126	0.125	0.124	0.115	0.118	0.13
	[0.031]**	[0.030]**	[0.027]***	[0.029]	[0.025]***	[0.026]***	[0.058]*	[0.026]***	[0.025]***	[0.026]***
Share of consumer loans	0.141	0.119	0.101	-0.061	0.023	-0.004	0.076	-0.071	-0.067	-0.026
	[0.044]**	[0.053]*	[0.058]	[0.039]	[0.047]	[0.041]	[0.049]	[0.042]	[0.041]	[0.043]
Share of corporate loans	-0.102	-0.063	-0.031	-0.089	-0.023	-0.062	-0.062	-0.104	-0.097	-0.072
	[0.063]	[0.060]	[0.054]	[0.067]	[0.060]	[0.077]	[0.086]	[0.077]	[0.077]	[0.069]
Capital/Assets	0.003	0.014	0.027	0.126	-0.018	-0.063	-0.095	-0.071	-0.069	-0.074
	[0.205]	[0.224]	[0.220]	[0.144]	[0.237]	[0.252]	[0.426]	[0.260]	[0.260]	[0.252]
Observations	302	302	302	172	302	302	196	302	302	302
Number of Banks	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
R2	0.68	0.67	0.66	0.68	0.62	0.60	0.58	0.61	0.61	0.60
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Monthly data: 2002:01 - 2006:06									

Clustered standard errors in parenthesis

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Determinants of SIH Mortgage Interest Rates

Dependent Variable: Interest Rate of Social Interest Housing Loans										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Macro variables:										
10 year government bond interest rate	0.38									
	[0.085]***									
7 year government bond interest rate		0.32								
		[0.092]**								
5 year government bond interest rate			0.325							
			[0.111]**							
4 year government bond interest rate				0.347						
				[0.078]***						
3 year government bond interest rate					0.128					
					[0.089]					
2 year government bond interest rate						0.039				
						[0.190]				
1 year government bond interest rate							0.076			
							[0.131]			
DTF (Average interest rate of 90 day CDs)								-0.367		
								[0.196]		
Interest rate of 180 days CDs									-0.354	
									[0.209]	
Interbank rate										0.115
										[0.166]
Industrial production (anual growth rate)	-0.825	-0.888	-0.721	0.058	-0.491	-0.547	-1.108	-0.783	-0.857	-0.612
	[0.575]	[0.587]	[0.607]	[0.648]	[0.663]	[0.637]	[0.411]**	[0.624]	[0.668]	[0.635]
HHI (Logarithm)	0.727	1.251	0.586	1.024	-0.148	0.144	-27.867	0.218	0.106	0.196
	[0.465]	[0.460]**	[0.495]	[0.393]**	[0.427]	[0.475]	[17.321]	[0.475]	[0.478]	[0.445]
Bank level variables:										
Credit risk (non performing loans/ total loans)	0.084	0.084	0.087	0.026	0.104	0.105	0.116	0.092	0.095	0.103
	[0.021]***	[0.021]***	[0.019]***	[0.010]**	[0.019]***	[0.022]***	[0.039]**	[0.012]***	[0.013]***	[0.022]***
Share of consumer loans	0.044	0.031	0.018	-0.022	-0.038	-0.054	-0.013	-0.104	-0.101	-0.056
	[0.035]	[0.035]	[0.034]	[0.030]	[0.028]	[0.041]	[0.056]	[0.044]**	[0.044]*	[0.034]
Share of corporate loans	-0.041	-0.017	0.003	-0.078	-0.001	-0.02	-0.012	-0.051	-0.045	-0.03
	[0.018]*	[0.018]	[0.017]	[0.035]*	[0.018]	[0.020]	[0.038]	[0.016]**	[0.015]**	[0.020]
Capital/Assets	0.178	0.186	0.193	0.274	0.155	0.133	0.32	0.132	0.134	0.129
	[0.136]	[0.135]	[0.135]	[0.120]*	[0.146]	[0.144]	[0.326]	[0.154]	[0.156]	[0.150]
Observations	300	300	300	172	300	300	194	300	300	300
Number of Banks	8	8	8	8	8	8	8	8	8	8
R2	0.63	0.62	0.62	0.73	0.59	0.58	0.56	0.60	0.60	0.58
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Monthly data: 2002:01 - 2006:06									

Clustered standard errors in parenthesis

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Determinants of Mortgage Rates Conditional on the Structure of Liabilities

Dependent Variable:	Interest Rate of NSIH loans			Interest Rate of SIH loans		
	(1)	(2)	(3)	(4)	(5)	(6)
Macro variables:						
10 year government bond interest rate	0.237			0.082		
	[0.111]*			[0.042]*		
7 year government bond interest rate		0.2			0.094	
		[0.109]			[0.032]**	
5 year government bond interest rate			0.183			0.084
			[0.150]			[0.062]
Industrial production (anual growth rate)	-1.606	-1.711	-1.466	-0.703	-0.795	-0.635
	[0.569]**	[0.565]**	[0.551]**	[0.662]	[0.629]	[0.633]
HHI (Logarithm)	0.968	1.68	0.769	0.836	1.365	0.718
	[0.953]	[1.188]	[1.186]	[0.668]	[0.782]	[0.715]
Bank level variables:						
Share of long term liabilities (% of total liabilities)	-0.342	-0.267	-0.321	-0.442	-0.358	-0.394
	[0.118]**	[0.102]**	[0.113]**	[0.054]***	[0.068]***	[0.082]***
Credit risk (non performing loans/ total loans)	0.093	0.091	0.094	0.102	0.1	0.102
	[0.045]*	[0.046]*	[0.045]*	[0.028]***	[0.027]***	[0.025]***
Share of consumer loans	0.083	0.062	0.046	0.023	0.014	0.003
	[0.028]**	[0.039]	[0.051]	[0.032]	[0.026]	[0.028]
Share of corporate loans	-0.067	-0.031	0.006	-0.017	0.007	0.033
	[0.060]	[0.061]	[0.059]	[0.024]	[0.023]	[0.021]
Capital/Assets	-0.03	0.027	0.078	0.185	0.237	0.278
	[0.193]	[0.215]	[0.206]	[0.081]*	[0.087]**	[0.084]**
Interactions						
10 year gov. bond interest rate * Share of long term liabilities	0.031			0.029		
	[0.010]**			[0.004]***		
7 year gov. bond interest rate * Share of long term liabilities		0.028			0.025	
		[0.009]**			[0.004]***	
5 year gov. bond interest rate * Share of long term liabilities			0.035			0.031
			[0.011]**			[0.005]***
Observations	302	302	302	300	300	300
Number of Banks	8	8	8	8	8	8
R2	0.70	0.70	0.71	0.68	0.68	0.69
F test (P-Value)[1]	0.000	0.000	0.000	0.000	0.000	0.000
Bank fixed effects	Si	Si	Si	Si	Si	Si
Sample	Monhly data: 2002:01 - 2006:06					

Clustered standard errors in parenthesis

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: [1] F-test under the null hypothesis that the coefficient on the long term interest rate of government bonds and its interaction with the share of long term liabilities are jointly equal to zero.