16ª Conferência Internacional da LARES

São Paulo - Brasil

29 e 30 de setembro de 2016

Rating para CRIs: vale a pena?

Eduardo Fernandes Cazassa[1], Richard Saito[2]

[1] Fundação Getulio Vargas – EAESP and NewEstate Investimentos, Rua Barão de Itapetininga, 50 - 9º andar - São Paulo, Brasil, eduardo@newestate.com.br

[2] Fundação Getulio Vargas – EAESP, richard.saito@fgv.br

RESUMO

Analisamos os determinantes de precificação de Certificados de Recebíveis Imobiliários (CRIs) com relação ao efeito do rating, controlando por variáveis de tamanho e prazo. Verifica-se um prêmio médio adicional em CRIs de 1,0 p.p. quando comparados com debêntures de prazos semelhantes e de mesmo rating. A justificativa desse prêmio é explicada pelos diferentes níveis de risco e ativos-objeto. Os diferentes níveis de risco são percebidos pelas diversas garantias utilizadas sendo que 41% das emissões possuem garantias pessoais de originadores (aval ou fiança). Somente 23% de todas as emissões foram avaliadas por agências de rating. Os efeitos do rating são analisados e, em resumo, são distintos para os segmentos residencial e comercial. A realização de avaliações de rating para instrumentos de dívida imobiliária como CRIs não é uma solução trivial para a redução de spreads. Em média, o spread de CRI é da ordem de 3,2p.p. superior à curva de juros de mercado. Em relação aos segmentos, o CRI residencial tem um spread médio 1,4p.p. superior ao CRI comercial. Para CRIs residenciais, o efeito de uma avaliação de rating é positivo (redução de spread) caso a emissão seja avaliada por alguma agência de rating, enquanto que para os CRIs comerciais, o efeito é negativo. O efeito pode ser positivo para os CRIs comerciais (redução de spread) em caso de avaliação por agência de rating internacional ou possuir notas de rating superiores à nota 'A'. Em resumo, os CRIs residenciais apresentam um menor spread se avaliados por quaisquer agências de rating enquanto que os CRIs comerciais devem apresentar notas altas de rating (e preferencialmente por agências de rating internacionais) para que apresentem spreads significativamente menores. Para a redução de riscos percebidos ou devido à baixa proporção de emissões com avaliação de rating, tornou-se comum que as emissões tenham melhorias de crédito tais como a acumulação de garantias, a subordinação e um excesso de retorno identificado por altos spreads.

Palavras-chave: CRI, rating, financiamento imobiliário, precificação, Brasil.

Do Ratings matter for RE Structured Debt?

ABSTRACT

The pricing of Real Estate (RE) Structured Debt or Real Estate Receivables Certificates (CRIs) is investigated in relation to the effects of ratings as far as volume and maturity are controlled for. An added average premium of 1.0 p.p. is seen in CRIs, compared with the same maturity and rating debentures. This premium is motivated by the different levels of risk and underlying assets leading to different pricing levels. The different risk levels are perceived by the different guarantees used – for instance, 41% of issuances include personal guarantees of the originators. It is curious to verify that only 23% of all CRI issuances have been assessed by rating agencies. The effect of rating is distinguished for either segments, the residential or the commercial. Being assessed by rating agencies is not a trivial solution for lowering spreads of CRIs. The average spread for CRIs is 3.2p.p. above the market yield curve. Within segments, the residential CRI bears an average spread 1.4p.p. higher than the commercial CRI. Residential CRIs show a positive effect (lower spread) when assessed by any rating agency whereas commercial CRIs show a negative effect (higher spreads) simply due to the fact of being rated. The commercial CRIs can also show a positive effect (lower spread) for issuances rated above 'A' or if they are assessed by an international rating agency. To summarize, residential CRIs show lower spread as long as they are rated by an external agency whereas commercial CRIs must deliver high scores (and preferably by international rating agencies) to present significant lower spreads. In order to minimize risks or the perceived risks and compensate for the low level of rated issuances, credit enhancements such as accumulation of guarantees, tranching and excess spread seem to be the rule.

Key-words: CRI, rating, real estate financing, pricing, Brazil.

1. INTRODUCTION

Securitization in the real estate market in Brazil has been carried out through the issuance of *Certificates of Real Estate Receivables* (CRIs). With strong development since 2005 when issued volumes surpassed BRL 1.0 billion for the first time (Cetip, 2015), this type of security has specific characteristics in relation to other markets and presents high returns to investors (spreads to market yield average 321 bps in the inflation-indexed issuances). Despite the recent growth, this market is relatively small (the recent couple of years showed annual issuances at BRL 16 billion and a total outstanding BRL 68 billion in May 2015). The existing balance of CRIs corresponds to 1% of Brazil's GDP in 2015. This compares to other markets such as the ABS (asset-backed bonds) market in the USA that stands at USD 1.3 trillion (monthly issue of USD 16 bn) equivalent to 7% of that country's GDP. The limited growth is related to the competition of a low-cost real estate financing system backed in the savings accounts (through 'Sistema Financeiro de Habitação', or SFH).

The CRI is not standardized as a strict mortgage vehicle and it encompasses other real estate assets (widely classified in commercial or residential segments). By the definition of the Bank for International Settlement and also found in the results of a survey by Davis (2005), a structured finance instrument has three main characteristics: (1) pooling of assets, (2) tranching of liabilities and (3) use of a standalone purpose vehicle (SPV). The CRI usually fits all three criteria, but it may also be just a pass-through instrument of securitization without the second characteristic above. It is not unusual to find a set of different guarantees under one CRI. Therefore, CRIs are not standardized securities. The Brazilian securities commission (CVM) demands disclosure in a handful of forms by market participants mainly at issue. Yet, Anbima (Brazilian Financial and Capital Markets Association) has implemented codes and best practices in order to foster market development in compliance with disclosure rules.

First, we find that there is a positive difference of returns of CRIs when comparing to debentures of the same tenor and rating – an average premium of 1,0p.p. (or 97bps). Second, a set of control variables are regressed to determine the composition of spreads and the effect of rating in CRIs. We find that the average spread of CRIs is 3.2 p.p. in the subsample of inflation-indexed issuances. This subsample was chosen for three main reasons: it does not hold subsidized or earmarked loans under the deposit-financed lending system; it can be compared with the available yield curve; and it represents 56% of the full sample. Therefore, the appropriate comparison is made based on the subsample of inflation-indexed issuances.

When regressing the available characteristics of CRIs, the relevant characteristics of pricing were identified in the two main segments (premium for the residential segments) according to different levels of guarantees. Controls were provided for (i) issuance characteristics such as volume and maturity, (ii) the rating grades and (iii) the origin of the rating agency. It is possible to verify a premium of 1.4p.p. in both residential and allotment segments. The more guarantees offered simultaneously the lower the spread. As for the controls, we find that larger and longer-maturity CRIs show a significant lower spread. Being assessed by rating agencies is not a trivial solution for lowering spreads of CRIs. Residential CRIs show a positive effect (lower spread) when assessed by any rating agency whereas commercial CRIs show a negative effect (higher spread) simply due to the fact of being rated. Eventually, the commercial CRIs show a positive effect (lower spread) in case a grade higher than 'A' is given or an international rating agency is chosen.

We, therefore, verify that the gross returns of CRIs exceed the pre-tax market in the yield curve and the calculated difference in returns is even higher for individuals or real estate funds that are tax-exempt from the

typical fixed income tax. Incentives also reach originators - either corporations ('Sociedades Anônimas') or limited partnerships ('Limitadas') are exempt from financial tax on loans ('IOF') by using proceeds into real estate.

The contribution of the paper is twofold: (a) although CRIs follow some standardization, we find that the instrument can represent different levels of risk and underlying assets; and (b) this lack of standardization leads to different pricing levels. The analysis and implications of this study are important for real estate financing in general either by (i) increasing access of companies to capital, (ii) reducing the cost of capital, or (iii) increasing the allocation of more resources to the Brazilian real estate financing system. Gyamfi-Yeboah et.al. (2010) wrote that the integration of mortgage and capital markets is particular to every country. We describe the characteristics of existing CRIs in face of the problems of a structured debt instrument described by Caselli and Gatti (2005), specially the impact of perceived risk behind the characteristics of CRIs. The pricing determinants are studied for similar debt instruments by other authors with regard to rating effect (Buscaino et al., 2006; Cuchra, 2004; Sheng and Saito, 2005). This is the first study to measure and evaluate the factors behind the high returns of CRIs in the Brazilian market. Other authors (Pinto et al., 2016; Buscaino et al., 2012; Vink, D., and A. Thibeault, 2008; Hu et al., 2006; Maris and Segal, 2002) have developed important strategies to investigate structured finance instruments and have been used in this study whenever possible.

This study is divided into five sections. Section 2 presents a literature review in the context of the Brazilian CRI Market. Section 3 describes the data used and the hypotheses developed. Section 4 presents the main empirical results and the analysis of the results. Section 5 concludes the study.

2. LITERATURE REVIEW

In Brazil, CRIs outstanding balance is BRL 68 billion (May 2015) and the total outstanding real estate credit reached BRL 498 billion (2014), equivalent to respectively 1.3% and 9.7% of the GDP (BCB, 2014). In the USA there is USD 1.3 trillion in asset-backed bonds (monthly issue of USD 16 bn) and USD 8.7 trillion in mortgage related bonds (monthly issue of USD 142 bn) accounting for respectively 7% and 50% of the GDP (SIMFA, 2016).

As the Real Estate sector is important to foster wealth, employment and well-being, Brazilian authorities have increased their attention to this market. The current mortgage system is funded by savings accounts which have a relatively low cost for banks, but have limited size and provide daily liquidity.

Campbell (2013) describes three main categories of mortgage systems with their distinguished allocation of risks and incentives. The first and oldest system is the deposit-financed lending, like the Brazilian traditional model where savings accounts are used to fund mortgages. The second is the securitized mortgage system, largely used in the USA since the 1990s and it relies on capital markets functioning. The third is the covered bond system, common in Europe, in a more complex system and well designed in countries like Denmark.

The first model, the deposit-financed lending, has the great advantage to merit solvent originators (i.e. banks that bear mortgage credit portfolios in Brazil) which have incentives to underwrite and modify mortgages if necessary. Major drawbacks are the local availability of deposit funding and liquidity transformation problems such as withdrawals of deposits. The second model, the securitized mortgage system, has the advantages of widening the base of funding and better matching investors' preferences. The disadvantages of this model relate to the asymmetry of information between originators and mortgage investors, and the consequent incentives and

distortions from this situation. The third model, the covered bonds system, are an advancement to the second model because the claims are held on originators but still collateralized by pools of mortgages.

For the second and third models, some authors highlight the importance of a secondary market with liquidity and a low level of information asymmetry (Campbell, 2013; Leece, 2008; Gyamfi-Yeboah et.al., 2010; Desa, 2005). Some ways to provide such a market include the packaging of mortgages in large and diversified pools, design of mortgages to limit their exposure to personal circumstances and behavioral uncertainties, tranching pools of mortgages to create instruments protected against prepayment or default, providing public guarantees and/or credit insurance. The Brazilian market has an increasing learning curve by producing credit-enhanced securitization instruments like the CRI and a new market to be developed of covered bonds with the LGI ('Letra Imobiliária Garantida'), created in 2014.

Agarwal et al. (2011) shed light on the effects of securitization on the lending process. They conclude that securitization lowers renegotiation rates but shows less efficient renegotiation outcomes in case of default. Keys et al. (2010) provide evidences that bad practices such as poor screening standards were present in issuing securitized mortgages in the USA in the mid-2000s. This shows that the rapid growth of securitized mortgage systems is capable of creating distortions and also the 'boom and bust' phenomena. Notwithstanding, securitization mortgage systems provide increased supply of credit (Mian and Sufi, 2009) and lower the cost of capital (Desa, 2005). A sound securitization market in mortgages is possible if proper attention is given to existing experiences.

As properly put by Campbell (2013), the mortgage market has been a specialty topic in finance and its importance is undermined as it deserves a broader perspective that includes distinct topics such as asset pricing, behavioral finance, financial intermediation, urban economics and macroeconomics. This paper focuses on the aspect of a specific tool in handling financial intermediation, as it puts together incentives and ideas to attract more supply of capital into mortgage, although not strictly residential mortgage.

Leece (2008) and Gyamfi-Yeboah et.al. (2010) debate the integration of mortgage markets and capital markets. The existence of an efficient secondary mortgage market has the consequences of a better environment with reduced interest rates for borrowers and reduction in mortgage credit rationing. Some difficulties regard the prepayment of mortgage debt and default on payments. The mortgage choices represented by mortgage instruments by households and companies have to be analyzed in the light of housing finance systems and broader economies they are part of. Gyamfi-Yeboah et.al. (2010) studied the integration of the mortgage and the capital markets in South Africa. They reason that financial market deregulation was the primary cause of this integration which eventually supplied additional mortgage credit, however at no lower cost in that country.

Brazil started to develop its secondary mortgage market in 1997 by creating a market driven alternative system to the deposits (savings accounts), based system through Law 9514 from 1997 (it established the 'Sistema de Financiamento Imobiliário' or the Housing Finance System – 'SFI' Act). Although securitization is not new in the Brazilian market (already experienced in the automotive industry) and other forms of securitization exist (e.g. 'Fundos de Investimento Creditórios' – acronym FIDC, or private contracts between parties), real estate securitization through CRIs is a recent and growing mechanism – and it is structured or tailor-made according to the demands from originators and investors. Previous local research sheds light on securitizations via FIDCs and their credit ratings (see Fernandes et al., 2014).

As noted by prior research, especially Caselli and Gatti (2005), the caveats for the financial disintermediation include three matters: (1) transactional difficulty, (2) informational difficulty, and (3) perceived

risk. All three matters can be accommodated by the existence of financial intermediaries. They should provide maturity intermediation, aggregate investors to larger sums, reduce risks by pooling assets, enhance creditworthiness of the securities, and mitigate the costs of information. Fernandes et al. (2014) argue that there must be an implicit contract between the originator and the investor in securitization, especially for true sale structures, in order to assure credit quality.

Caselli and Gatti (2005), Fabozzi et al. (2006), Davis (2005) and Gatti (2005) address the structured finance phenomenon as the financial product flexible enough to meet the needs of originators and investors. And as pointed out by Caselli and Gatti (2005), 'structured finance' is used almost interchangeably with securitization in a narrow and more common sense. The economic benefits of structured finance instruments are known to be an alternative supply of credit in times of credit shortage, a mean of fundraising for smaller firms and a tool for lowering the cost of capital by the mitigation of risks.

The international experience provides important lessons. Poindexter et al. (2002) visits legal requirements matters in the secondary mortgage market in Latin America. The USA, for example, which began securitization of mortgage loans in the early 1970s, has regularly revised its legal frameworks to encounter the requirements of securitized transactions and the demands of investors. Another lesson regards the electronic market, where participants have access to benefits such as liquidity and cheaper funding as presented by Vickery and Wright (2013). The market of securitization in the USA deserves recognition for the transparency in the definitions and standardization of instruments. Securitization products include ABS (assets), RMBS (residential), CMBs (commercial), CDOs (debt obligation) as different classes that allow scalability and better understanding.

The analysis and implications of this study are important for real estate financing in general either by increasing access of companies to capital, by reducing the cost of capital, or by increasing the allocation of more resources to the Brazilian real estate financing system. As indicated by Gyamfi-Yeboah et.al. (2010), the integration of mortgage and capital markets is particular to every country. We describe the characteristics of existing CRIs in face of the problems of a structured debt instrument described by Caselli and Gatti (2005), especially the impact of perceived risk behind the characteristics of CRIs. The pricing determinants are studied in similar instruments by other authors with regard to rating effect (Buscaino et al., 2006; Cuchra, 2004; Sheng and Saito, 2005). This is the first study to measure and evaluate the factors behind the high returns of CRIs in the Brazilian market. Other authors (Vink, D., and A. Thibeault, 2008; Pinto et al., 2016; Buscaino et al., 2012; Hu et al., 2006; Maris and Segal, 2002) have developed important strategies to investigate structured finance instruments and have been used in this study whenever possible.

3. METHODOLOGY

3.1 DATA DESCRIPTION

CRIs were created back in 1997, but regulation became more sophisticated in 2004 with improvements in the local laws that established rules for the registration of securitization companies and public offerings. Besides the clarifications needed by the market, the Brazilian authorities put together laws that allowed for the separated regimen (separate venture or enterprise for each project) for mortgage from the originator or intermediary ('regime fiduciário') and a new and reliable foreclosure system ('alienação fiduciária'). As seen on Table 1, the market picked up in 2005 (when issuances surpassed BRL 1bn yearly for the first time) and showed relevance in recent years. The main database is formed primarily by issuances of CRIs registered at CETIP[1] clearance, as more information is disclosed under this platform. Available data range from 2002 to 2015, although the market is relevant in size since 2008 (more than 50 issuances annually versus 9 annual issuances on average from 2002 to 2007). In 2013 and 2014, total issuances of CRI reached BRL 16 billion annually. Since 2010, issuances have surpassed the BRL 6 billion annual figure. Since the first issuance in 2002, CRIs have surpassed BRL 80.0 billion and the total outstanding balance in June/2015 was BRL 68.2 billion.

Table 1 - Issuances (BRL million) per year

Year	Volume	% per year (of the total)	% acc.
2002	58	0%	0%
2004	9	0%	0%
2005	1,103	2%	2%
2006	165	0%	2%
2007	583	1%	3%
2008	3,301	5%	8%
2009	2,129	3%	11%
2010	6,014	9%	20%
2011	11,302	17%	36%
2012	8,161	12%	48%
2013	16,157	24%	72%
2014	16,938	25%	97%
2015 (until May)	2,328	3%	100%
Total	68,248		

Source: CETIP (2015)

It is important to note that this study data ranges most but not the whole market. There are two main clearances where CRIs can be traded: CETIP and Bovespa. As of July 23, 2015, about 89.4% of the issuances were registered at CETIP whereas 10.6% were listed on either Bovespa markets (Bovespa Fix or Soma Fix).

While asset managers can issue shares of REITs ('FIIs') and banking institutions (among others) can issue real estate credit bonds ('LCIs' and 'LIGs', the latter created by Law 13,097 in 2015), only securitizing entities are

---

[1] Central de Custódia e de Liquidação Financeira de Títulos. The database is available on https://www.cetip.com.br/tituloscri

allowed to issue CRIs (as determined by Law 6,385 in 1976 and CVM 414 in 2004). As of 2015, eight securitizing entities concentrated 90% of all issuances of CRIs, as seen in Table 2.

Table 2 - Historical Market Share

Top Securitizing Entities	Volume R$ million	Market Share	Accumulated Market Share
1	14,394	21%	21%
2	11,194	16%	37%
3	8,365	12%	50%
4	8,296	12%	62%
5	7,163	10%	72%
6	5,360	8%	80%
7	3,863	6%	86%
8	2,825	4%	90%
9	1,230	2%	92%
10	949	1%	93%
Market Size	68,248		

Note: * data until May 2015
Source: CETIP (2015)

CRI as a structured finance instrument bears significant risks as it inherits the risk of the underlying asset. It is not a simple mortgage securitizing tool as it may be changed in its nature. The underlying credit may rely on one contract (such as a rental contract), a corporate risk or on several contracts (pool of mortgages). Currently, only a broad classification is available through four segments: commercial, residential, allotments and financial. As seen on Table 3, the market share is divided into commercial and residential in approximate even shares.

Table 3 - Breakdown by segments

Segments	Full Sample	Senior	Junior/Subordinated
Commercial	391 (46%)	361 (50%)	30 (22%)
Residential	421 (49%)	330 (46%)	91 (68%)
Allotment	31 (4%)	19 (3%)	12 (9%)
Financial / others	10 (1%)	9 (1%)	1 (1%)
Total	853 (100%)	719 (100%)	134 (100%)

The percentages refer to the subtotal of the column, either full sample, senior or junior/subordinated tranches.
Source: CETIP

Around 50% of all CRI[2] volumes have been issued by banks that have used it as a tool for recycling existing loans. According to the Brazilian law, banks are obliged to use saving accounts deposits in mortgages[3]. All these CRIs are TR-linked (both deposits and loans use a formula of *quasi*-fixed-rate mortgage, which is low inflation-based rate named TR plus spread) and do not reach the large public. See Table 4 for the breakdown of CRIs by index.

---

[2] Brazilian banks formed a joint-venture named Cibrasec which holds 21% of market share. See Table 2 for the historical market share of the securitizing entities.
[3] Mandatory allocation of resources of savings accounts was lowered if loans were repackaged into CRIs – this rule was valid until May 2015

Excluding TR-indexed CRIs which are originated, structured and purchased by banks mostly due to regulatory reasons, the majority of CRIs (59%) are indexed at inflation (mostly IPCA or IGP-M) plus spread in percentage points. A smaller amount of CRIs is priced at a percentage (or a spread over) the DI rate (interbank rates that proxy the Selic rate).

Table 4 - Breakdown by index

Index	Full Sample	Senior	Junior/Subordinated
Inflation (IGP, IPCA, IPC)	501 (59%)	400 (56%)	101 (75%)
DI	106 (12%)	100 (14%)	6 (4%)
INCC (Construction index)	3 (0%)	3 (0%)	0 (0%)
TR (Bank mortgage contracts)	221 (26%)	201 (28%)	20 (15%)
Fixed	22 (3%)	15 (2%)	7 (5%)

The percentages refer to the subtotal of the column, either full sample, senior or junior/subordinated tranches.
Source: CETIP

The capital markets strength is made present in financing gaps in the existent mortgage system, such as commercial real estate and some residential real estate (especially customers financed by developers). Out of the database study, 853 issuances have been analyzed. Senior tranches account for 719 of them while 134 were subordinated tranches. Senior tranches have an average of BRL 87 million per issuance (see Table 5) and by excluding TR-linked issuances, the average is BRL 29 million per issuance.

Table 5 - Basic Characteristics of the Full Sample

Characteristics	Full Sample	Senior	Junior/Subordinated
Number of tranches	853	719	134
Total volume, R$ million	68,732	62,915	5,817
Average tranche size, R$ million	80.6	87.5	43.4
Average subordination	-	-	17%
Average maturity, years	12.5	11.9	15.6

Source: CETIP

As a fixed income security, a CRI bears the risks of default, liquidity, interest rate, and possible prepayment. CRIs may rely on junior tranches or excess collateral in the form of extra cash flow and may contain other relevant guarantees such as properties and endorsements. Given that extra guarantees are usually of three types (corporate, personal and property), the majority of issuances (82%) hold one or more guarantees, as seen on Table 6. A large portion of issuances are rated on a stand-alone basis (23% of the full sample are rated).

Table 6 - Guarantees and Rating

Guarantees	Full Sample	Senior	Junior/Subordinated
a. Corporate Guarantee	296 (35%)	234 (33%)	62 (46%)
b. Personal Guarantee	328 (38%)	292 (41%)	36 (27%)
c. Property Guarantee	556 (65%)	453 (63%)	103 (77%)
Number of guarantees			
Contains no guarantee	155 (18%)	141 (20%)	14 (10%)
Contains 1 guarantee (a to c)	304 (36%)	256 (36%)	48 (36%)
Contains 2 guarantees (a to c)	306 (36%)	243 (34%)	63 (47%)
Contains 3 guarantees (a to c)	88 (10%)	79 (11%)	9 (7%)
Rating			
With rating grade	200 (23%)	154 (21%)	46 (34%)
With national rating agency	120 (14%)	87 (12%)	33 (25%)
With international rating agency	80 (9%)	67 (9%)	13 (10%)
Total	853 (100%)	719 (100%)	134 (100%)

The percentages refer to the subtotal of the column, either full sample, senior or junior/subordinated tranches.
Source: CETIP

The process of underwriting a CRI is fairly peculiar in Brazil as it relies heavily on the preexistence of real assets or mortgages, it can contain different underlying assets and obligations in one security, uses independent audits *ad hoc*, and usually bears great interference from the lender. Also as a consequence of the different risk profiles of these securities, there has been a high participation in the books of subscription by institutional investors who themselves design and structure the CRI. They accounted for 56% of the total volume in 2015, being followed by Institutional Investors at 33% and lastly by Individuals at 11% of volumes, according to Anbima (2016a).

Due to specificities of these instruments, a minimum ticket requirement for investors applies. Generally, the minimum ticket is BRL 1 million at issue (restricted offer) and BRL 300 thousand per certificate. As the market evolves, this limitation should not be justified.

Hence, for every issuance, the underwriting is specific for every case. Credit enhancements and excess spread are very common in the Brazilian CRI market. The average remuneration of inflation-indexed CRIs was the inflation index plus 11.4% for the full sample, as seen in Table 7. On account of comparison in nominal terms, in the period 2002-2014, the interbank rate was 13.4% p.a. while 'inflation plus 11.4%' is equivalent to 17.8% p.a. if we consider the yearly average IGP-M for this period to be 6.4% p.a.

Table 7 - Average Remuneration per subsample

Remuneration (average)	Full Sample	Senior	Junior/Subordinated
Inflation (IGP, IPCA, IPC) plus | n=501	11.4%	8.8%	21.8%
DI plus | n=106	4.5%	4.6%	3.6%
INCC (Construction index) plus | n=3	9.0%	9.0%	N/A
TR (Bank mortgage contracts) plus | n=221	10.5%	10.2%	14.0%
Fixed | n=22	18.0%	13.8%	27.0%

Notes: (i) 'n' refers to the size of the sample; (ii) the percentages refer to remuneration of each category.
Source: CETIP

The current benchmark of the securities has low risk and high returns – the treasury debt. A possible solution consists of a construction of long maturity and fixed yields through a directed monetary policy - and this appears to be the trend of the Central Bank and Treasury policies in the recent years. Paula & Faria Jr (2012) argue that the persistent issuance of treasury bonds indexed at the Selic rate curb the fostering of the primary market for private bonds, because they are the risk free alternative at relatively high returns. The years that took advantage of the highest growth of issuances of CRIs were years with historical low levels of the Selic rate, i.e. 2008 onwards. The correlation of issuances of CRIs and the Selic rate is -0.64x (moderate to strong negative relationship) for the period 2000 – 2015 and even stronger if 2009 data is not considered (correlations reached -0.71x). The average base rate for the Brazilian economy for the period 2009 – 2014 was 10.7% p.a. and remained below 12.0% per annum until 2015.

To achieve the goal of the study, the spreads have been calculated based on the yield structure of the treasury at issue. Spreads are shown in Table 8 for the inflation-indexed sample. The average spread is 3.2p.p. and is more pronounced in the residential and allotment segments. The average duration of this sample is 6.1 years.

Table 8 - Spreads of Senior Issuances per Segment

Segments	Number of Issuances	Average Spread	Average Duration
Commercial	181	2.3	5.7
Residential	183	4.0	6.6
Allotment	19	4.4	4.6
Total	**383**	**3.2**	**6.1**

Subsample: senior issuances, indexed at inflation.
Source: Author

The spread is defined by the difference between the CRI remuneration and the reference index yield curve which was the Brazilian available treasury bonds. For every issue, the spread was calculated at the time of issue – some authors name this variable 'ex-ante' spread as this is previously known upon issuance. The negotiations of the issued securities thereafter may affect the real spread, but it was not measured or captured by this study.

About 20 issuances have been partially removed in some models – as the research database information was unavailable from either of the main databases (at CVM mostly and a few at Cetip).

Investors. The banks that are usually the most informed of the firms' situation and along with institutional investors comprise the majority of CRI investors. This is coherent to the findings of Chen et.al. (2008) that banks retain the risks of securitized loans for contractual interests and ability to provide recourse.

Rather than only individuals who benefit from tax exemption, the institutional investors comprise Real Estate Funds ('FIIs'), Multimarket Funds ('FIM') and receivables-backed funds ('FIDC'). They are often allowed to purchase CRIs either as a strategy or as a financial allocation of liquidity. Brazilian funds have concentrated portfolios in fixed income (88.7%). CRIs are included in the 'other fixed income' bracket which totals only 17.4% of the BRL 2.7 trillion under management by the Brazilian funds in July/2015. More than 60% of the funds are partially or entirely invested in the Brazilian public debt, according to Anbima.

The fostering of a primary and secondary market involves the publicity and standardization of issuances. More recently Anbima created a CRI database in October 2014 and it has set rules for the disclosure of every new issue from December 2014. CRIs detailed information in comparison to the current benchmark is generally limited however widely disclosed to investors upon issuances. The measures taken by Anbima and supported by CVM should improve the general level of public information on issuances. Much has been discussed under Anbima structure for the development of the Secondary Market for Private Debt Instruments. In July 2015, Anbima published its first draft database of historical issuances of CRI with a partial view of the market, not used in this study.

Default. It is worth to note that the credit quality of debtors and receivables in such securities have just recently been tested and screened by creditors and involved parties such as the agents for registration and settlement (servicer companies) and most importantly the securitizing entities. As most certificates in the market assemble a number of guarantees (credit enhancements), recent pre-default events (such as delays in payments) have triggered the execution of guarantees and early amortization clauses (payout events). In 2015, more than a couple of issuances have triggered Extraordinary Shareholders Meetings with the purpose of reaching resolutions.

No CRI has defaulted (i.e. reached all guarantees and did not have proper compensation) as far as the research could verify. Public screening is not available other than minutes filed by securitizing entities. Most of all issuances are not yet due – as Cetip database of registered and existing issuances amounts to BRL 68 billion whereas total issuances have surpassed BRL 80 billion according to Anbima. Taken that Cetip database accounts for roughly 90% of the Market, less than 10% of all CRIs have reached the maturity date.

3.2 Methodology and Hypothesis

The database gathers information from the CVM website where securitizing entities must fill out on a quarterly basis form containing a wide set of information such as guarantees and updated information of the securities or the underlying credit. The main variables of study are listed in Table 9.

Table 9 - Main variables of the study

Variable	Source	Description
SpreadCRI	Author	Calculated at issue by subtracting same duration Treasury Bond *100
SpreadDeb	Anbima	Spread over Treasury in three categories of rating grades (A, AA, AAA)
SizeIn	Cetip	Volume of the transaction in base-e logarithm
Segment	CVM/Cetip	Three dummies, for either Residential, Commercial or Financial/Others
CorpGtee	CVM/Author	Corporate co-obligation added (1) or not (0)
PropGtee	CVM/Author	Property ownership given as guarantee (1) or not (0)
PersGtee	CVM/Author	Personal lien guarantee added (1) or not (0)
GteeLevel	CVM/Author	Sum of CorpGtee, PropGtee and PersGtee. Reaches values (0) to (3)
LTVln	CVM	Percentage of the loan to total value of assets in base-e logarithm
JRSUB	Cetip	Dummy for contains junior or subordinated tranches related (1) or not (0)
Coobligated	CVM	Dummy for having a major (>20%) co-obligated party (1) or not (0)
TotalTermln	Cetip	Total term (maturity) in years in base-e logarithm
Rated	CVM	Dummy for having a rating assessment (1) or not (0)
RatingGrade	CVM	Three dummies, for rating categories (A, AA, AAA)
RatingInt	CVM	Dummy for being rated by international rating agency (1) or national (0)

Source: Author

This study has focused on two main subsamples: a smaller subsample with available information of same maturity and even rating grade debentures, totaling 41 issuances; and a wider subsample with 383 inflation-indexed issuances.

The first subsample was used in the first hypothesis and comprised all current rated issuances with available information on the database. The second subsample was used in the second hypothesis and has been chosen for three main reasons: it does not hold subsidized or earmarked loans under the deposit-financed lending system; it can be compared with the available yield curve; and it represents 56% of the full sample. So, the deeper analysis have been made using this second more appropriate subsample.

To compare with the first subsample of CRIs, the debentures data were gathered from Anbima. This additional database provided daily data on debentures pricing in the form of spread over the basic interest rates upon issuances. These data are available from 2013 to 2015. As for the treasury rates or market yield curve, the projected yield was provided by Anbima from 2009 to 2015.

The research question of the study is why there is such an excess return in CRIs. The empirical strategy has two steps. First, we analyze how the spread of CRIs relates to debentures. Same rating issuances of debentures and CRIs are compared in the period from 2013 to 2015. Second, a set of control variables are regressed to determine the composition of spreads in the subsample of inflation-indexed CRIs, emphasizing the largest two segments that are the commercial and the residential. Guarantees were verified for these two major segments. Control variables included volume, maturity and rating.

The regression in the second hypothesis was reduced to only inflation-indexed CRIs because TR-linked, INCC-linked and fixed-rate issuances have been removed from the database. The reason for the removal of TR-linked issuances is related to the fixed cost funding for TR- *quasi* fixed-rate mortgage that are the underlying assets of those CRIs. There were 197 TR-linked issuances that have not been accounted for. DI-linked were a small sample (less than 30 issues). As for INCC and fixed-rate issuances, they respectively account for 3 and 22 issuances – very

few if compared to 383 inflation-linked senior issuances (either IPCA, IPC or IGP-M). Junior or subordinated tranches accounted for 102 issuances in inflation-linked issuances and have been discarded as they have higher incomparable risk-reward profiles. Additionally, 14 inflation-linked senior issuances did not have full information available from the databases and could be used to the regression.

The regression models have been based on ordinary least squares (OLS) regressions and dummy variables for quarters have been added in order to measure specific temporal effects. Similar OLS linear models are used in the studies of Sheng and Saito (2005) and Pinto et.al (2016).

'SpreadCRI' in the main regressions has been tested for normality through Kolmogorov –Smirnov one-sample test and due to failure to reject the null hypothesis, the sample approximates a Gaussian distribution (at critical value 1%). For all models, White's heteroscedasticity-consistent estimator was used.

The first hypothesis to be tested is:

H1*: Existence of difference in spreads between CRIs and debentures (given the same rating and duration). Based on existing research, no significant difference would be verified based solely on rating grades.*

Buscaino et al. (2006) and Cuchra (2004) state that credit rating is the number one pricing factor for asset securitization at issue. If a relevant difference is identified, then CRIs are perceived with additional risk in relation to debentures. This may be due to lower liquidity or worse risk perception of an identified risk level. As for the origin of the rating agency, it is discussed for local debentures in Sheng and Saito (2005) – their conclusion is that whether national or international origin does not hold a relevant impact in the spreads of their sample.

Hypothesis 1 uses a parametric test (Student's t-test) for continuous variables and OLS regression models with and without interactions between rating grades and origin of the rating agency.

The null hypothesis is: "there is no difference between the spreads of CRIs and Debentures", and a relevant difference could exist and be explained by credit and liquidity risks.

The estimated equation **(1)** is:

$$SpreadCRI = \propto\ + \ln(SpreadDeb) + Dummy(Ratings) + \varepsilon$$

Definitions:

$SpreadCRI$: CRI $yield$ $minus$ $same$ $duration$ $risk$ $free$ $yield$

$\ln(SpreadDeb)$: $\ln$ of the $Debentures$ $spread$ $given$ the $same$ $rating$ and $duration$

α: $liquidity$ $risk$ $component$ of $CRIs$ $vs.$ $debentures$

$Dummy(Ratings)$: $dummy$ for the $three$ $available$ $ratings$ of $debentures$

The second hypothesis to be tested is designed as follows:

H2*: Determinants of spreads are different based on the segments of the CRIs (cross-section study). Based on existing literature, the determinants should be highlighted for the segments – residential and commercial – and their guarantees.*

The results should demonstrate what the relevant features are to determine the differential spread in CRIs. The most predominant features should not be statistically relevant. However, the features that stand out should be noted. The subsamples of the two largest segments (commercial and residential) show possible specific details about their pricing.

In Brazil, the commercial CRIs seem to be better priced (lower spreads) than the residential ones (as seen in Table 8). This is possibly due to better structures of guarantees whereas residential real estate is represented by pools of mortgages with higher uncertainty, as seen by the higher proportion of subordinated tranches in this group (as seen in Table 3). In the USA, a previous research made by Vink and Thibeault (2008) find that lenders demand a lower spread in MBS with a longer maturity as compared to ABS and CDOs. Consequently, one could expect that CRIs in the residential segment (more similar to MBS) present lower spreads than the CRIs in the commercial division (more similar to ABS).

Reinforcing that credit rating is an important feature, this regression shows how effective ratings may be for the different segments. Maris and Segal (2002) analyze the CMBS credit spread and find the following relevant determinants: (1) default probability, (2) tranche size, (3) transaction size (volume), and (4) year influence. This study offers control variables for transaction size (volume) and quarter of issue, but not for default probability which are indirectly measured in credit ratings. Vink and Thibeault (2008) study the pricing factors for ABS, MBS and CDO and conclude that some pricing factors are the same and others differ significantly. Even credit rating does not provide an unbiased estimate in determining spreads, according to Vink and Thibeault (2008).

The null hypothesis here is: "there is no relevant characteristic to determine differential spread in CRIs based on segments". If accepted, that would mean that all CRIs present a common credit or liquidity risk that cannot be justified by specific determinants. The two main segments to be tested are residential and commercial.

An important note must be made regarding guarantees. It is very common to find more than one guarantee in such instruments. By identifying different types of guarantees, this study separates three broad types of guarantees used: the property guarantee (a real estate property, either underlying the mortgage or an additional property); the personal guarantee (lien of shareholders of the firm that originated the credit); and the recourse guarantee (corporate endorsement). A variable that sums up 1 for each of the guarantee was created to identify a number of guarantees (scale 0 to 3) and its strength when used simultaneously. This variable was named guarantee level and presented statistically significant results. Another variable named 'coobligated' is conceived by CVM and defines a recourse that is responsible for at least 20% of the value of the CRI – chances are that issuers have not properly filled in this information in the mandatory CVM quarterly forms. Consequently, the variable 'coobligated' did not present significant results as seen in the next section.

The sample includes 373 active senior tranches of CRIs that were originated from May 2004 to March 2015. All regressions include fixed effects for quarters and their coefficients are omitted. The regression of Hypothesis 2 is enhanced with (n-1) quarter dummies in order to control for unobservable effects not already measured by the formula of the dependent variable. The dependent variable 'SpreadCRI' already captures the effects of changing interest rates as it is calculated as the difference between the remuneration of CRIs and the correspondent yield curve at issue. Also, duration information has been excluded as an independent variable as it is endogenous to the dependent variable (it was used to measure the yields).

There are 13 available features to be measured in 18 independent variables, shown in Table 10.

The estimated equation **(2)** is:

$$SpreadCRI = \alpha + \beta1.SizeIn + \beta2.Residential + \beta3.Commercial + \beta4.Financial + \beta5.Allotment + \beta6.LtoVln + \beta7.GteLevel + \beta8.PropGtee + \beta9.PersGtee + \beta10.CorpGtee + \beta11.ContainsJRSUB + \beta12.Coobligated + \beta13.TotalTerm + \beta14.Rated + \beta15.RatAAA + \beta16.RatAA + \beta17.RatA + \beta18.RatingInt + \varepsilon$$

Definitions:

$SpreadCRI = CRI\ yield\ minus\ same\ duration\ risk\ free\ yield$

$\beta s = sensitivities\ to\ the\ variables$

For variables definitions, please see Table 9.

This hypothesis employs a standard OLS regression technique and adjusts for heteroscedasticity using White's methodology. Similar methodology was used by Pinto et. al (2016) in a more recent study in the European market.

4. RESULTS

4.1 Spread comparison to Debentures

From equation (1), comparable risk securities should indicate that equivalents mean equivalent returns. Available data range from years 2013 to 2015. The subsample totals 41 observations and the main variables are summarized in Table 10. On average, there is a difference of +1.0 p.p. of the means of the full sample. That means that CRIs have a premium over debentures. The difference is not equally seen in all rating grades and a distinction is clear as far as the origin of the rating agency is concerned. A deeper investigation of the three categories of rating grades (A, AA and AAA) and the existence of CRIs rated by international rating agencies (17 out of 41, or 41%) provide interesting results.

Lower grades and be assessed by a national rating agency provide less benefits than the highest rating grade or being assessed by an international rating agency. The difference in spreads is positive and clear for rating grades A and AA (both groups if summed total 26 issuances and reach 36 under the assumption that rated issuances without available rating grade are also in this group). The CRIs that have been assessed by national rating agencies bear a large and significant differential spread of 2.0 p.p. On the other hand, the differential spread was even negative (CRIs have lower spreads than the debentures in 0.8p.p. in 5 existing issuances) for the CRIs with rating grade AAA whether they have been assessed by international rating agencies (average discount of 0.6p.p. for 17 issuances).

One possible evidence of this result is the concentration in the subsample of large issuances (BRL 160 million versus average of BRL 82 million) and commercial issuances (13 out of 17) in CRIs assessed by international agencies. Due to limitations to the size of the subsample, further investigation of the impact of different segments is made in the second hypothesis of this study.

Table 10 - Univariate Statistics of the main variables – Equation 1

Summary statistics for the variables that present a comparable debenture information.

Variable	Obs	Mean	Std.Dev.	Min	Max	T-student (null hyp.)
SpreadCRI	41	2.61	2.18	-0.69	8.78	7.67***
SpreadDeb	41	1.64	0.43	0.8	2.28	24.42***
Δ Spread	41	0.97	2.05	-1.81	7.82	3.03***
Δ Spread | Rating AAA	5	-0.81	0.39	-1.5	-0.56	-4.64***
Δ Spread | Rating AA	7	1.38	2.99	-1.03	7.82	1.22
Δ Spread | Rating A	19	1.05	1.8	-1.69	4.9	2.54***
Δ Spread | Rating A – wide*	29	1.18	1.85	-1.81	4.9	3.43***
Δ Spread | International R.Ag.	17	-0.56	0.81	-1.81	1.04	-2.85***
Δ Spread | National R.Ag.	24	2.05	1.97	-1.65	7.82	5.1***

Note: * several rated issuances did not disclose grades and it was added to the A category.

Regressions have been formulated and are shown in Table 11. From equation a.1, the main model presents statistically significant results. For the variation in the spread of the corresponding debentures (matched by duration and rating grades), the effect of a 10% increase in the spread of the debenture has an impact of $2.752 * \ln (1.10) = 26\%$ increase in the spread of the CRI. From equation a.2, the constant variable equals 2.20p.p. and could be understood as a liquidity component of the spread. When rated by an international agency, the spread in equation b.2 is offset in 2.11p.p. It confirms the importance of an international rating agency to reduce the spreads of CRIs.

The rating grades provide the expected results – the higher the grade the lower the spread. Regardless of the origin of the rating agencies, 'AAA' issuances show a positive impact (lower spreads) in the spreads of CRIs rather than 'AA' and 'A' issuances (models a.3 to a.6). By interacting the rating grades and international rating (models a.7 to a.10), the positive effects of lower spreads are largely present in issuances rated in the lower bracket (A) and, simultaneously, that this rating is granted by an international agency. This is possibly a useful takeaway – low rates would be partially compensated by being assessed by an international rating agency.

Table 11 - Regressions I - Spread comparison to Debentures

The Table presents the results of an OLS regression analysis of the determinants of CRI spreads controlling for rating grades and the origin of the rating agency. The subsample has data available from CVM and Anbima debentures database. There are 41 active CRIs issued from October 2013 to March 2015. The dependent variable is 'SpreadCRI'. All regressions include fixed effects for quarters and their coefficients are omitted. The dependent variable for all regressions is SpreadCRI, calculated at issue by subtracting the nominal remuneration by the yield curve of same duration Treasury Bond *100. The independent variable SpreadDeb is the spread over Treasury in three categories of rating grades (A, AA, AAA) of local debentures as informed by Anbima. Models 1 to 5 compute independent variables and models 6 to 10 compute interaction between rating grades and being rated by an international rating agency. Specifications are estimated by pooled OLS, using White's heteroscedasticity-consistent estimator. Indexes *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively, and t-statistics are reported in parentheses. Highlights are made for 10% and 5% significance levels in yellow/darker shade whereas 1% significance levels are in blue/lighter shade.

	(1) a.1 Pooled OLS Rob SpreadCRI	(2) a.2 Pooled OLS Rob SpreadCRI	(3) a.3 Pooled OLS Rob SpreadCRI	(4) a.4 Pooled OLS Rob SpreadCRI	(5) a.5 Pooled OLS Rob SpreadCRI	(6) a.6 Pooled OLS Rob SpreadCRI	(7) a.7 Pooled OLS Rob SpreadCRI	(8) a.8 Pooled OLS Rob SpreadCRI	(9) a.9 Pooled OLS Rob SpreadCRI	(10) a.10 Pooled OLS Rob SpreadCRI
Dependent Variable										
VARIABLES	**Full sample**	**RatingInt**	**RatAAA**	**RatAA**	**RatA**	**RatAamplo**	**RatAAAint**	**RatAAint**	**RatAint**	**RatAam.int**
SpreadDebln	**2.752****	1.002	0.322	**2.860****	**3.031***	-1.477	0.322	**2.800****	**3.177*****	**3.477*****
	(2.57)	(1.11)	(0.19)	(2.62)	(2.02)	(-0.47)	(0.19)	(2.50)	(2.84)	(3.29)
RatingInt		**-2.106*****								
		(-4.95)								
RatAAA			**-2.598****							
			(-2.08)							
RatAA				0.179						
				(0.25)						
RatA					-0.272					
					(-0.37)					
RatAamplo						2.747				
						(1.61)				
RatAAAint							**-2.598****			
							(-2.08)			
RatAAint								0.180		
								(0.34)		
RatAint									**-1.568*****	
									(-4.14)	
RatAamploint										**-1.963*****
										(-4.69)
Constant	-0.115	**2.198*****	1.146	-0.201	-0.078	-0.210	1.146	-0.170	0.449	0.490
	(-0.15)	(3.24)	(1.19)	(-0.25)	(-0.11)	(-0.25)	(1.19)	(-0.21)	(0.87)	(0.98)
Observations	41	41	41	41	41	41	41	41	41	41
Adjusted R-squared	0.3700	0.5429	0.4111	0.3516	0.3540	0.4029	0.4111	0.3514	0.4252	0.4897

Source: Author

4.2   CRI Spread pricing factors

Eighteen features independent variables are measured in their impact in the spreads of CRIs over the risk free yield curve. The subsample has been divided into three groups: one consolidated of the residential and commercial segments, one group of the residential segment and one group of the commercial segment.

The results indicate that the pricing is different dependent upon the underlying assets being of two possible segments. The level of guarantees is important and other four characteristics are statistically significant in pricing CRIs. These important characteristics are (i) volume, (ii) maturity, (iii) rating grade, and (iv) rating origin, as seen in Tables 13 and 14. As expected the relevant features are noted by statistical relevancy but also the signs must be checked in accordance with the existing literature.

Segments. The two largest segments (commercial and residential) show specific details about their pricing. In general, one can expect residential CRIs to be priced at base rates (constant variable) with premium above the average of this subsample (+3.0p.p.) and commercial CRIs to be priced at discount to the average (-2.5p.p.). This is possibly due to better structures of guarantees or less perceived risks for commercial CRIs. By consolidating all segments and effects, it is possible to verify a premium at issue of 1.4p.p. in both residential and allotments (residential urban parceling).

Guarantees. A lesser strong predictor is the level of guarantees which is a sign of credit enhancement, especially for the residential CRIs. At 10% significance level, the more joint guarantees are provided, the lower the spread for the full subsample. In the consolidated sample, it is clear that the more guarantees the lower the spread. The effect is -0.4 p.p. for the consolidated sample and -0.6 p.p. in the residential subsample.

When guarantees are analyzed individually, the results are somehow mixed due to lower significance levels and different signs as expected. Personal guarantee is an important feature (significant at 5% Sig.) in the consolidated sample – although it shows an opposite sign to the expected one. Personal guarantees are usually the shareholders' personal lien, and could possibly be offered in riskier issuances without the effect of improving the perceived risk of the instrument. For the commercial group, no variables related to guarantees are statistically relevant when this group is analyzed apart from the residential cluster (see model 3 in Table 13).

Volume and Maturity. The three groups of the subsample (consolidated, residential only and commercial only) show no controversy with regards to the effects of volume and maturity. Larger and longer-maturity CRIs show a significant lower spread for both segments analyzed. The effect of maturity in residential CRIs is lesser than the effect of maturity in commercial CRIs – a different result from the ones by Vink and Thibeault (2008) who considered residential instruments (MBS in the USA) offered lower spreads than other types of instruments.

Rating. Being assessed by rating agencies is not a trivial solution for lowering spreads of CRIs. Residential CRIs show a positive effect (lower spread) when assessed by any rating agency whereas commercial CRIs show a negative impact (higher spread) for the fact of simply being rated. The effect of lowering spreads in the commercial segment derives from the respective rating grade. For commercial CRIs rated in grades AA and AAA (in possible three categories), there is a relevant positive effect of lower spreads (at 10% significance level). With regard to the origin of the rating agency, if international, its impact is at least -0.8 p.p. in the spread of the issuances (at 5% significance level), regardless the grade of rating. This effect is numerically higher for the commercial CRIs at -1.2 p.p. To summarize, residential CRIs show lower spread as long as they are rated by an external agency whereas

commercial CRIs must deliver high scores (and preferably by international rating agencies) to present significant lower spreads.

Other variables. Two important variables have showed no significant effect which are loan-to-value (LTV) and issuances with tranching. Possible reasons are mismeasurement for LTV and a commonplace in tranching strategies. LTV data is reported as 99% by securitizing entities (for 48% of this subsample) in the CVM quarterly forms.

Table 12 - Expected Sign for the Variables

The Table presents the independent variables and their expected signs in regressing the dependent variable SpreadCRI, calculated at issue by subtracting the nominal remuneration by the yield curve of same duration Treasury Bond *100. Time dummies are not included in the Table. ***, **, * for 1%, 5%, and 10% significance level, respectively

Variable	Expected Sign	Verified Sign	Statistically Relevant	Conclusion
Sizeln	Negative	Negative	***	Larger transactions offer lower spreads, especially in the residential segment
Segment	Neutral	Positive for 2 out of 4 segments	*** (Residential and Allotment)	There is a premium to residential and allotment segments
CorpGtee (Corporate)	Negative	Positive	* in models 1 and 2	Higher level of guarantees lowers the spread. Yet solely the commercial segment shows no relevant variables
PropGtee (Property)	Negative	Omitted	Omitted	
PersGtee (Personal)	Negative	Positive	** in model 1	
GteeLevel (Sum)	Negative	Negative	* in models 1 and 2	
Coobligated	Negative	Negative	Not relevant	
LTVln	Positive	Negative	Not relevant	Inconclusive
ContainsJRSUB (Contains Junior or Subordinated Tranches)	Negative	Negative	Not relevant	Tranching has expected results but does not differentiate the spread marginally
TotalTerm (Maturity)	Positive / Neutral	Negative	***	The higher the maturity, the lower the spread on average. The effect is more pronounced for the commercial segment
Rated (1 if rated)	Negative / Neutral	Negative for Residential and Positive for Commercial	** in models 2 and 3	Being rated impacts residential CRIs positively (lower spread) but the opposite for commercial CRIs
RatingGrade (3 dummies for A, AA, AAA)	Negative	Negative	* for model 3 in grades AA and AAA	Rating grades are relevant for commercial CRIs with relevant and positive impacts (lower spreads) for grades AA and AAA
RatingInt (1 if rated by International Ag)	Neutral	Negative	**	Being rated by an international rating agency provides lower spreads for commercial CRIs. Not relevant for residential CRIs

Source: Author

Table 13 - Regressions II – Differentiating CRIs pricing factors

The Table presents regressions of the determinants of pricing in inflation-indexed subsample of CRIs for three groups of data: (1) Residential and Commercial, (2) solely Residential and (3) solely Commercial. For the Residential grouping, 18 items listed as allotments which are used for residential purposes have been included for generalization purposes. In model (1), the commercial segment was omitted and therefore 'Residencial' and 'Loteamento' refer to the marginal difference to 'Comercial'. The sample includes 373 active CRIs that were originated from May 2004 to March 2015. All regressions include fixed effects for quarters and their coefficients are omitted. The dependent variable for all regressions is SpreadCRI, calculated at issue by subtracting the nominal remuneration by the yield curve of same duration Treasury Bond *100. Specifications are estimated by pooled OLS, using White's heteroscedasticity-consistent estimator. Indexes *, **, and *** represent significance levels of 10%, 5%, and 1% respectively, and t-statistics are reported in parentheses. Highlights are made for 10% and 5% significance levels in yellow/darker shade whereas 1% significance levels are in blue/lighter shade. The coefficients are omitted (a) due to noncoklinearity for PropGtee and (b) due to low t-values for LtoVln, RatA, ContainsJRSUB, Coobligated.

	(1) b.1 Pooled OLS 4_D Rob	(2) b.2 Pooled OLS 4_D Rob	(3) b.3 Pooled OLS 4_D Rob
Sample	Residential and Commercial	Residential	Commercial
Dependent Variable	SpreadCRI	SpreadCRI	SpreadCRI
VARIABLES	**Residential and Commercial**	**Residential**	**Commercial**
Sizeln	**-0.352***	**-0.519***	**-0.258***
	(-3.34)	(-2.64)	(-1.82)
Residencial	**1.392***		
	(5.63)		
Loteamento	**1.378***		
	(3.78)		
GteeLevel	**-0.429***	**-0.665***	0.070
	(-1.92)	(-1.76)	(0.21)
PersGtee	**0.797****	0.821	0.442
	(2.34)	(1.56)	(0.85)
CorpGtee	**0.521***	**0.909***	0.261
	(1.70)	(1.82)	(0.54)
TotalTermln	**-1.102***	**-0.822****	**-1.185***
	(-4.57)	(-2.32)	(-2.79)
Rated	0.234	**-1.041****	**1.305****
	(0.65)	(-2.34)	(2.08)
RatAAA	-0.481		**-1.229***
	(-1.00)		(-1.74)
RatAA	-0.545	0.903	**-1.312***
	(-1.13)	(0.98)	(-1.85)
RatingInt	**-0.824****	-0.929	**-1.222****
	(-2.55)	(-0.74)	(-2.35)
Constant	**10.775***	**13.754***	**8.282***
	(5.16)	(4.13)	(2.76)
Observations	373	197	176
Adjusted R-squared	0.4181	0.2204	0.4009

Source: Author

5. CONCLUDING REMARKS

This study provides an overview of the present market of the real estate securitization instrument CRI and sets the discussion of its pricing determinants focusing on rating assessments of issuances. Eventually, the discussions address the real estate financing model in Brazil and the recent integration of the real estate mortgage system as well as the capital markets. Besides allowing for higher access to capital and providing alternative sources of funding, the secondary mortgage market represented by the growth of instruments such as CRIs could benefit the market by lowering the cost of capital used in the real estate market.

Previous studies have investigated other markets, like Gyamfi-Yeboah et.al. (2010) in South Africa and Campbell (2013) in the USA and Denmark. For some similarities such as the recent development, the South African experience resembles the Brazilian current experience as it has provided extra resources however at no lower costs to borrowers.

One motivation for this study is the excess return of the CRIs. As Caselli and Gatti (2005) note, the financial disintermediation includes three problems that are present in the discussion: the transactional and the informational difficulties as well as the perceived risk. For all these questions, the investigation of the market and relevant pricing determinants is key for the future development of this market.

This study aims at evaluating the factors behind the high returns of CRIs in the Brazilian market while focusing on rating assessments. Other authors (Vink, D., and A. Thibeault, 2008; Pinto et al., 2016; Buscaino et al., 2012; Hu et al., 2006) have developed important strategies to examine structured finance instruments and have been used in this study. We describe the market and show its increasing relevance since 2005. The empirical section covers the spreads of most issuances in the market using a recent and extensive database.

Consistent with previous findings (Buscaino et al., 2006 and Cuchra, 2004), credit rating is key for pricing securitization instruments. As the most important pricing factor for those authors, we have compared the returns of CRIs and local debentures, controlling for rating grades and the origin of the rating agencies (whether international or national). On average, there is a positive difference in CRIs of 1.0 p.p. over debentures. The difference is not equally seen in all rating grades and a distinction is clear with regard to the origin of the rating agency. In our results, being assessed by an international rating agency showed great importance in reducing spreads in general.

We measured the determinants of spreads of CRIs compared to the risk free yield curve. The results indicate that the pricing is different dependent upon the underlying assets being of two possible segments and their guarantees. The analysis has been controlled for (i) volume, (ii) maturity, (iii) rating grade, and (iv) rating origin. Notably, residential and allotment (residential urban parceling) present, on average, 1.4p.p. higher spreads. The level of guarantees is important to all segments, being the personal and corporate guarantees signs of higher perceived risks (significant and positive coefficients). It seems that, for compensating the low level of rated issuances, high levels of guarantees are usually offered. As for the volume and maturity, larger and longer issuances have lower spreads – however a small impact. Being assessed by rating agencies is not a trivial solution for lowering spreads of CRIs. Residential CRIs show a positive effect (lower spread) when assessed by any rating agency regardless of the grade. Commercial CRIs must deliver high scores and preferably by international rating agencies to present significant lower spreads.

The results allow us to understand the key features that characterize risk and pricing factors for CRIs. Probably, issuances would benefit from assessments by rating agencies by providing deeper knowledge of structures

used by issuers – currently only 23% of the issuances are rated. Still, a wider availability of information of issuances could lower the calculated spreads of CRIs. Currently, this market is still majorly restricted to qualified investors with a high minimum ticket. In order to minimize risks or the perceived risks, credit enhancements such as accumulation of guarantees, tranching and excess spread seem to be the rule.

Future studies may explore other aspects such as the companies that use CRI for funding, the profile of the typical investor, behavioral aspects of the disintermediation, macroeconomic impacts in the local capital market, among other aspects of this developing market.

6. REFERENCES

ANBIMA (2014). *Séries Históricas*. Retrieved from http://portal.anbima.com.br/informacoes-tecnicas/estatisticas/series-historicas/Pages/default.aspx.

ANBIMA (2016a). *Características de Subscritores*. Retrieved from: http://portal.anbima.com.br/informacoes-tecnicas/estatisticas/certificados-de-recebiveis-imobiliarios/.

ANBIMA (2016b). *Comparativo de Valores Mobiliários*. Retrieved from: http://www.debentures.com.br/dadosconsolidados/comparativovaloresmobiliarios.asp.

ANBIMA (2016c). *Global Ranking of Assets under Management*. Retrieved from: http://portal.anbima.com.br/informacoes-tecnicas/rankings/fundos-de-investimento/adm-rec-terc/Pages/adm-rec-terc.aspx.

BCB (2015). *Sistema Gerenciador de Séries Temporais (SGS)*. Retrieved from: https://www3.bcb.gov.br/.

BCB (2014). *Relatório de Economia Bancária e Crédito, 2014*. Retrieved from: http://www.bcb.gov.br/pec/depep/spread/rebc_2014.pdf.

Buscaino, V., Caselli, S., Corielli, F., & Gatti, S. (2012). Project Finance Collateralised Debt Obligations: an Empirical Analysis of Spread Determinants. *European Financial Management*, 18(5), 950-969.

Campbell, J. Y. (2013). Mortgage Market Design. *Review of finance*, 17(1), 1-33.

Campbell, J. Y., & Taksler, G. B. (2003). Equity volatility and corporate bond yields. *The Journal of Finance*, *58*(6), 2321-2350.

Caselli, S., & Gatti, S. (2005). Characteristics and Common Features of Structured Finance Operations. In *Structured Finance* (pp. 1-4). Springer Berlin Heidelberg.

CETIP (2015). *Características de CRI Database*. Retrieved from https://www.cetip.com.br/tituloscri.

Chen, W., Liu, C. C., & Ryan, S. G. (2008). Characteristics of securitizations that determine issuers' retention of the risks of the securitized assets. *The Accounting Review*, *83*(5), 1181-1215.

Corielli, F., Gatti, S., & Steffanoni, A. (2010). Risk shifting through nonfinancial contracts: effects on loan spreads and capital structure of project finance deals. *Journal of Money, Credit and Banking*, *42*(7), 1295-1320.

Davis, H. A. (2005). The Definition of Structured Finance: Results from a Survey. *Journal of Structured Finance*, *11*(3), 5.

Desa, C. L. (2005). Da Agua Pro Vinho: How the Baby Boomers Enabled the Creation of a Secondary Mortgage Market in Brazil. *Available at SSRN 811547*.

Fabozzi, F. J., Davis, H. A., & Choudhry, M. (2006). *Introduction to structured finance*. Wiley.

Fernandes, M. P., Sheng, H. H., & Lora, M. I. (2014). Securitization, Credit Rating and Issuers' Characteristics. *Brazilian Business Review*, *11*(6), 1.

Cuchra, M. F. (2004). Explaining launch spreads on structured bonds. *Avail. at SSRN 687800*.

Gyamfi-Yeboah, F., & Ziobrowski, A. J. (2010). The Integration of Mortgage and Capital Markets in Emerging Economies—Evidence from South Africa. *The Journal of Real Estate Finance and Economics*, *41*(3), 339-353.

Hu, J., & Cantor, R. (2006). The relationship between issuance spreads and credit performance of structured finance securities. *Journal of Fixed Income, Summer*.

Leece, D. (2008). *Economics of the mortgage market: perspectives on household decision making*. John Wiley & Sons.

Maris, B. A., & Segal, W. (2002). Analysis of yield spreads on commercial mortgage-backed securities. *The Journal of Real Estate Research*, 23(3), 235.

Mian, A., & Sufi, A. (2008). *The consequences of mortgage credit expansion: Evidence from the 2007 mortgage default crisis* (No. w13936). National Bureau of Economic Research.

Paula, L. F. D., & Faria Jr, J. A. D. (2012). Private corporate bonds market in Brazil: structural features and recent evolution. *Revista de Economia Contemporânea*, *16*(1), 107-137.

Pinto, J., Marques, M. O., & Megginson, W. L. (2016). A Comparative Analysis of Ex Ante Credit Spreads: Structured Finance versus Straight Debt Finance. Manuscript submitted for publication.

Poindexter, G. C., & Vargas-Cartaya, W. (2002). En ruta hacia el desarrollo: the emerging secondary mortgage market in Latin America. *Geo. Wash. Int'l L. Rev.*, *34*, 257.

Securities Industry and Financial Markets Association (SIFMA). (2016). *US Bond Market Issuance and Outstanding*. Retrieved from http://www.sifma.org/research/statistics.aspx.

Sheng, H. H., & Saito, R. (2005). Determinantes de spread das debêntures no mercado brasileiro. *Revista de Administração da Universidade de São Paulo*, *40*(2).

Sorge, M., & Gadanecz, B. (2008). The term structure of credit spreads in project finance. *International Journal of Finance & Economics*, *13*(1), 68-81.

TESOURO NACIONAL, Brasil. *Dívida Pública Federal: Relatório Anual 2015*. Retrieved from: http://www.tesouro.fazenda.gov.br/relatorio-anual-da-divida.

Vickery, J. I., & Wright, J. (2010). TBA trading and liquidity in the agency MBS market. *Economic Policy Review, May/2013*.

Vink, D., & Thibeault, A. E. (2008). ABS, MBS and CDO compared: an empirical analysis. *The Journal of Structured Finance*, *14*, 27-45.