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Balliester Reis, T orcid.org/0000-0002-8566-9787 (2019) Why Are Policy Real Interest Rates So High in Brazil? An Analysis of the Determinants of the Central Bank of Brazil's Real Interest Rate. International Journal of Political Economy, 47 (2). pp. 178-198. ISSN 0891-1916

https://doi.org/10.1080/08911916.2018.1497580

Why are policy real interest rates so high in Brazil? An analysis of the determinants of the Central Bank of Brazil's real interest rate

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Abstract

This paper discusses the determinants of Brazil's high policy real interest rates by considering two opposing views, the orthodox and heterodox approaches. While orthodox authors defend the position that bad domestic policies are the cause of the high interest rate, heterodox economists claim that the international financial system and orthodox policies influence the level of the policy rate in Brazil. The aim of this study is to assess whether the proposed arguments can be supported when comparing Brazilian real interest rates with other developing countries under the same monetary regime. A panel regression with 11 developing countries over the period 1996-2015 is estimated to test these hypotheses. The conclusion is that, although the orthodox and heterodox arguments are both coherent, when comparing stylized facts and testing the hypotheses econometrically neither is sufficient to elucidate the Brazilian case. The paper concludes by suggesting that there might be political causes of the high real interest rates in Brazil such as a politically influential rentier class.

Keywords: Brazil, Central Bank, interest rate, monetary policy, political economy

JEL Classification: E43, E58

1. Introduction

The high central bank interest rate in Brazil has been under discussion for a long time in academia and society in general. Although some economists conceive interest-rate setting as a purely technical mechanism, monetary policy is in fact constantly under dispute between workers, firms and rentiers. In order to support workers and firms, the former Workers' Party government implemented direct attempts to reduce the central bank real interest rate in 2012/13. However, the policy has failed, and the country has again raised real policy rates to a level much higher than in similar economies. Therefore, the debate on central bank interest rates and their effects has sparked again in the country, and existing economic theories that seek to explain the phenomenon shall be examined in this paper.

Table 1 shows that Brazil's central bank real interest rate (CBRIR) is among the highest in the world.[1] While Brazil has an average of 8.14% over the period 1996-2015, the corresponding time average for a group of selected countries, including Brazil, is only 1.85%. These extraordinarily high real interest rates of Brazil mean that the country is prone to reduced growth, increasing public indebtedness and rising income inequalities. Therefore, the Central Bank of Brazil (BCB) has been trying to reduce policy rates since the implementation of inflation targeting (IT) in 1999. Although there has been a clear declining trend of policy rates, Brazil has not been able to reduce its CBRIRs to a comparable level with the rest of the world.

One could argue that, since the country follows the IT framework, the central bank needs to respond to accelerating inflation by raising interest rates. However, Brazil does not have inflation rates much higher than other similar economies under IT regimes, as can be seen in Table 2.

Table 1: Central bank real interest rates of selected countries (%), 1996-2015

Country	1996-2000	2001-2005	2006-2010	2011-2015	1996-2015
BRA	16.36	9.69	4.27	2.22	8.14
CHL	2.53	-2.36	-1.99	1.60	-0.05
COL	5.64	0.73	1.70	0.65	2.18
IDN	-6.60	2.10	-5.41	1.36	-2.14
PHL	2.20	2.72	1.20	1.05	1.79
THA	4.13	-0.78	-0.98	0.31	0.67
ZAF	7.36	1.58	1.24	-0.67	2.38
AVR	4.52	1.95	0.00	0.93	1.85

Source: IMF – International Financial Statistics and national Central Banks (more information in Appendix A).
Note: The abbreviations correspond as following: Brazil (BRA), Chile (CHL), Colombia (COL), Indonesia (IDN), the Philippines (PHL), Thailand (THA) and South Africa (ZAF), and the simple average of the selected countries and periods (AVR).

Table 2: Inflation rates of selected countries (%), 1996-2015

Country	1996-2000	2001-2005	2006-2010	2011-2015	1996-2015
BRA	8.51	9.40	7.55	7.67	8.28
CHL	4.33	5.79	6.16	3.26	4.88
COL	18.57	6.43	5.13	3.28	8.35
IDN	26.26	9.71	13.41	5.16	13.64
PHL	9.71	4.85	4.52	2.12	5.30
THA	3.07	2.88	3.40	1.72	2.77
ZAF	7.90	7.52	7.56	5.54	7.13
AVR	11.19	6.66	6.82	4.11	7.19

Source: World Bank – World Development Indicators.
Note: Inflation is here defined as GDP deflator, following the World Bank measure for real interest rates.

Therefore, economists debate other aspects besides inflation that could explain this discrepancy. Mainstream economists find low saving (Hausmann 2008; Lara Resende 2011;

Segura-Ubiergo 2012), the history of sovereign debt default (Rogoff 2005; Segura-Ubiergo 2012), strong capital controls (Arida 2003; Arida et al. 2003), and weak domestic institutions (Bacha et al. 2009; Gonçalves et al. 2007; World Bank 2006) to be important causes of the phenomenon. Heterodox economists, on the other hand, claim that high exchange rate volatility (Arestis et al. 2008; Sicsú 2002) as well as the high exchange rate pass-through (Baltar 2015; Ono et al. 2005) are important determinants of the high CBRIR in Brazil. In addition, they argue that, since the country has cost-push inflation due to its indexed prices and high exchange rate pass-through, interest rate policy is not the appropriate tool to control inflation (Modenesi and Modenesi 2012; Oreiro et al. 2012; Summa and Serrano 2012). In combination with conservative interest rate-setting, this has induced the BCB to keep on raising its policy rate without succeeding in reducing inflation, thus constantly pushing the CBRIR up (Modenesi 2011).

The paper provides a systematic review and empirical test of the proposed explanations by mainstream and heterodox studies. It assesses the determinants of CBRIRs through stylized facts and econometric evidence. The study will thus contribute to the existing literature by providing evidence for proposed theoretical explanations, which could be used to formulate a more accurate theory of the determinants of real interest rates in Brazil. The main finding of the paper is that the existing orthodox and heterodox explanations for the high CBRIR in Brazil are insufficiently supported by the data. As a result, I suggest that a political economy approach, which conceives monetary policy mainly as an instrument for distributional purposes, must be adopted in order to properly understand the case of Brazil.

The paper is structured as follows: the second section discusses mainstream and heterodox explanations for high Brazilian CBRIRs and provides an empirical comparison between Brazil and other developing countries under the IT framework. Section 3 presents an econometric analysis of the determinants of CBRIRs for eleven countries from 1996 to 2015. The fourth

section discusses the empirical results through the lenses of a political economy approach. The last section concludes.

2. How do mainstream and heterodox economists explain the high policy rate in Brazil?

In this section, I review the mainstream and heterodox arguments for CBRIRs in Brazil, and present some comparative empirical evidence in order to provide a first reality check of the proposed determinants.

2.1. Mainstream explanations

Mainstream economists consider the high real interest rates in Brazil to be a puzzle (Bacha et al. 2009; Segura-Ubiergo 2012). Four main arguments have been put forth to explain the phenomenon: lack of saving, a high risk premium, high convertibility risk, and jurisdictional uncertainty.[2]

Lack of saving

According to mainstream economists, the CBRIR is high because there is a lack of saving in Brazil (Arida et al., 2003; Lara Resende 2011; Lopes 2014; Segura-Ubiergo 2012). This argument is based on the loanable funds theory in which the supply of saving and the demand for investment in the market for loanable funds determine the equilibrium interest rate (Mishkin 2014, chap. 4). Although it is acknowledged that short-term interest rates are set by the central bank, it is argued that the central bank rate cannot deviate from the natural rate of interest given by loanable funds market equilibrium without compromising price stability.

Lopes (2014) disaggregates saving into three components: private saving, government saving and external saving. Private saving corresponds to domestic firms and household saving, while government saving corresponds to the budget surplus, and external saving to the commercial deficit, i.e., the surplus in the capital and financial account (Lara Resende 2011). It is claimed

that private saving is low in Brazil because the high marginal tax rate affects mostly firms and households with high propensities to save, whereas most of the transfers are made to households with a low propensity to save, such as pensioners and poor individuals (Hausmann 2008). At the same time, government saving is also low in Brazil, although public investment is the lowest compared to other developing countries. The explanation given for low public saving is thus the considerable weight of pension transfers, high interest rates on public debt, and strong government consumption. Those factors would thus explain why domestic saving rates are lower in Brazil than in other countries, thus forcing the central bank to push interest rates up (Segura-Ubiergo 2012).

Table 3 depicts gross domestic saving rates as a share of GDP for a sample of seven developing countries that follow an IT regime. It is possible to see that Brazil has a higher saving-to-GDP ratio in comparison with other countries in the sample. For instance, Brazil showed higher rates than Colombia until 2010, South Africa after 2001, and the Philippines for the entire sample period. Thus, the stylized facts do not support the saving gap argument.

Table 3: Gross domestic saving as share of GDP for selected countries (%), 1996-2015

Country	1996-2000	2001-2005	2006-2010	2011-2015	1996-2015
BRA	15.64	19.17	20.46	19.66	18.73
CHL	24.31	25.59	30.32	24.73	26.24
COL	14.57	15.51	20.16	21.84	18.02
IDN	28.06	29.88	31.44	34.24	30.91
PHL	15.06	15.66	16.90	16.20	15.96
THA	34.14	29.64	31.04	29.56*	31.09
ZAF	19.26	19.12	20.28	18.79	19.36
AVR	21.58	22.08	24.37	23.58	22.90

Source: World Bank – World Development Indicators.
Note: Grey areas represent saving rate lower than the Brazilian one.
*Note 2: *Thailand's average is only from 2011 to 2014.*

High default risk premium

A second mainstream argument is that due to Brazil's history of sovereign defaults the country must pay a high default risk premium (Segura-Ubiergo 2012). In this view, a "country's risk of default on external debt, […] provides a good measure of a country's capacity to bear debt without brooking high risk of default" (*ibid*: 54). For being a "serial defaulter", Brazil is bound to receive less capital inflow from rich countries (Reinhart and Rogoff, 2004), which means that the country must take action to attract capital. Thus, the high government default risk would be captured by a higher central bank interest rate (Rogoff 2005).

The sovereign default of our selected countries is shown in Table 4. In the sample, Brazil had seven sovereign debt problem occurrences in the 1980s and five in the 1990s. However, in the 1980s Chile and the Philippines exhibit the same number of sovereign default events as Brazil and in the 2000s Indonesia had two years of default while Brazil had none. Therefore, this explanation also has weak empirical support. This result is consistent with Salles's (2007) argument that the history of inflation and default is common ground for all Latin American countries, thus not justifying the substantially higher Brazilian CBRIR.

Table 4: Sovereign debt default events for selected countries, 1996 – 2015

Country	1970-1979	1980-1989	1990-1999	2000-2015	1970-2015
BRA	0	7	5	0	12
CHL	0	7	1	0	8
COL	0	0	0	0	0
IDN	0	0	1	2	3
PHL	0	7	3	0	10
THA	0	0	0	0	0
ZAF	0	4	1	0	5
AVR	0	4	2	0	5

Source: Database for Sovereign Defaults, Bank of Canada.
Note: The indicator was calculated by using the foreign currency bank loans and transforming them into dummy vari ables. When there was an event of default on this type of loan, the dummy assumed the value of 1, while 0 means its absence.
Note 2: The grey areas show the periods in which countries had a number of sovereign debt default events similar to or greater than in Brazil.

Convertibility risk

A further argument is that the convertibility of the Brazilian Real is very restrictive. As clarified by Gonçalves et al. (2007), this argument is not related to pegged exchange rate regimes, but to capital controls, i.e., any restrictions to convert local currency into foreign currency. Some examples of capital controls that impose restrictions on foreign investments by Brazilian residents are the prohibition of big institutional investors such as pension funds to invest abroad, the high level of bureaucracy that increases compliance costs and, lastly, a requirement of previous authorization from the BCB to transfer large amounts abroad (Arida et al. 2003). As a result, mainstream studies argue that foreign lenders would be very cautious in providing funds to Brazilian residents as there would be a high risk that residents would not be able to repay their loans. Thus, lenders would increase their interest rates in foreign currency because of the convertibility risk. The higher interest rates on foreign loans would also push domestic interest rates up (Arida 2003).

Table 5 displays the level of capital controls for the seven countries under analysis, using a capital control index as a proxy for the convertibility risk argument. The index was constructed by Fernández et al. (2015) based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. As it is noticeable, Brazil had relatively strong capital controls until 2001, but so did other countries. Moreover, Brazil had lower capital controls than the average from 2001 to 2010. Therefore, it is not possible to conclude that this is a strong cause of the Brazilian higher real interest rate, which is also confirmed by the time series in Gonçalves et al. (2007).

Table 5: Convertibility risk measured by capital control index of selected countries, 1996-2013

Country	1996-2000	2001-2005	2006-2010	2011-2013	1996-2013
BRA	0.76	0.41	0.49	0.65	0.58
CHL	0.88	0.29	0.18	0.40	0.44
COL	0.74	0.64	0.63	0.58	0.65
IDN	0.54	0.63	0.66	0.66	0.62
PHL	0.77	0.85	0.88	0.88	0.85
THA	0.66	0.77	0.79	0.77	0.75
ZAF	0.63	0.62	0.60	0.63	0.62
AVR	0.71	0.60	0.60	0.65	0.64

Source: Fernández et al. (2015).
Note: The grey areas indicate higher capital control index than Brazil.

Jurisdictional uncertainty

Regarding institutional aspects, we find the so-called jurisdictional uncertainty hypothesis. According to it, the institutions of a particular country are determinants of interest-rate setting (Arida et al. 2003). The theory is based on the fact that there is no domestic market for long-term credit and bonds (Gonçalves et al. 2007) neither in Real nor foreign currency, but the

Brazilian government, as well as large firms and banks, do have access to foreign credit denominated in foreign currency (Arida et al. 2003). The lack of a domestic credit market is due to uncertainties related to the Brazilian jurisdiction. One example of jurisdictional uncertainty would be the risk created by the government since it could modify financial contracts at any time, such as through surprise inflation, asset confiscation and direct lending policies – as it has done in the past. Therefore, investors would demand a premium for a possible future loss. The other example relates to the lack of legal rights for creditors and a legal system that systematically benefits debtors (World Bank 2006). Moreover, in this view, there is an anti-creditor bias reflected in the common Brazilian opinion in which the creditor has a negative connotation and opposes itself to the debtor, who is considered the productive capital that is able to generate jobs and output (Arida et al. 2003). In this respect, the uncertainty related to the Brazilian jurisdiction would require from the central bank the setting of a higher interest rate to attract foreign capital.

Bacha et al. (2009) quantify jurisdictional uncertainty through the rule-of-law index from the World Bank to estimate its impact on interest rates in Brazil but find no relation between the two variables. In the same way, Gonçalves et al. (2007) use the rule-of-law and regulatory quality as proxies for jurisdictional uncertainty but again find no relation between the variables and interest rates. Table 6 deals with the jurisdictional uncertainty argument. Following the work of Gonçalves et al. (2007), I use the rule-of-law index as a proxy for jurisdictional uncertainty. Rule-of-law is an estimation of the confidence that agents have in law enforcement and legal stability, in particular in the quality of contract enforcement, property rights, the police, and the courts, in addition to the likelihood of crime and violence. It is captured by an index ranging from -2.5 to 2.5 units in a standard normal distribution. As we can see, many countries such as Colombia, Indonesia, and the Philippines have a similar or lower rule-of-law index than Brazil. Thus, the empirical evidence does not support this mechanism.

Table 6: Rule-of-law index of selected countries, 1996-2014

Country	1996-2000*	2001-2005**	2006-2010	2011-2014	1996-2014
BRA	-0.31	-0.40	-0.29	-0.08	-0.27
CHL	1.13	1.28	1.26	1.37	1.26
COL	-0.89	-0.73	-0.44	-0.37	-0.61
IDN	-0.61	-0.86	-0.66	-0.53	-0.67
PHL	-0.15	-0.47	-0.52	-0.46	-0.40
THA	0.53	0.18	-0.13	-0.17	0.10
ZAF	0.08	0.06	0.11	0.12	0.09
AVR	-0.03	-0.13	-0.10	-0.02	-0.07

Source: World Bank – Worldwide Governance Indicators.
*Note: *1997 and 1999 are missing. **2001 is missing.*
Note 2: The grey areas show rule-of-law values lower than the respective Brazilian one.

To sum up, mainstream economists provide four key explanations for why the policy real interest rate in Brazil is higher than in other countries which are summarized in Table 7. They refer to the lack of saving, the country's history of default on external lenders, the level of capital controls and the intrinsic risk of the national institutions. Yet, the analysis of the stylized facts shows that those arguments are not supported when comparing the Brazilian results with other developing countries under the IT regime.

Table 7: Summary of mainstream explanations for the high real interest rate in Brazil

Argument	Proponents	Cross-country comparison	Empirical support?
Low level of saving	Arida et al. 2003; Hausmann 2008; Lara Resende 2011; Segura-Ubiergo 2012	Colombia, the Philippines and South Africa have lower saving rates	No
Default history	Rogoff 2005; Segura-Ubiergo 2012	Brazil only has more default issues than other countries in the 1990s	No
Convertibility risk	Arida 2003; Arida et al. 2003	The Philippines show higher capital control measures for the entire sample	No
Jurisdictional uncertainty	Arida et al. 2003; Bacha et al. 2009; Gonçalves et al. 2007; World Bank 2006	Colombia, Indonesia and the Philippines exhibit lower rule-of-law indicators	No

2.2. Heterodox explanations

Heterodox economists reject the theoretical foundation of mainstream arguments, such as the loanable funds theory and the natural rate of interest. The heterodox tradition argues that interest rates are variables that are determined exogenously, while the credit supply is endogenous (Smithin 1994). Therefore, the heterodox explanations differ substantially from mainstream ones.

With respect to Brazil, two key arguments made by heterodox economists are related to the effect of the exchange rate on inflation. Moreover, it is argued that the application of inappropriate monetary policies and the conservative approach of the BCB are also important factors for the high CBRIR in Brazil.[3]

Exchange rate volatility

The first argument is that the high volatility of the exchange rate has a strong connection with the high interest rates (Sicsú 2002; Oreiro et al. 2012). According to Carneiro and Rossi (2013: 6), "international investors demand a premium which takes the form of an increase in the nominal interest rate to compensate for the risk of moving to an unstable currency". This argument stems from the Keynesian assumption that every asset has a liquidity premium, that is, a value for its convenience and security, which is included in the final rate of return on this asset (Keynes 2003 [1936]). Regarding national currencies as assets, the more convenient and secure the currency, the lower its interest rate premium will be. Herr (2008) calls this phenomenon *currency premium*, in which "each currency in the world earns a specific non-pecuniary rate of return" that represents its respective qualities. This concept is also present in Conti et al. (2014), who elaborate the determinants of the domestic interest rate under this aspect.

In Table 8, the volatility of the nominal exchange rate for selected countries can be compared.[4] Although Brazil does show a strong volatility, other countries' exchange rates are also highly unstable, such as the Indonesian and the South African ones. Therefore, this argument seems not to be a sufficient explanation for the high CBRIRs in Brazil.

Table 8: Nominal exchange rate volatility of selected countries, 1996 – 2015

Country	1996-2000	2001-2005	2006-2010	2011-2015	1996-2015
BRA	0.035	0.099	0.077	0.075	0.072
CHL	0.028	0.054	0.060	0.040	0.046
COL	0.065	0.035	0.067	0.050	0.054
IDN	0.135	0.048	0.045	0.040	0.067
PHL	0.058	0.018	0.035	0.020	0.033
THA	0.084	0.025	0.030	0.022	0.040
ZAF	0.058	0.078	0.082	0.058	0.069
AVR	0.066	0.051	0.057	0.044	0.054

Source: USDA, Economic Research Service.
Note: Following Clark et al. (2004), volatility is measured as the yearly standard deviation of the growth rate of monthly exchange rates.
Note 2: The grey shadows show periods in which volatility in other countries was greater to that of Brazil.

Exchange rate pass-through

Furthermore, heterodox economists highlight the effects of strong exchange rate pass-through in Brazil. The high exchange rate pass-through means that in the case of a currency devaluation there is a strong effect on the domestic price level. Consequently, the BCB is forced to increase the nominal interest rate to contain the increase in general prices (Ono et al. 2005). A high exchange rate pass-through is a second channel through which exchange rate volatility may affect the CBRIR. Since exchange rate volatility changes the expected inflation rate, the monetary authority might be unable to meet the previously established target (Arestis et al. 2008). According to Barbosa-Filho (2015), by adopting an interval of tolerance of 2 percentage points, the BCB can adjust the target according to the exchange rate variations. He finds that exchange rate volatility is able to explain most of the changes in inflation in Brazil since the IT implementation. This is supported by an empirical study by Oreiro et al. (2012) that shows that

the variation in the exchange rates is the main determinant of the Consumer Price Index (CPI) and central bank nominal interest rate in the country.

The measurement of exchange rate pass-through for each country in the sample is beyond the scope of this paper. However, empirical evidence shows that Brazil does not have a higher exchange rate pass-through than other countries in the sample. Baqueiro et al. (2003: 349) found that, for Colombia, the exchange rate pass-through has a coefficient between 0.77 and 2.56. Extending the model to Brazil, Silva and Vernengo (2008: 69-70) find the exchange rate pass-through coefficient in Brazil to be between 0.02 and 0.91, which is much lower than the Colombian equivalent. Thus, although it is possible that exchange rate variation has a positive effect on inflation in Brazil, this cannot be the only explanation for the high real interest rates.

Cost-push inflation

Heterodox economists do not assume that inflation is a matter of pressures from aggregate demand. The increase in prices rather comes from the supply-side, due to so-called cost-push inflation. This phenomenon can stem from an increase in rents (Wray 1997), indexation of administrated prices (Summa and Serrano 2012), devaluation of the national currency (Serrano 2010), but mostly from the distributional aspirations of workers and capitalists (Rochon and Rossi 2006; Smithin 1994). Also known as conflict inflation, this theory states that by demanding higher nominal wages, there is an increase in costs of production that firms are likely to roll over onto prices. Therefore, the distributional conflict between workers and capitalists can push prices up (Lavoie 2014, chap.8; Rochon and Rossi 2006).

Correspondingly, heterodox authors believe that the orthodox policy of controlling inflation through monetary policy is not appropriate. This is particularly important in Brazil, where indexed prices in the economy cause cost-push inflation, which cannot be prevented by setting a higher nominal interest rate (Summa and Serrano 2012; Oreiro et al. 2012). Due to high

inflation in the 1980s, many services and goods, including administered prices, were indexed to inflation in order to maintain their real values. Although there was a reduction of indexation after the *Real Plan* in 1994, a significant share of goods and services still have formally indexed prices, such as rents, energy and telecommunication (Modenesi and Modenesi 2012). In addition to the indexation, administered prices exhibit other peculiarities. Those prices show insensitivity towards interest rate changes, represent around 30% of the CPI, and have growth rates beyond the free-price goods and services (*ibid*: 396), which pushes inflation further up. A study by Summa and Serrano (2012) shows that average administrated price inflation has been higher than total average price growth during the 2000s. This study corroborates the hypothesis that the indexation of administered prices has a strong effect on inflation in Brazil. Moreover, there is an 'amplifying effect' of monitored prices. For instance, exchange rate fluctuations have a greater effect on those prices than free-price goods or services (Oreiro et al. 2012). Serrano (2010) affirms that these fluctuations first impact monitored prices, which are later passed on to free-price goods. Thus, inflation in Brazil cannot be reduced by increasing nominal interest rates and, by trying to do so, the BCB, in fact, keeps on raising them beyond the international level.

Empirically, the indexation of prices as a factor of increasing central bank interest rates is difficult to compare due to lack of data. Although Brazil has a high indexation level, as discussed above, other countries also exhibit the same issue. In Colombia, for instance, regulated prices of electricity, gas, water and sewage are indexed to the previous inflation level, while fuel and transport services adjust prices according to costs (Vargas et al. 2009). Moreover, López (2008) affirms that, although showing a declining trend in relative prices with respect to free-price goods, administered prices in Colombia have a higher annual variation than the latter. They also have a large impact on total inflation, when considering its relative size in the basket of goods. Therefore, administered-price indexation is not a feature only of the Brazilian

economy. Since Colombia exhibits a much lower CBRIR than Brazil, this explanation can also be regarded as insufficient.

Monetary policy conservatism

Considering the political aspect of the IT framework, Oreiro et al. (2012) claim that the BCB has an excessive concern about the inflation rate. To confirm this argument, Modenesi (2011) shows that the BCB has an extremely conservative reaction function: it sets the nominal interest rate higher than necessary to fight inflation and it reduces the rate only very slowly when actual inflation is below the target. This "slow to ease, quick to hike" philosophy has been adopted by other inflation-targeting central banks as well (Bibow 2013: 623). In fact, under disinflation or economic deceleration is it likely that the BCB interest rate will remain unchanged (Modenesi 2011).

Schmidt-Hebbel and Werner (2002) econometrically test the Granger causality from CPI inflation to inflation targeting. For Brazil, they do not find any Granger causality, probably due to the small sample period or the fact that the country already had low inflation rates when adopting the IT framework. For Chile, however, they conclude that CPI inflation Granger caused the setting of the inflation target and consider this finding to be consistent with the argument that the Central Bank of Chile was conservative during the setting of its targets in the 1990s. In that way, Brazil does not seem to be the only country in which the Central Bank sets conservative targets to reduce inflation.

To conclude, heterodox economists consider that the BCB's interest rate policy has another purpose beyond controlling inflation directly: to control exchange rate volatility due to high exchange pass-through. Moreover, due to an incorrect diagnosis of the causes of inflation, the BCB is unable to reduce inflation effectively. Therefore, the interest rate ends up being set at a

much higher level than it should be. A summary of heterodox arguments can be found in Table 9.

Table 9: Summary of heterodox arguments for the high real interest rate in Brazil

Argument	Proponents	Cross-country comparison	Empirical support?
Exchange rate volatility	Arestis et al. 2008; Sicsú 2002	South Africa has strong volatility as well	No
High exchange rate pass-through	Baltar 2015; Ono et al. 2005; Oreiro et al. 2012	Brazil shows a lower coefficient than Colombia	No
Cost-push inflation	Modenesi and Modenesi 2012; Oreiro et al. 2012; Serrano 2010; Summa and Serrano 2012	Colombia exhibits indexation of administered prices too	No
BCB conservatism	Modenesi 2011; Oreiro et al. 2012	Chile also implemented conservative targets in the 1990s	No

As we can see, the stylized facts indicate the fragility of the current analyses for the case of Brazil. However, in order to test the general explanatory power of each argument, I will use an econometric analysis to investigate their relevance in a context of developing countries under IT. Moreover, the econometric analysis will provide evidence on country-specific characteristics that are not captured by the existing explanations.

3. Econometric analysis of the determinants of central bank real interest rates

This section develops a panel analysis of the determinants of central bank real interest rates based on the orthodox and heterodox explanations presented above. The sample consists of 11

developing countries: Brazil (BRA), Chile (CHL), Colombia (COL), Indonesia (IDN), Mexico (MEX), Peru (PER), the Philippines (PHL), Poland (POL), Thailand (THA), Turkey (TUR) and South Africa (ZAF). The time period is 1996-2015. I start from the following general regression equation:

$$(1) \qquad CBRIR_{it} = \alpha_i + \beta_1 SAV_{it} + \beta_2 RULE_{it} + \beta_3 KCONTR_{it} + \beta_4 XRVOL_{it} + \beta_5 IT_{it} + \beta_6 FED_t + \beta_7 GDP_{it} + \varepsilon_{it}$$

Where *CBRIR* is the central bank real interest rate, α_i is the fixed effect of each country, *SAV* is gross domestic saving as share of GDP, *RULE* is the rule-of-law index, *KCONTR* is an index of overall restrictions on inflow and outflow of assets and *XVOL* is the volatility of nominal bilateral exchange rates with respect to the U.S. dollar. *IT* is a dummy variable for the years in which the country was under the inflation targeting framework (0 is not under IT and 1 is under IT), *FED* is the effective federal funds rate of the United States (U.S.) and *GDP* is the GDP growth rate.[5]

The first three variables are derived from mainstream theory. *SAV* is the saving rate of the economy which, according to the loanable funds theory, is expected to exert a negative effect on the *CBRIR*. *RULE* is a proxy for jurisdictional certainty. A better ranking in the rule-of-law index is expected to have a negative impact on *CBRIR* because it implies a lower risk for creditors. Mainstream authors further argue that capital controls constitute convertibility risk for foreign investors that is being compensated by a higher interest rate. *KCONTR* is thus expected to have a positive effect on *CBRIR*.

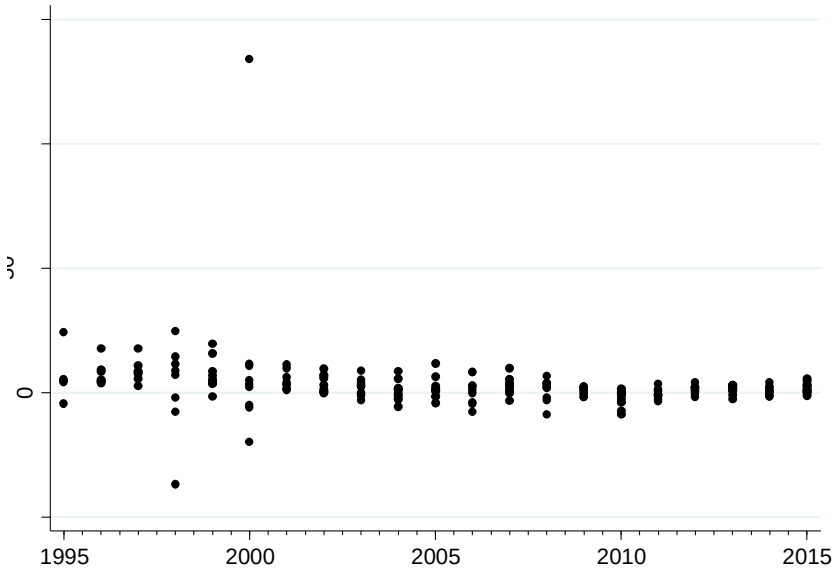
The variable *XRVOL* captures the argument that has been put forth by heterodox economists that exchange rate volatility affects real interest rates via risk premium. *XVOL* is expected to

have a positive impact on *CBRIR* because it leads to a lower quality of the currency, which is assumed to be compensated by a higher interest rate premium. The exchange rate pass-through, cost-push inflation and the monetary policy conservatism channels are not included in the model due to lack of data.

Lastly, *IT*, *FED*, and *GDP* are added as control variables. *IT* represents a change in the monetary policy regime towards inflation targeting, i.e., a more rigid, rule-based approach. *FED* is expected to have a positive effect on *CBRIR,* as it has been argued that in a financially globalized world, U.S. monetary policy influences policy rates in the rest of the world through speculative capital movements (Rey 2016). Moreover, output growth is expected to impact on monetary policy setting insofar as the output gap is an argument of the central bank reaction function. We would, therefore, expect *GDP* to exert a positive effect on *CBRIR*.

Figure 1 shows a scatter plot of the dependent variable. We can see that Turkey's value of 133.97 in the year 2000 constitutes an extreme outlier. It has thus been removed from the sample.

Figure 1: Scatter plot for the *CBRIR* variable for all the countries in the sample, 1995-2015



I initially estimate the model using a within estimator and then run different tests to control for certain effects that could bias the estimates. First, I check for unit roots in the time series. I conduct Fisher type panel unit root tests for all time series using the augmented Dickey-Fuller test. The mean of the series across the panel for each period has been subtracted in order to correct for cross-sectional dependence and a drift term is used since the mean of each variable is nonzero for all the countries in the sample. The result indicates that there are no unit roots in the estimation. Second, I conduct a Hausman test to decide between random and fixed effects. The result indicates the use of fixed effects. Then, I perform a Wald test which suggests no time fixed effects. Fourth, a modified Wald test showed the presence of heteroskedasticity in the model. Lastly, in order to test for autocorrelation, I run the Wooldridge test for autocorrelation in panel data and the result indicates first-order autocorrelation (AR1) in the model.

In order to account for the problems of autocorrelation and endogeneity, I chose the autoregressive distributed lag (ADL) approach to find the right lag structure for the model. I start from a general model with contemporaneous explanatory variables and two time lags each, including the dependent variable. The Pesaran test for cross-sectional independence is not rejected, which suggests the presence of cross-sectional independence. Therefore, I apply robust standard errors to correct heteroskedasticity. Then I successively withdraw the explanatory variable with the lowest t-value until I reach a model with one explanatory variable each, either lagged or contemporaneous:

$$(2) \qquad CBRIR_{it} = \alpha_i + \beta_1 CBRIR_{it-1} + \beta_2 SAV_{it-1} + \beta_3 RULE_{it-1} + \beta_4 KCONTR_{it-1}$$

$$+ \beta_5 XRVOL_{it} + \beta_6 IT_{it-2} + \beta_7 FED_{t-2} + \beta_8 GDP_{it-1} + \varepsilon_{it}$$

I employ four different methods to estimate equation (2). The first one is a within estimation with robust standard errors of the ADL model given by equation (2) (RB), which corrects for heteroskedasticity and first-order autocorrelation. The Pesaran test indicates that the model (2) still suffers from cross-sectional dependence. I thus use the within estimator with Driscoll-Kraay standard errors (DK) correcting for heteroskedasticity and cross-sectional dependence as a second estimation method. Next, I use the Pesaran and Smith (1995) Mean Group Estimator (MG) with robust standard errors that allows for heterogeneous slope coefficients across group members and corrects for cross-sectional dependence. Lastly, I apply a regression using in first differences with robust standard errors so as to account for autocorrelation and heteroskedasticity. The specifications are described in Table 10, while the results are shown in Table 11.

Table 10: Methodology of each ADL estimation

Specification	Estimation method	Unobserved country fixed effect	Standard Errors	Corrects for heteroskedasticity?	Corrects for Autocorrelation AR1?	Corrects for Cross-sectional dependence?
(1) RB	Within	Fixed	Robust	Yes	Yes	No
(2) DK	Within	Fixed	Driscoll-Kraay	Yes	No	Yes
(3) MG	Mean group		Robust	Yes	No	Yes
(4) FD	Within	Fixed	Robust	Yes	Yes	No

As it is possible to notice, no explanatory variable is statistically significant across all specifications. Except for the estimations using first differences, the *IT* regime dummy variable

is statistically significant in most specifications and has a negative effect on *CBRIR*. In the first specification, for instance, implementing the IT framework reduces *CBRIR* by about 5.2 percentage points on average two years later. Thus, there is some evidence that the IT framework reduced the *CBRIR* in the sample. Apart from *IT*, no other variable is statistically significant in more than one specification. Therefore, none of the other explanatory variables can be considered robust.

As a final robustness check, I redo the ADL method with fixed-effects and robust standard errors, and successively remove the variables with the lowest t-value until only statistically significant variables remain, which turn out to be $CBRIR_{it-1}$ and IT_{it-2}, thus confirming previous findings.

Table 11: Estimations of equation (2)

Dependent variable: central bank real interest rate (*CBRIR*)				
	(1) RB	**(2) DK**	**(3) MG**	**(4) FD**
$CBRIR_{it-1}$	0.18**	0.18**	0.26***	-0.15
	(0.08)	(0.07)	(0.07)	(0.10)
SAV_{it-1}	0.22	0.22**	0.21	-0.07
	(0.13)	(0.08)	(0.36)	(0.25)
$RULE_{it-1}$	-2.27	-2.27*	5.49	4.37
	(1.73)	(1.08)	(6.42)	(3.38)
$KCONTR_{it-1}$	1.62	1.62	0.01	-9.91**
	(2.26)	(2.76)	(9.19)	(4.75)
$XRVOL_{it}$	0.54	0.54**	0.55	-0.18
	(0.33)	(0.23)	(1.01)	(0.55)
IT_{it-2}	-5.24***	-5.24***	-2.98***	-2.02
	(0.90)	(0.23)	(1.14)	(1.88)
FED_{t-2}	0.11	0.11	0.14	0.42**
	(0.12)	(0.19)	(0.17)	(0.21)
GDP_{it-1}	0.09	0.09	0.18	-0.16*
	(0.10)	(0.10)	(0.18)	(0.07)
Observations	149	149	143	115
Groups	11	11	10	11
Time period	**1996 – 2015**	**1996 – 2015**	**1996 – 2015**	**1996 – 2015**
F-test	0.0000***	0.0002***	0.0035**	0.0000***

*Note: * statistically significant at the 10% level, ** statistically significant at the 5% level, *** statistically significant at the 1% level.*
Note 2: Values in the brackets are standard errors.

In conclusion, the results show that the proposed explanations for CBRIR determination in developing countries under IT cannot obtain strong econometric support. This confirms the indicative descriptive evidence presented in the previous section. The weak performance of the

explanatory variables points to the relevance of omitted variables that are partly captured by the country-specific constants α_i. Table 12 displays the country-specific constants of the sample obtained from specification (1).

Table 12: Country fixed effects of sample countries

Country	BRA	CHL	COL	IDN	MEX	PER	PHL	POL	THA	TUR	ZAF
FE	5.22	-0.76	0.15	-3.04	-0.27	-0.45	-0.47	0.67	-1.10	-0.41	0.34

Here it is possible to see that Brazil, even after controlling for other factors, has a very high fixed effect of 5.22, while other countries had smaller and even negative country-specific constants. What could explain the significantly higher level of Brazil's country-specific intercept that is not captured by the model?

4. Discussion

A possible explanation for the high country-specific constant is that central bank policy is affected by political determinants that have not been properly considered by the economic literature on interest rates in Brazil so far. However, on a more general theoretical level, the heterodox tradition does offer an approach to the political economy of monetary policy. By arguing that the interest rate determines how income is distributed between borrowers and lenders, heterodox political economy maintains that higher interest rates benefit rentiers to the detriment of the working class and possibly firms (Lavoie 2014, chap. 4; Rochon and Setterfield 2007; Wray 2007). With the rise of financialization, such as the de-regulation of financial markets, frequent mergers and acquisitions, the increase of financial assets on non-financial corporations' balance sheets, and the development of new financial products, firms are, however, increasingly aligning their interests with those of financial capitalists. Thus,

under financialization, there is an increasing coincidence of interests between rentiers and industrial capitalists, which creates support for rentier-based policies also from non-financial corporations (Epstein 2002; Lapavitsas 2009).

This theory has been applied to IT as a monetary policy rule, where IT is considered to be an especially rentier-friendly monetary policy since it aims at lowering inflation so as to maintain the accumulated fixed nominal value of financial assets. Hence, with the implementation of an IT regime, a comparatively low rate of inflation would be achieved by setting higher nominal interest rates. In this way, the increase in the average real interest rate would benefit rentiers to the detriment of workers' wages and firms' profits (Atesoglu and Smithin 2006; Epstein 2002; Epstein and Power 2003). IT in Brazil is also analyzed by Vernengo (2008), who affirms that this monetary regime benefits rentiers and diminishes workers' wages and firms' profits. The empirical results presented in section 3 of this article, however, point in a different direction, since the coefficient on IT exhibits a statistically negative effect on real interest rate in three out of four estimations. Even though there has been a sharp reduction in inflation since the implementation of IT in developing countries, nominal interest rates have fallen by even more, resulting in declining real interest rates (as shown in Table 1).[6]

Thus, although the decline in real interest rates in developing countries since the introduction of IT is at odds with the political economy theory, it may still be able to explain the high level of CBRIRs in Brazil. According to the contest terrain theory of central banking, the Central Bank is a terrain of inter- and intra-class struggle and its policy will depend on the relative power of rentiers, firms and workers (Epstein, 1994). Following this approach, my suggestion is that the power of the Brazilian financial and industrial elite could be the reason for this phenomenon.

In fact, different social scientists have pointed to the strong political power of rentiers in the country (Boito Jr. 2012; Bruno 2011; Singer 2015). In a historical perspective, Boito Jr. (2012)

mentions the rapprochement of industrialists with the workers' movements in 1996 to protest against neoliberal reforms and the increase of interest rates, which were considered to be pro-rentier policies. On a more recent outlook, Singer (2015) writes about the attempt to reduce the CBRIR in 2012 and 2013 by the Workers' Party government. He shows how expansionary monetary policies caused a strong reaction from the rentier class and, later, from industrialist organizations as a result of an elite coalition. The opposition of industrialists to decreasing CBRIRs is also investigated by Bruno (2011) who points out the increasing financialization of firms in Brazil, aligning the interests of industrialists with that of rentiers. Nonetheless, these studies do not provide rigorous empirical evidence explaining the high level of the Brazilian CBRIR.

The present analysis suggests that political power of rentiers and financialized firms could be the cause of the high country-specific intercept since other possible determinants do not exhibit robust statistical support. A monetary policy committee with strong links to the financial sector, for instance, could set conservative inflation targets, thus seeking to maintain the real interest rate at a high level. A possible method to assess this would be to examine the composition of the high-level administrations in order to evaluate the policy influence of the financial sector, as has been done already for the U.S. by Bellamy Foster and Holleman (2010). Likewise, rentiers that move their assets abroad in the case of low real interest rates could also have a strong influence over the Central Bank's nominal interest rate setting. A possible analysis could consist in estimating capital flight as a proxy for the exit-options of rentiers with respect to reductions in the CBRIR. However, although these hypotheses are plausible, empirical investigation of this matter is still lacking as data to measure the power of rentiers are not readily available. Therefore, operationalizing rentier power would constitute a promising future research project.

5. Conclusion

This paper presented orthodox and heterodox views in order to explain the high Central Bank real interest rate in Brazil. Mainstream studies highlight low saving rates, the default history of the country, strong capital controls and jurisdictional uncertainty, while heterodox economists discuss the importance of the exchange rate volatility and the inappropriateness of monetary policy to control inflation in Brazil due to indexed prices and the exchange rate pass-through. A comparison of stylized facts between Brazil and other developing countries under the IT framework suggested that the existing arguments are not sufficient to explain why the CBRIR is much higher in Brazil than in other countries. Subsequently, an econometric model was estimated using panel data. The result corroborated the descriptive analysis and showed that all proposed variables perform weakly as predictors of CBRIR in developing countries under inflation targeting. Furthermore, a key conclusion of the econometric analysis regards the country-specific intercepts: in comparison to other countries, Brazil has a very high constant even after controlling for the hypothesized factors, which means that there are important country-specific factors that are not captured by the model.

This paper embraces the view that the interest rate is mainly a distributional variable, as argued by Lavoie (2014), Rochon and Setterfield (2007) and Wray (2007). Following the literature on the political economy of monetary policy (Epstein 2002; Epstein and Power 2003), according to which rentiers are able to influence interest rate setting, I suggest that Brazilian rentiers are comparatively more successful in influencing the Central Bank to keep real interest rates at a high level. Hence, the strong power of the rentier class could explain the comparatively high level of CBRIR in Brazil.

Despite some descriptive evidence of the power of the rentier class in Brazil and their effects on monetary policy (Boito Jr. 2012; Bruno 2011; Singer 2015), this channel has not been rigorously investigated yet. This could be operationalized by analyzing the composition of the

high-level administrations or estimating capital flight, for instance. This should be dealt with in further research.

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Appendix A: Description of variables used in the model (1) and (2)

Table A1: Dependent variables' measures, period and sources

Country	Variable	Measure	Period	Source
BRA	SELIC/TCB	Simple average	1996 – 2015	Central Bank of Brazil
CHL	Tasas de interés de referencia de la política monetaria	Simple average	1995 – 2015	Central Bank of Chile
COL	Tasa de intervención	Simple average	1995 – 2015	Banco de la Republica
IDN	Central bank policy rate	Percentage per annum	1995 – 2015	International Financial Statistics, IMF
MEX	Tasa de fondeo bancario	Weighted average	2008 – 2015	Bank of Mexico
PER	Tasa Referencia de Politica Monetaria	Simple average	2003 – 2015	Central Reserve Bank of Peru
PHL	RRP Rate (term)	Simple average	1995 – 2015	Central Bank of the Philippines
POL	Reference rate	Simple average	1998 – 2015	Narodowy Bank Polski
THA	Max. interest rates of fixed deposits (1 year)	Simple average	1995 – 2015	Bank of Thailand
TUR	Central bank policy rate	Percentage per annum	1999 – 2015	International Financial Statistics, IMF
ZAF	Central bank policy rate	Percentage per annum	1995 – 2015	International Financial Statistics, IMF

Table A2: Explanatory variables

Variable	Name	Measure	Period	Source
Gross domestic saving (% of GDP)	*SAV*	Gross domestic saving is calculated as the GDP minus the final consumption expenditure (total consumption)	1996 – 2015	World Development Indicators, World Bank
Rule-of-law	*RULE*	Index of an estimation of the confidence that agents have in the rules of society	1996 – 2014	Worldwide Governance Indicators, World Bank
Capital control	*KCONTR*	Overall restrictions index (all assets categories)	1996 – 2013	Fernández et al., 2015
Exchange rate volatility	*XRVOL*	Yearly standard deviation of the first difference of monthly nominal values (local currency per USD) in log, as defined by the Clark et al. (2004)	1996 – 2015	USDA, Economic Research Service
Inflation-targeting	*IT*	Dummy variable for the years under the inflation-targeting framework	1996 – 2015	Hammond, 2012
Effective federal funds rate	*FED*	Volume-weighted median of overnight federal funds transactions	1996 – 2015	Federal Reserve Economic Data
GDP growth	*GDP*	Annual percentage growth rate of GDP at market prices based on constant local currency	1996 – 2015	World Development Indicators, World Bank

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Biographical Statement

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