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Аннотация

Эта статья посвящена монетарной политике и финансовым рынкам в Бразилии. Мы обнаруживаем, что с 2000 года четные недели периодов между встречами Комитета по денежно-кредитной политике характеризуются статистически значимыми положительными дополнительными доходностями на рынке акций. Мы утверждаем, что этот двухнедельный цикл является локальным феноменом и, вопреки существующей гипотезе, не может быть объяснен побочными эффектами монетарной политики США. Мы также фиксируем повышение важности решений ФРС для Бразилии после 2009 года.

Abstract

This paper is devoted to the monetary policy and financial markets in Brazil. We find that since 2000 the even weeks of the COPOM (Brazil's central bank) intermeeting periods are characterized by statistically significant positive additional stock market returns. We argue that this bi-weekly pattern is a local phenomena and, as opposed to the existing hypothesis, cannot be fully explained by spillover effects of the US monetary policy. We also document an increase of the impact of the Fed decisions on Brazil's financial markets after 2009.

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1 Introduction

1.1 Literature review

The questions about the implications of Central banks' policy decisions and communication on asset prices and interest rates have been in the scope of financial research for a long time. Unsurprisingly, many papers first of all investigate the short-term responses of interest rates to monetary surprises. For example, Rosa and Verga (2008) in their article examine the effect of European Central Bank (ECB) communication on the price discovery process in the Euribor futures market. They find that both the ECB policy rate decision and the explanation of its monetary policy substantially influence the financial markets on Governing Council meeting days. In particular, they detect a significant effect of unexpected explanation parts on the Euribor futures prices. Importantly, they also underscore the role of the central bank's transparency in this mechanism.

The reaction of stock markets on interest changes is also a relatively well-studied phenomenon, starting with Bernanke and Kuttner (2005). The authors analyze the impact of changes in the US monetary policy on equity prices on the announcement days, measuring the average reaction of the stock market. The authors also try to suggest an economic explanation and, surprisingly, find that the reaction of equity prices to monetary policy is not directly attributable to the interest rate changes. They offer expected future excess returns or expected future dividends as plausible alternatives.

Another work by Rosa (2011) also focuses on the Federal Reserve and the US stock and volatility indices. Employing a high-frequency event-study framework, he finds evidence that not only target changes, but also central bank communication about its future policy is a key driver of stock returns. Rosa shows that equity indices tend to incorporate Federal Open Market Committee (FOMC) monetary surprises within less than an hour. Lucca and Moench (2015) go further by exploring the stock market behavior during the 24-hour periods, preceding the scheduled FOMC announcements. They document large average excess returns in anticipation of monetary policy decisions, but also note that is difficult to provide an extensive economic explanation.

Though the topic is clearly not new, most of the prior works focus, as it can be seen, on either immediate or very short-term effects. However, monetary policy news may arrive during the whole monetary cycle, so restricting the research only to the announcement dates may lead to severe underestimation of the central banks' impact on stock markets, and Kuttner (2001) provides evidence for this. He uses federal funds futures data to decompose target rate changes on FOMC announcement dates into expected and surprise components and shows that the news driving updates of monetary policy expectations do not necessarily come out at the time of FOMC statements.

Therefore, it might be useful to study the evolution of stock returns over the full time periods between key rate decisions. In their recent article (which is the one most closely related to our work) Cieslak et al. (2019) do this for the US stock market and find a totally novel fact. They show that since 1994, the equity premium in the US is earned entirely in even weeks starting from the last FOMC meeting. They document this pattern not only for the aggregated market, but also for cross-section of portfolios, and, importantly, for international equity indices. Moreover, the strongest bi-weekly cycle is observed for the emerging markets. As the main objective of the article is to causally relate such behavior of the US domestic market to Fed's public communications, the authors do not go into much detail about the emerging markets. They hypothesize that the observed pattern is due to the spillover effects of the FOMC news and suggest the foreign exchange rates as a possible transition channel. Finally, they propose the additional semi-regular Board of Governors meetings and intermeeting informal news from Fed as plausible drivers of the bi-weekly mechanism.

In this paper we attempt to examine this recently discovered phenomenon in context of Brazil and challenge the conclusions of Cieslak, Morse and Vissing-Jorgensen. We argue that there is a bi-weekly pattern, which is tied to the Brazilian Monetary Policy Committee (COPOM) meetings, and is totally independent of the US monetary cycle. As a side result we find evidence of a significant increase in the importance of the US monetary policy for the Brazilian stock market since 2009. Overall, we contribute to the existing literature by studying the recently discovered and relatively unexplored effect in a new framework; we check the hypothesis offered by the previous authors and try to expand the understanding of the causes of the monetary cycles in stock returns.

1.2 Summary of the approach

The rest of the paper is organised in the following way: in section 2 we provide the description of the data we use. In section 3 we introduce a model for a detection of the monetary cycle in the stock returns and apply it to weekly and daily data. We test both US dollar and Brazilian real returns to check the hypothesis of the spillover effects of Fed policy through the exchange rates. We also provide illustrative representation of the monetary cycle in returns. In the same section we construct and evaluate the performance of a simple trading strategy, tied to the COPOM cycle, and show that it can indeed be useful for the investors.

Section 4 is devoted to various technical and economical robustness checks. We address the potential stationarity and coefficient stability issues. We also extend the baseline model to validate the specific and local nature of the monetary cycle. Sections 5 and 6 contain the discussion of the result, direction for the future research and the summary of our findings.

2 Data Description

In this paper we are using several datasets. We start with collecting data on Brazilian monetary policy, which includes the Selic rate (Brazilian key rate, Figure 3) decisions and the texts of the COPOM minutes. Minutes are 5–6-page long documents, which are essentially commission's review of the current economic situation and the explanation of the accommodated policy. The dataset covers the time period between October 2000 and February 2021, which is almost the whole period through which the minutes are being published. We omit several first publications, as they have a very different format. Overall, the sample contains 1067 weekly and 5017 daily observations, and accounts for 186 COPOM meetings. The meeting schedule since 2000 has been relatively irregular (Figure 11), with the intervals mostly varying between 4 and 7 weeks (as we will later explain, this fact is very helpful for the inference). The Selic rate, as well as the minutes texts can be obtained from the Banco Central do Brasil website.

In this paper we will be referring to weeks by the number — these are the ordinary numbers of the weeks in the corresponding intermeeting intervals, starting from 0. It means that week zero is the one, during which the COPOM meeting happened. Thus, even weeks are weeks 0, 2, 4 and 6.

The measure of the Brazilian stock market performance which we are using is The Bovespa Index (BVSP). It is a benchmark index of a weighted by free float theoretical portfolio, including about 70 stocks traded on the B3 stock exchange and accounting for most of the trading and market capitalization in Brazil. We calculate the weekly (and daily) returns based on BVSP adjusted close price. For the purpose of investigating the foreign exchange transition channel we additionally use the BRL/USD (Brazilian real to US dollar) exchange rates to calculate the dollar returns to the BVSP.

Also, for the assessment of the trading strategy performance, we need the risk-free rate. Since Brazilian government started issuing the bonds only in 2006, they are not suitable for the whole-sample estimations. Besides, the current credit rating of Brazil according to Fitch and S&P is BB-, which means that Brazilian bonds can hardly be viewed as risk-free assets in context of the international markets. Therefore, we estimate our CAPM model on the dollar returns, using the 3-Month US Treasury Bills rate as risk-free.

Finally, we use the US Federal Funds target rate (Figure 4) as one of the control variables. In December 2008 Fed switched from setting a particular target rate to setting a range of its acceptable values. We use the upper limit in the subsequent period, but generally it does not matter much, since in this work we are more interested in the dynamics of the key rate, rather than its level.

3 Empirical Model

3.1 Bi-weekly pattern in returns

The first step of our empirical strategy is to check, whether the bi-weekly pattern, described by Cieslak, Morse and Vissing-Jorgensen is at all present in Brazil. Thus, the baseline model of our empirical strategy is the following OLS regression:

$$ret_t = \beta_0 + \gamma D_t + \beta_1 V_t + u_t$$

where ret_w is the BVSP net return in week/day t, D_t is a vector of weekly dummies (we try multiple specifications with different dummy sets) and V_t is the vector of control variables. The controls we are using include the latest domestic target rate change (so this variable is constant during one monetary cycle), the US target rate change and a special control variable, which represents the "evenness" of the week in the global timeline. We use two variations of this variable - one showing if the week is even inside one year according to the ISO calendar, another does the same thing for cross-year timeline (in other words, it is just a dummy alternating from 0 to 1 each week over the sample).

The results of the estimations are presented in Table 1 (alternative control - Table 2 in Appendix). As it can be seen, in all specifications the results are essentially the same: even weeks of the monetary cycle in Brazil are on average associated with approximately 60-70bp increase in weekly return, and tree of four estimates are significant at 5% level.

These results are very important in two ways: first, we document a bi-weekly pattern in returns for Brazil, tied to the COPOM meetings. It is consistent with Cieslak, Morse and Vissing-Jorgensen findings for US and leads us to think that the central banks are indeed the drivers of the phenomenon. Secondly, the pattern can be observed while controlling for Fed's monetary decisions, not only for dollar, but also for local currency returns. It allows us to say with a certain degree of confidence that what we see are not the spillover effects of Fed actions, aligning with COPOM meetings (as previously thought). Instead, it is a locally-driven phenomenon, and it is one of the main findings of

Table 1: BVSP Brazilian real and US dollar net returns, not annualized, %

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Dummy = 1 in even weeks	0.578**	0.126**	0.665**	0.141*
	(0.227)	(0.052)	(0.326)	(0.073)
Brazil target rate change	−0.651***	−0.132***	−0.730**	−0.161**
	(0.218)	(0.047)	(0.334)	(0.067)
US target rate change	2.496	0.558	3.999	0.817
	(2.625)	(0.776)	(3.597)	(0.912)
Dummy = 1 in even weeks (ISO)	−0.131	−0.021	−0.347	−0.064
	(0.228)	(0.051)	(0.327)	(0.072)
Intercept	−0.045	−0.015	−0.013	−0.010
	(0.200)	(0.045)	(0.291)	(0.062)
Number of observations	1067	5017	1067	5017

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

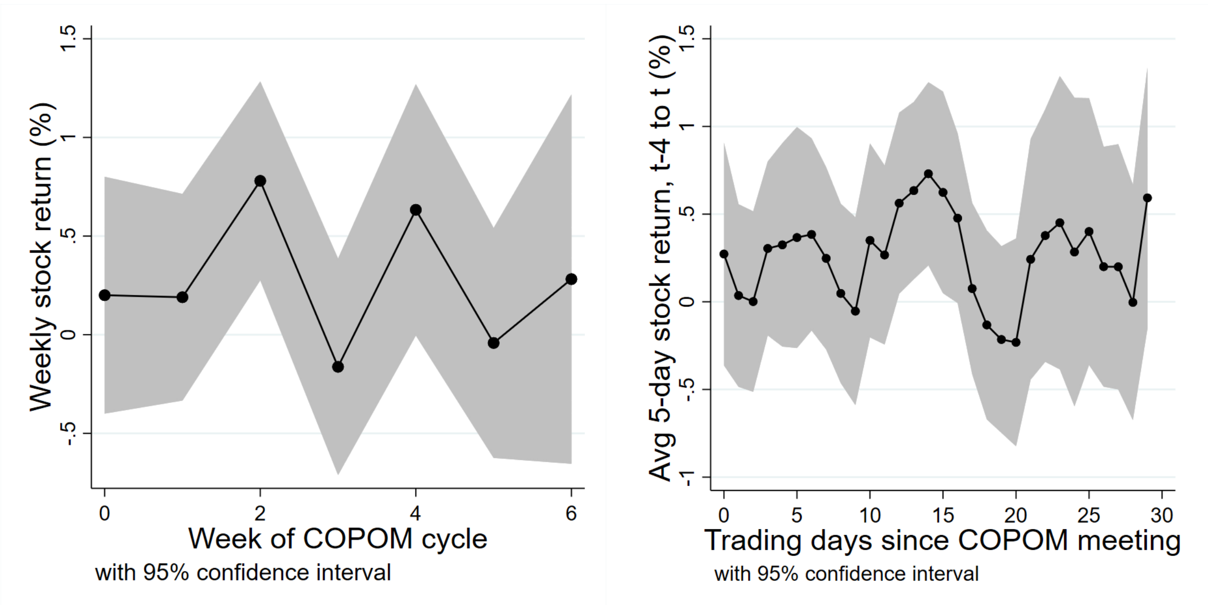

Figure 1: Average BVSP BRL returns over the COPOM cycle

this paper (we discuss the robustness of this conclusion in more details in further sections).

Figure 1 shows the average weekly and cumulative 5-day returns over the COPOM cycle. Both figures follow a clear oscillating pattern. The key feature of the weekly plot are high average returns in weeks 2 and 4. Returns in week 2 are highly significant, and the 95% confidence interval for week 4 just barely covers zero. Tables 3-6 show the output of the OLS estimation for a wide variety of dummy combinations, and indicate the same results. The daily plot is also mostly consistent with them, with returns peaking around days 5, 15 and 25. The outlier around day 30 is most likely a consequence of these days sometimes being part of week 0 of the subsequent cycle.

3.2 Trading applications

A logical follow-up is to check whether this finding can be utilized to outperform the market portfolio. For this purpose we construct a simple strategy: hold Brazilian market portfolio (BVSP index) in even weeks of the COPOM cycle, and in odd weeks hold the US Treasury bills (we use dollar returns to BVSP here).

The trading costs of this strategy should be unreasonably high due to the frequent transactions between currencies. However, in reality there would probably be no reason to switch to US bonds, as since 2006 Brazilian government is also issuing debt obligations. As discussed earlier, they are rather risky compared to the US analogue, but they are a reasonable low-risk asset for the Brazilian market. Thus, this section just gives an idea about the potential of using monetary cycle in trading.

The estimates of the CAPM model (Table 7) show, that the described strategy has a market beta of 0.55 and a significant at 10% level alpha of approximately 14bp per week (or approximately 7.3% per year), which is comparable with classical factors. Our strategy at the same time has a higher average excess return, and lower volatility than BVSP. As the result, Sharpe ratio of the former over 20 years is 0.063, while of the latter — 0.036. Figure 2 shows how performance of the strategy compares to the Brazilian market since 2000. Overall, the results are very solid, and utilizing the bi-weekly pattern could likely benefit the investors.

4 Robustness Check

4.1 Stationarity

Since in this paper we are doing OLS regressions with time-series data, an important assumption should generally be that all the variables are stationary. However, our models

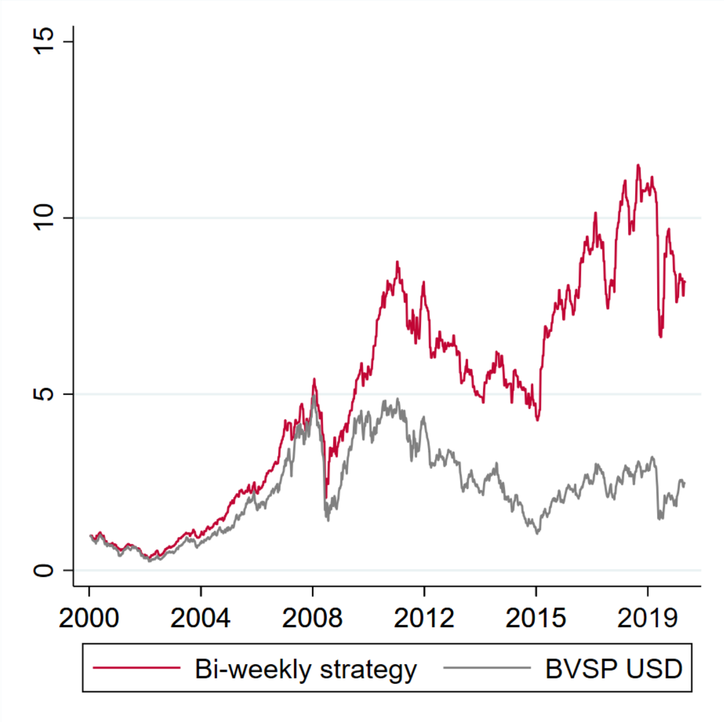

Figure 2: Bi-weekly trading strategy performance, USD

are constructed in such a way that we should not be much worried about non-stationarity issues.

As cyclicity is the central concept of the research, in the baseline model we approach our time-series more like a panel data, and each COPOM intermeeting period is treated like a separate observation unit. As a result, each subset is a series of 6 to 8 weekly observations (daily data just has one more "layer"), and non-stationarity issues are actually not a big concern on such horizons.

Nevertheless, for completeness, we perform Augmented Dickey-Fuller test for unit root with 8 lags (by the maximum number of weeks in almost all cycles) for BVSP returns - the only variable that could potentially (though very unlikely to) have a unit root – weekly dummies and target rate changes based on common sense should be stationary. We reject the H0 of unit root for all four variations of the return at 1% significance level (Figures 5 and 6), so the question of non-stationarity can be considered resolved.

4.2 Stability of the coefficients

Another frequent time-series issue is the potential presence of the structural break in the data-generating process. This is particularly significant in our case, since we are working with a relatively long time-series, covering about 20 years. During that period there could possibly be many reasons for a change in the behaviour of financial markets, with the global financial crisis being, undoubtedly, the most important.

Thus, we start with conducting a supremum Wald test for endogenous break, following Andrews (1993). The procedure is to trim top and bottom 15% of the sample, and then to estimate at each possible time t the same F-statistic as in the usual Chow-test:

$$F = \frac{(SSE - SSE(t))/k}{SSE(t)/(N-2k)}$$

where SSE is the sum of squared errors from the original model, and $SSE(t)$ - from a model with assumed structural break at t. The time point with the highest F-stat, if it is high enough, is the estimated break date (note that, as we select the largest of them, it doesn't follow the usual distribution, so the critical values are also different). The results are reported in Table 8 and Figures 7 and 8. The sup-Wald tests don't detect a structural break.

Another frequently used stability check that we employ is the CUSUM test, which is based on the sequence of recalculated cumulative sums of forecast errors. If the model is stable and has no breaks, all the cumulative sums should be in a confidence band around zero. The results of the test are reported in Figure 9 - again, no structural breaks are detected.

4.3 Estimation on subsamples

Overall, the tests we use do not detect any structural breaks in the model. However, looking at Figure 2 and Figure 11 (an analogue with BRL returns) one might notice that the makret index and the bi-weekly trading strategy start to diverge dramatically only around year 2009. Also we should keep in mind that our models have very weak fit (R^2 around 2% for weekly returns and less than 1% for daily), and thus the tests based on SSR and forecast errors may just work bad for it due to small relative changes in the fit. Therefore, we manually estimate the model on subsamples before and after 2009.

The results of the estimation are reported in Tables 9 and 10. Though before 2009 the cycle dummy is not significant, the magnitude of the effect doesn't differ much from the full-sample estimate (insignificance can plausibly be attributed to small-sample issues). After 2009, the magnitudes are also consistent with full sample, and are significant for BRL returns at 5% level. Thus, we can conclude that the bi-weekly return pattern is sustainable across the whole time period.

What is more interesting is a dramatic change in the interaction of the returns with the change in the US target rate - both in magnitude and significance. While before 2009 the effect is approximately twice smaller than in full-sample and insignificant, after 2009 it not only becomes significant for weekly returns (daily returns are probably too noisy to capture it), but also increases by 5-7 times in size.

This is an important finding, as it suggests a structural break in the interaction of the Brazilian stock market with the interest rates in the US, which can most likely be attributed to the global financial crisis. Also after 2009 the US interest rates were essentially on zero level until 2016, so the changes that followed had a greater impact.

4.4 Extensions to the model

Figure 1 and Tables 3-6 along with the previous research suggest, that week 2 of the cycle is the most profitable and significant. Therefore, to account additionally for spillover effects of the US policy we include the second lag of the US interest rate change (or its dummy) to the baseline model. The results are reported in Tables 11 an 12 - none of the specifications show any significance in the additional controls, and the conclusions are mostly the same. An important note is that US target change lagged dummy actually makes even week coefficients insignificant for USD returns, but not for BRL returns. This is absolutely consistent with our point that the cycle is locally-driven.

Another robustness check which we do is including the lagged return into the model — basically, making AR(1) with additional explanatory variables. This validity check addresses the following issue: high positive returns in even weeks may align with the mean-reversion of the market after the downsides (this option is also mentioned in Cieslak, Morse and Vissing-Jorgensen (2019)). The estimation (Table 13) again shows no threats to the validity of the results (only in one specification the lag is significant, and in all of them the even week significance remains), so we conclude that our attribution of the monetary cycle in returns to the COPOM meetings withstands all the employed robustness checks.

5 Discussion

In the previous sections we provide evidence for the local nature of the Brazilian monetary cycle an its independence of the Fed decisions and US dollar exchange rates. In combination with the findings of Cieslak, Morse and Vissing-Jorgensen (2019) our results strongly suggest that the drivers of the phenomenon are indeed the central banks. Monetary cycle in returns is significant in the presence of various controls accounting for the potential omitted variables with a period of two weeks. Besides, Figure 10 shows that the COPOM meeting schedule is highly irregular, with lots of inter-meeting intervals containing odd number of weeks (such intervals "break" the alignment of even COPOM weeks in the global timeline). As a result, correlation between COPOM calendar and both modifications of control that we use is less than 10%.

However, the exact economic mechanism is still not clear. As well as in the US, in Brazil the bi-weekly monetary cycle doesn't align with any of the central banks news releases: minutes come out once in a cycle, inflation reports are released only since 2019, financial stability reports come out on a semi-annual basis, and the weekly market readouts, in addition to being weekly, don't contain any information from COPOM - they are just summaries of the publicly available independent analysts' forecasts and expectations.

The direction for the further research for Brazil is thus to investigate a channel, proposed by Cieslak, Morse and Vissing-Jorgensen — informal communication of the monetary authorities. Besides, the pattern is indeed unexplored, so it has to be tested for other stock markets.

6 Conclusion

In this paper we document a recently-discovered phenomenon for a fundamentally different market. We find that in Brazil since 2000 the even weeks of the COPOM cycle are characterised by statistically significant positive additional stock market returns. The magnitude of the effect is persistent over time and sufficient to provide an annual alpha of approximately 7.3%.

We check a hypothesis, proposed in the previous research, that Fed monetary cycle has spillover effects on the emerging stock markets through exchange rates. We examine both US dollar and Brazilian real returns, and extend our model with US-specific controls. We find no evidence of such spillover effects and, thus, argue that the bi-weekly pattern in Brazilian returns is solely a local phenomena.

We provide some evidence that the explored pattern can be indeed attributed to the COPOM cycle. First, it exists in presence of control variables, accounting for different types of exogenous bi-weekly processes. Second, the COPOM calendar itself is highly irregular with constantly alternating inter-meeting intervals. All of that supports the previous findings.

As a side-result we also find a structural break in the interaction between stock returns in Brazil and the monetary policy in the US. While before 2009 US target rate changes have no significant effect on Brazil stock returns, after 2009 the effect becomes significant and considerably increases in magnitude. We offer global financial crisis as a plausible driver of such raise in the importance of Fed decisions for Brazil.

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Appendix

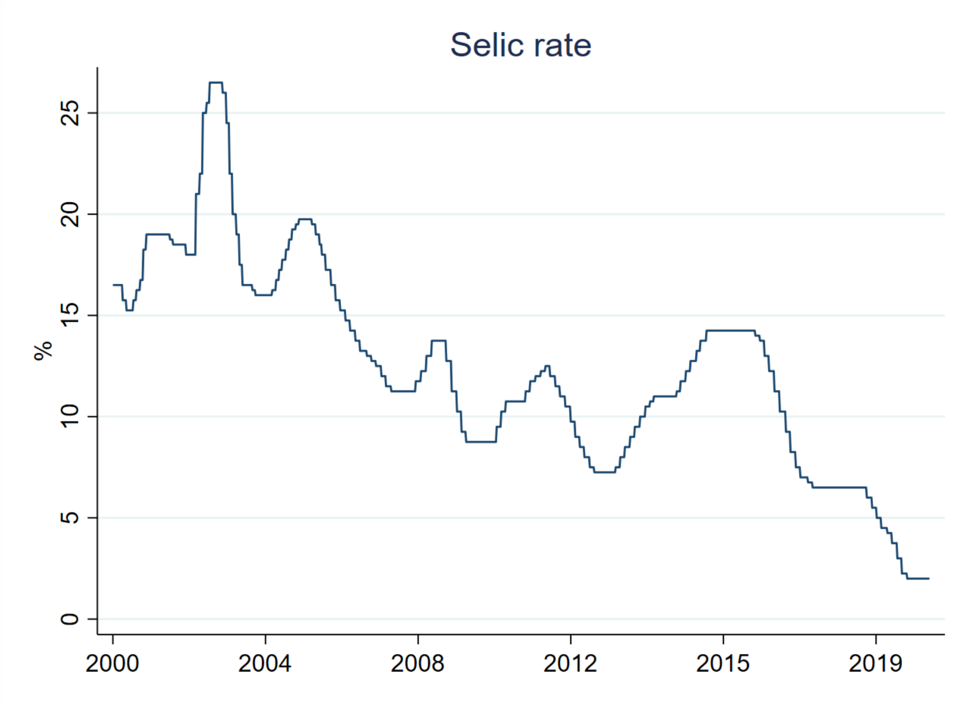

Figure 3: Selic rate (Brazil key rate)

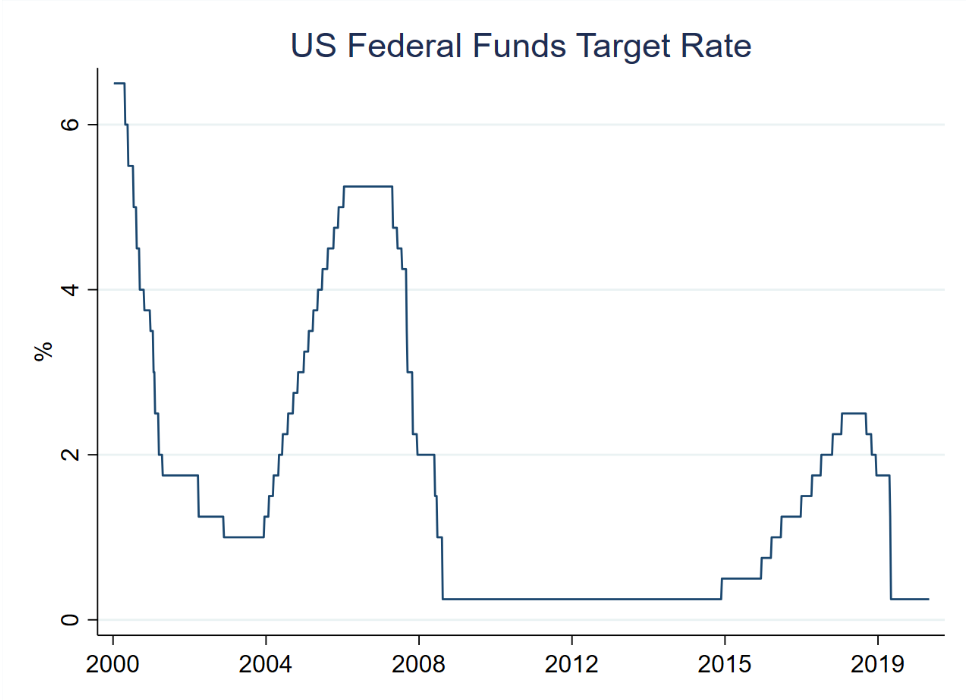

Figure 4: US Federal Funds Target Rate (upper limit after 2008)

Table 2: Alternative bi-weekly control

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Dummy = 1 in even weeks	0.539**	0.119**	0.591*	0.127*
	(0.230)	(0.053)	(0.332)	(0.074)
Brzil target rate change	−0.651***	−0.132***	−0.731**	−0.161**
	(0.218)	(0.047)	(0.335)	(0.067)
US target rate change	2.466	0.549	3.966	0.807
	(2.607)	(0.775)	(3.565)	(0.910)
Dummy = 1 in even weeks (global)	−0.239	0.052	0.356	0.079
	(0.230)	(0.051)	(0.332)	(0.072)
Intercept	0.030	−0.048	−0.325	−0.073
	(0.214)	(0.044)	(0.268)	(0.061)
Observations	1067	5017	1067	5017

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-10.911	-3.430	-2.860	-2.570

MacKinnon approximate p-value for Z(t) = 0.0000

Figure 5: ADF test, 8 lags, weekly BRL returns

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-24.309	-3.430	-2.860	-2.570

MacKinnon approximate p-value for Z(t) = 0.0000

Figure 6: ADF test, 8 lags, daily BRL returns

Table 3: Weekly BRL returns, %

	(1)	(2)	(3)
d0	0.271		
	(0.348)		
d2	0.830***		0.618*
	(0.306)		(0.316)
d4	0.644*		0.432
	(0.363)		(0.374)
d6	0.286		
	(0.487)		
d1		−0.324	
		(0.313)	
d3		−0.683**	−0.352
		(0.327)	(0.339)
d5		−0.549*	−0.218
		(0.330)	(0.341)
d7		−1.548	
		(1.109)	
Brzil target rate change	−0.651***	−0.652***	−0.651***
	(0.219)	(0.219)	(0.220)
US target rate change	2.459	2.494	2.466
	(2.621)	(2.609)	(2.622)
Dummy = 1 in even weeks (global)	−0.231	−0.241	−0.236
	(0.230)	(0.230)	(0.230)
Intercept	0.022	0.570***	0.236
	(0.214)	(0.193)	(0.227)
Observations	1067	1067	1067

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Daily BRL returns, %

	(1)	(2)	(3)
d0	0.065		
	(0.076)		
d2	0.179**		0.127*
	(0.071)		(0.071)
d4	0.142*		0.091
	(0.074)		(0.074)
d6	0.069		
	(0.117)		
d1		−0.068	
		(0.069)	
d3		−0.168**	−0.099
		(0.070)	(0.073)
d5		−0.102	−0.033
		(0.095)	(0.097)
d7		−0.329	
		(0.202)	
Brzil target rate change	−0.132***	−0.132***	−0.132***
	(0.047)	(0.047)	(0.047)
US target rate change	0.544	0.561	0.550
	(0.776)	(0.773)	(0.773)
Dummy = 1 in even weeks (global)	0.051	0.052	0.052
	(0.051)	(0.051)	(0.051)
Intercept	−0.048	0.071	0.003
	(0.044)	(0.044)	(0.047)
Observations	5017	5017	5017

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Weekly USD returns, %

	(1)	(2)	(3)
d0	0.093		
	(0.495)		
d2	0.979**		0.784*
	(0.431)		(0.443)
d4	0.881*		0.686
	(0.527)		(0.540)
d6	0.384		
	(0.716)		
d1		−0.246	
		(0.453)	
d3		−0.931**	−0.528
		(0.474)	(0.491)
d5		−0.476	−0.074
		(0.483)	(0.499)
d7		−1.794	
		(1.597)	
Brzil target rate change	−0.727**	−0.729**	−0.726**
	(0.337)	(0.336)	(0.337)
US target rate change	3.901	4.041	4.004
	(3.592)	(3.576)	(3.600)
Dummy = 1 in even weeks (global)	0.345	0.359	0.339
	(0.332)	(0.332)	(0.331)
Intercept	−0.327	0.265	−0.128
	(0.268)	(0.295)	(0.304)
Observations	1067	1067	1067

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Daily USD returns, %

	(1)	(2)	(3)
d0	0.026		
	(0.102)		
d2	0.212^{**}		0.167^{*}
	(0.100)		(0.099)
d4	0.185^{*}		0.140
	(0.110)		(0.110)
d6	0.088		
	(0.170)		
d1		−0.052	
		(0.097)	
d3		-0.221^{**}	−0.138
		(0.101)	(0.104)
d5		−0.072	0.011
		(0.133)	(0.135)
d7		−0.381	
		(0.298)	
Brzil target rate change	-0.160^{**}	-0.161^{**}	-0.159^{**}
	(0.068)	(0.068)	(0.068)
US target rate change	0.793	0.830	0.822
	(0.911)	(0.909)	(0.910)
Dummy = 1 in even weeks (global)	0.078	0.080	0.077
	(0.073)	(0.073)	(0.073)
Intercept	−0.074	0.054	−0.028
	(0.061)	(0.062)	(0.065)
Observations	5017	5017	5017

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: CAPM, weekly USD excess returns

	Excess return
Market excess return	0.555***
	(0.037)
Intercept	0.001*
	(0.001)
Observations	1067

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Supremum Wald test, weekly BRL returns

Break in	Statistic	p-value
All variables	13.285	0.238
US target rate change	5.063	0.241

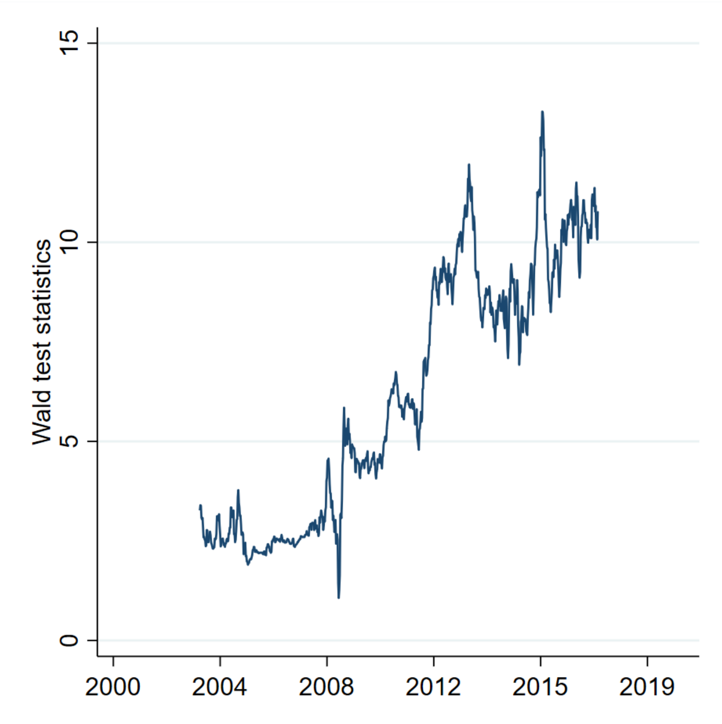

Figure 7: Sup-Wald test, all variables, weekly BRL returns

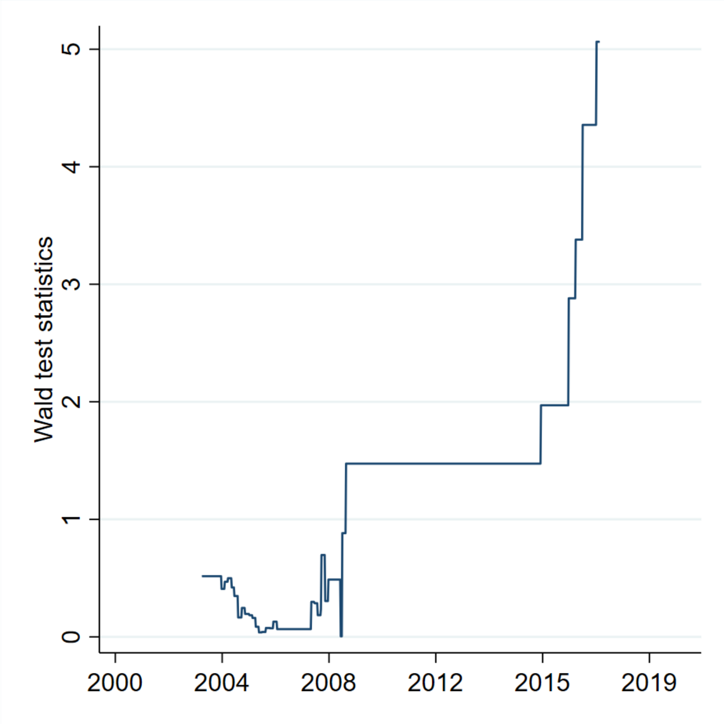

Figure 8: Sup-Wald test, US target rate change, weekly BRL returns

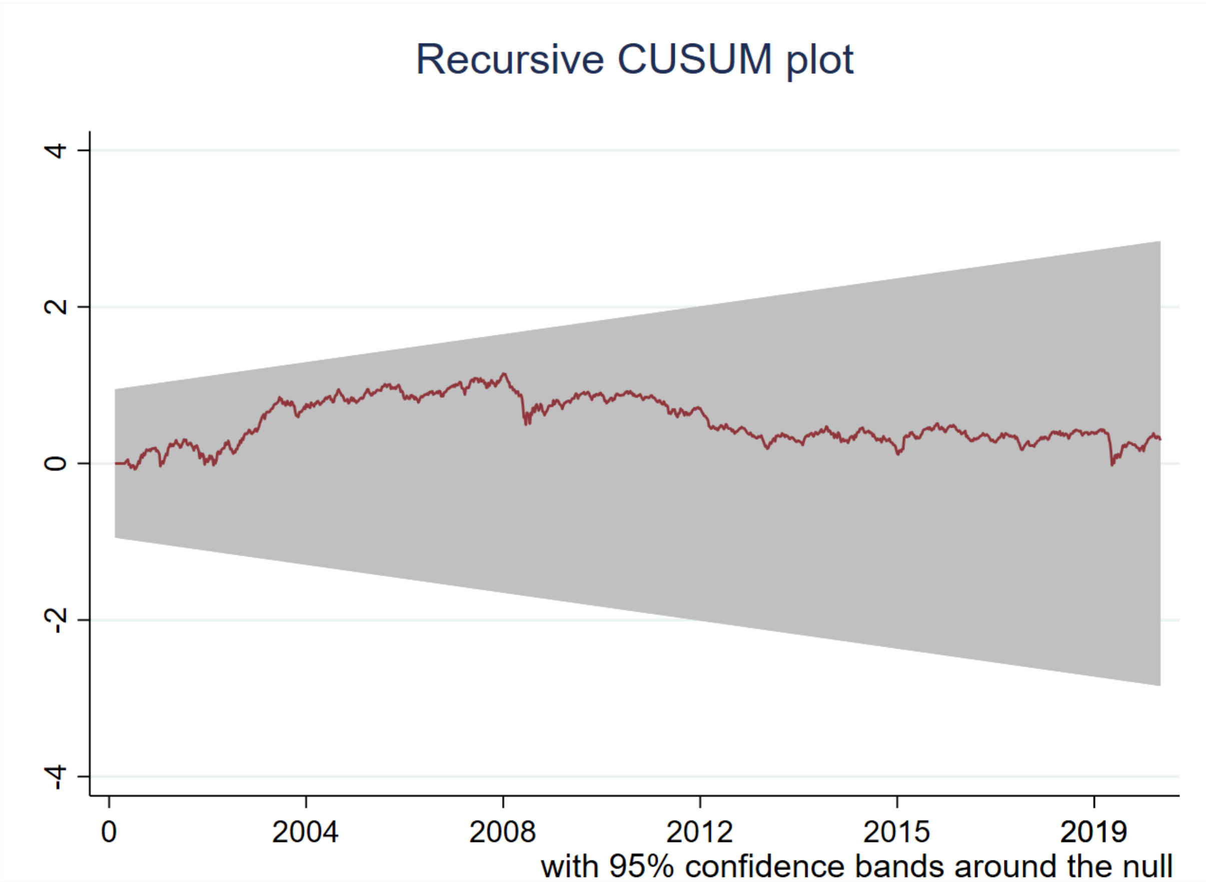

Figure 9: CUSUM test, weekly BRL returns

Table 9: BVSP net returns 2000-2009, not annualized, %

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Dummy = 1 in even weeks	0.463	0.116	0.632	0.151
	(0.390)	(0.086)	(0.559)	(0.122)
Brzil target rate change	-0.701^{**}	-0.142^{**}	-0.809^{*}	-0.181^{**}
	(0.292)	(0.062)	(0.450)	(0.089)
US target rate change	1.051	0.320	2.148	0.469
	(2.646)	(0.570)	(3.824)	(0.798)
Dummy = 1 in even weeks (global)	−0.630	0.135	1.058^{*}	0.231^{*}
	(0.397)	(0.088)	(0.566)	(0.124)
Intercept	0.378	−0.064	−0.449	−0.112
	(0.379)	(0.069)	(0.437)	(0.098)
Observations	485	2284	485	2284

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: BVSP net returns 2010-2021, not annualized, %

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Dummy = 1 in even weeks	0.568^{**}	0.116^{*}	0.505	0.099
	(0.265)	(0.063)	(0.388)	(0.088)
Brzil target rate change	-0.547^{*}	-0.112^{*}	−0.549	−0.116
	(0.298)	(0.065)	(0.436)	(0.096)
US target rate change	7.416^{*}	1.286	10.424^{**}	1.946
	(4.431)	(2.586)	(5.083)	(2.710)
Dummy = 1 in even weeks (global)	0.091	−0.017	−0.237	−0.048
	(0.263)	(0.059)	(0.385)	(0.084)
Intercept	−0.255	−0.033	−0.203	−0.038
	(0.240)	(0.057)	(0.327)	(0.077)
Observations	582	2733	582	2733

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: BVSP net returns - lagged US target rate change

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Dummy = 1 in even weeks	0.508^{**}	0.114^{**}	0.556^{*}	0.120
	(0.230)	(0.051)	(0.332)	(0.073)
Brzil target rate change	-0.664^{***}	-0.134^{***}	-0.745^{**}	-0.162^{**}
	(0.221)	(0.047)	(0.338)	(0.067)
Lag 2 US target rate change	−0.159	0.340	0.650	0.625
	(2.214)	(0.773)	(2.867)	(0.898)
Dummy = 1 in even weeks (global)	−0.256	0.056	0.379	0.084
	(0.231)	(0.051)	(0.333)	(0.073)
Intercept	0.041	−0.049	−0.335	−0.073
	(0.214)	(0.044)	(0.271)	(0.061)
Observations	1065	5015	1065	5015

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: BVSP net returns - lagged US target rate change (dummy)

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Dummy = 1 in even weeks	0.506^{**}	0.113^{**}	0.545	0.119
	(0.229)	(0.051)	(0.332)	(0.073)
Brzil target rate change	-0.666^{***}	-0.135^{***}	-0.753^{**}	-0.166^{**}
	(0.220)	(0.047)	(0.338)	(0.067)
Lag 2 US target change (dummy)	0.369	−0.027	0.415	0.018
	(0.659)	(0.175)	(0.878)	(0.228)
Dummy = 1 in even weeks (global)	−0.248	0.056	0.376	0.085
	(0.231)	(0.051)	(0.334)	(0.073)
Intercept	0.020	−0.049	−0.353	−0.078
	(0.217)	(0.044)	(0.273)	(0.061)
Observations	1065	5015	1065	5015

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: BVSP net returns - AR(1) component

	(1) BRL, weekly	(2) BRL, daily	(3) USD, weekly	(4) USD, daily
Return lag	-0.081^{*}	-0.037	-0.078	-0.031
	(0.045)	(0.027)	(0.048)	(0.022)
Dummy = 1 in even weeks	0.502^{**}	0.121^{**}	0.550^{*}	0.129^{*}
	(0.230)	(0.052)	(0.333)	(0.074)
Brzil target rate change	-0.703^{***}	-0.137^{***}	-0.788^{**}	-0.166^{**}
	(0.222)	(0.047)	(0.337)	(0.067)
US target rate change	2.725	0.588	4.327	0.848
	(2.590)	(0.758)	(3.552)	(0.899)
Dummy = 1 in even weeks (global)	-0.216	0.054	0.323	0.082
	(0.228)	(0.051)	(0.330)	(0.072)
Intercept	0.057	-0.049	-0.271	-0.075
	(0.218)	(0.044)	(0.272)	(0.061)
Observations	1066	5016	1066	5016

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

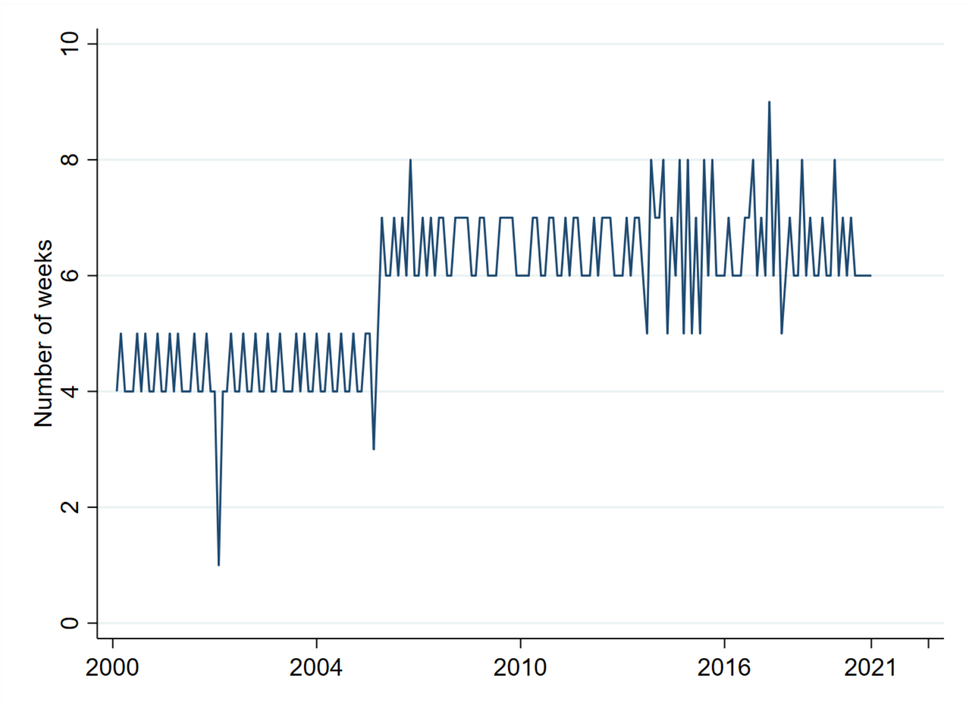

Figure 10: Intervals between COPOM meetings

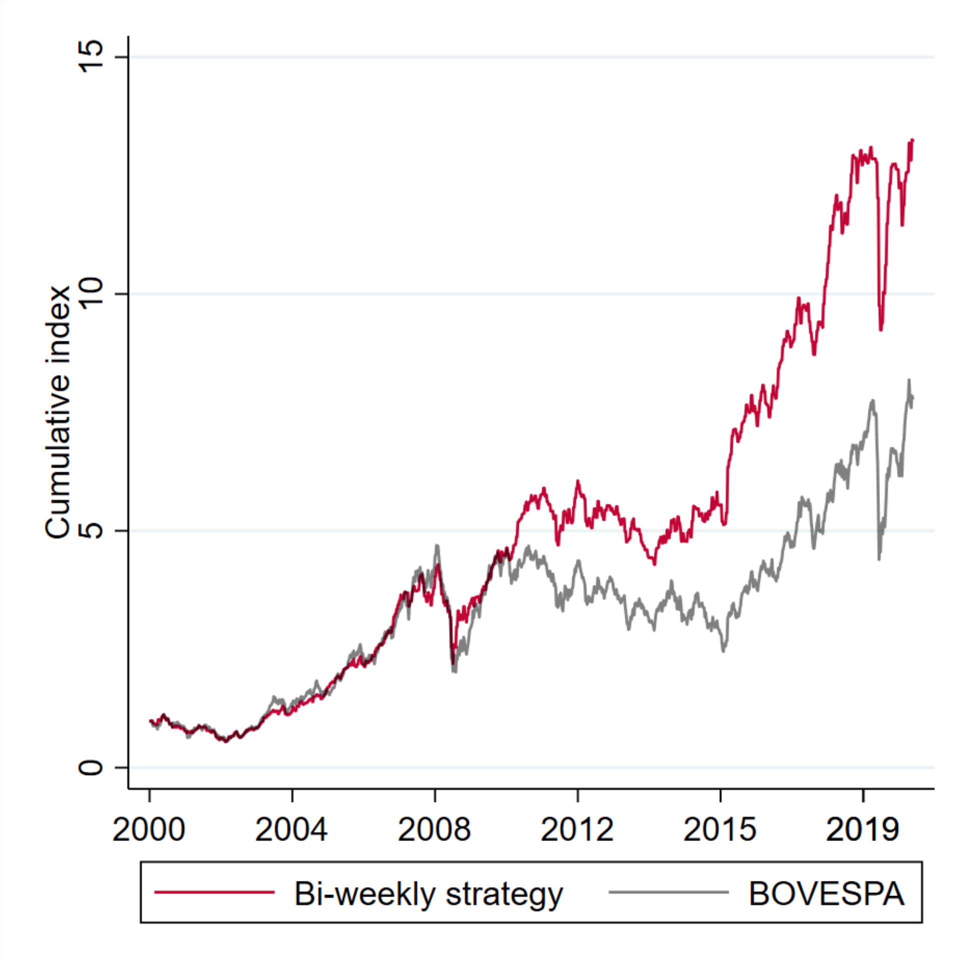

Figure 11: Bi-weekly trading strategy performance, BRL