



Vinci Partners Macro Research

Is the BRL Overshooting Coming to an End?

December 2020

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Why do exchange rates overshoot ?

Prices in markets are unequivocally determined by the supply and demand balance. The exchange-rate market is no different. However, it holds a major distinction to other markets: the difference between the adjustment speed in the exchange rate and the real economy. Prices, like the FX rate, are free to move continuously without significant costs. However, changes that are triggered by currency devaluations take a long time to take effect in the real economy. This difference in speed between the

signal of a hard currency scarcity and the future dollar supply increase, generates the overshooting effect – an exaggeration in the FX fluctuations beyond the new equilibrium.

From time to time, there might be a sudden change in perception of the economic environment. This leads the market increase its holdings of foreign currency. Sometimes the trigger is the awareness that an unsustainable policy is coming to an end. For example, when the British FX reserves needed to maintain an artificial rate in the ERM (European



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Exchange Rate Mechanism) started to run low, George Soros mounted an attack that ultimately led to the devaluation of the pound.

Sometimes the catalyst is a sudden change in risk perception. This happened in Brazil during the presidential election of 2002. The previous equilibrium was shaken as the chances of Lula being elected became more likely. In the past, Lula had suggested that a debt default could be a good idea for Brazil. Therefore, as election-day neared, an increasing number of individuals were willing to dispose of their assets in BRL and acquire US dollars to protect their wealth from a possible debt default.

There are many reasons why the market may suddenly alter a previous equilibrium and may be more willing to dump the local currency and buy a foreign currency. The price move is a market-signal, and if the price of the foreign currency is “going up”, one should supply more foreign currency. This is precisely the point where the overshooting phenomenon originates. While in most markets a price incentive would increase the supply of the good relatively fast, it takes a long while for the supply of foreign currency to increase in the FX market. Basically, the local currency devaluation will make imports more expensive and exports more competitive. Exporters will have to find new markets, sign contracts, hire more people, expand capacity... and this is time consuming. On the import side, companies and individuals will have to look for local alternatives, cancel import contracts, etc. This also takes time. This “expenditure switching process” will ultimately generate the flow of additional foreign currency in the future.

While this intricate and slow adjustment takes place in the real world, the FX market is operating on an almost continuous basis. Given this lag between the price incentive and the slower reaction of the real economy, the FX rate keeps devaluing past the point where supply and demand of spot currency would clear. Therefore, at a later date, the real economy ends up generating an excess of foreign currency than would be needed to reach equilibrium. In the final stages of the adjustment process, the local currency starts to appreciate. In this paper we try to answer the question: is Brazil arriving at this late stage? Will the Real start to appreciate in the near future?

In this brief note, we try to characterize the adjustment stages in the overshooting process that the Real is currently going through. In Brazil’s case, a sharp drop in interest rates was probably the trigger for the overshooting.

Foreign investors drastically reduced their investment in the local fixed income market. Additionally, as credit became available at low rates in Brazil, several Brazilian corporations issued debt in the Brazilian market (debentures) to pre-pay previously issued external debt. These two factors explain a significant portion of the outflows in the capital account of the balance of payments over the last couple of years.

As the Real devalued significantly after these events, the adjustment mechanism we described above started to operate. The current account of the balance of payments (basically the trade balance plus interest payments on external debt and profit remittances) has been positive for the past seven



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months. The 12-month accumulated current account deficit, which was around -3% of GDP when the adjustment started, has already improved to -1% of GDP. We expect this trend to continue leading to a current account surplus greater than 1% of GDP within six to twelve months.

We will discuss the adjustment in Brazil in more detail in the following pages, as well as provide a benchmark for international comparison and highlight some idiosyncrasies of the Brazilian case, such as the “overhedge” of foreign assets by Brazilian banks. Our conclusion is that Brazil is getting closer to the latter stages of the overshooting process of its currency. We will probably have an appreciation bias in the BRL in 2021.

What has triggered the recent BRL overshooting?

In Economics, it is always hard to pinpoint a single element that kicks off a whole process. The significant reduction in interest rates in Brazil was a key factor in triggering the overshooting of the Real exchange rate. Until a couple of years ago, even the most optimistic market participant could not have foreseen a Selic rate as low as 2%. Furthermore, no

one could have imagined that independent market readings of future inflation would be on target for the next three years despite these low interest rates.

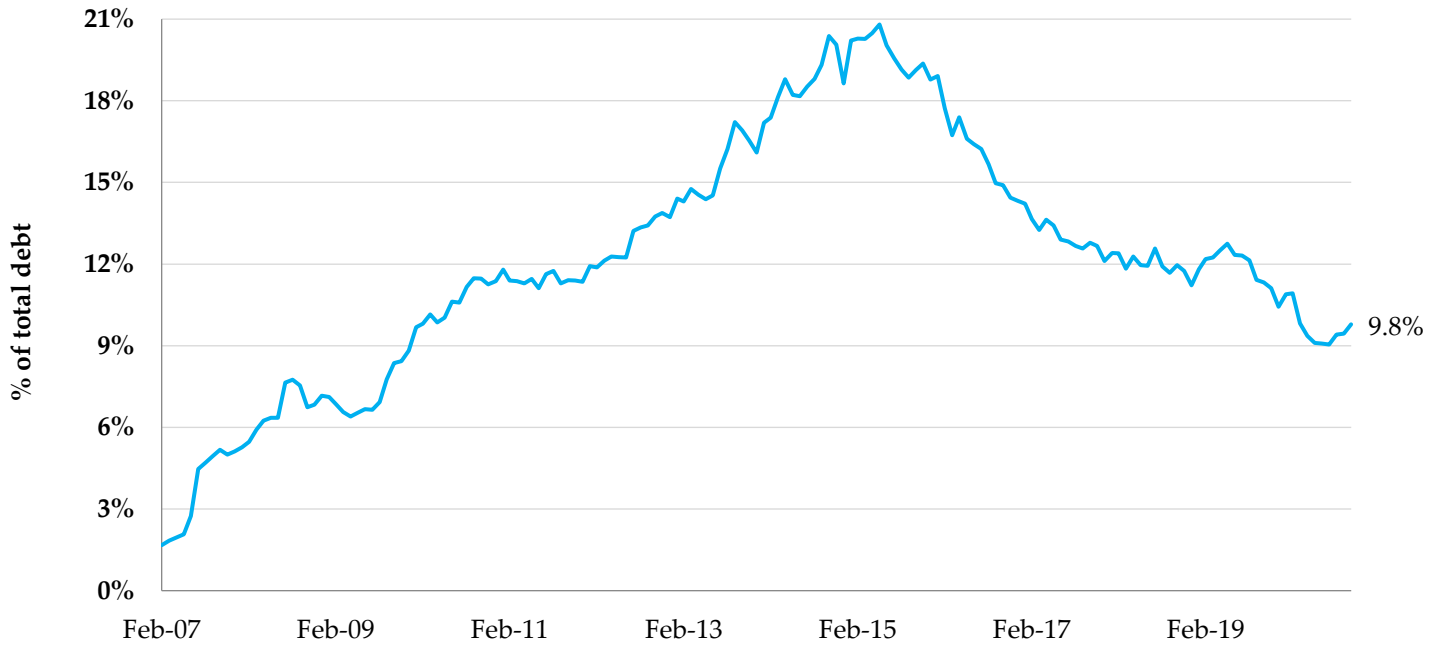
Figure 1 shows the share of foreign investors holding Brazilian debt (in Reais) in the local debt market. The peak was in 2015 when foreigners held an impressive 21% of the total domestic debt. Many debt funds held overweight positions in Brazil, hoping for a stellar economic performance. It was during Dilma Rousseff’s second term (which started in 2015) that this hope started to vanish. A first wave of exposure reduction followed the loss of the investment grade rating in September 2015. By the end of 2016, now already in Michel Temer’s government, the Selic rate started its downward trajectory from 14.25% to the current 2% level. As we can see from the following chart, this cut in local rates was accompanied by a persistent reduction in the share of foreigners holding local Brazilian debt. The share of foreigners fell from the aforementioned 21% to as low as 9%. Nowadays, most dedicated debt funds already have a market-weight position in Brazil, meaning that further reductions are less likely in the future. In fact, an inflow of foreign funds to the fixed income market was observed in the latest readings of the capital account.



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Figure 1: Percent of Local Debt Held by Foreigners: Brazil



Source: Bloomberg, Vinci Partners.

Figure 2 shows the accumulated amount of dollars invested in the Brazilian stock and fixed income markets since 1997. The majority of the outflows that occurred after 2015 were in the fixed income market. This trend accelerated in 2019 after the Brazilian

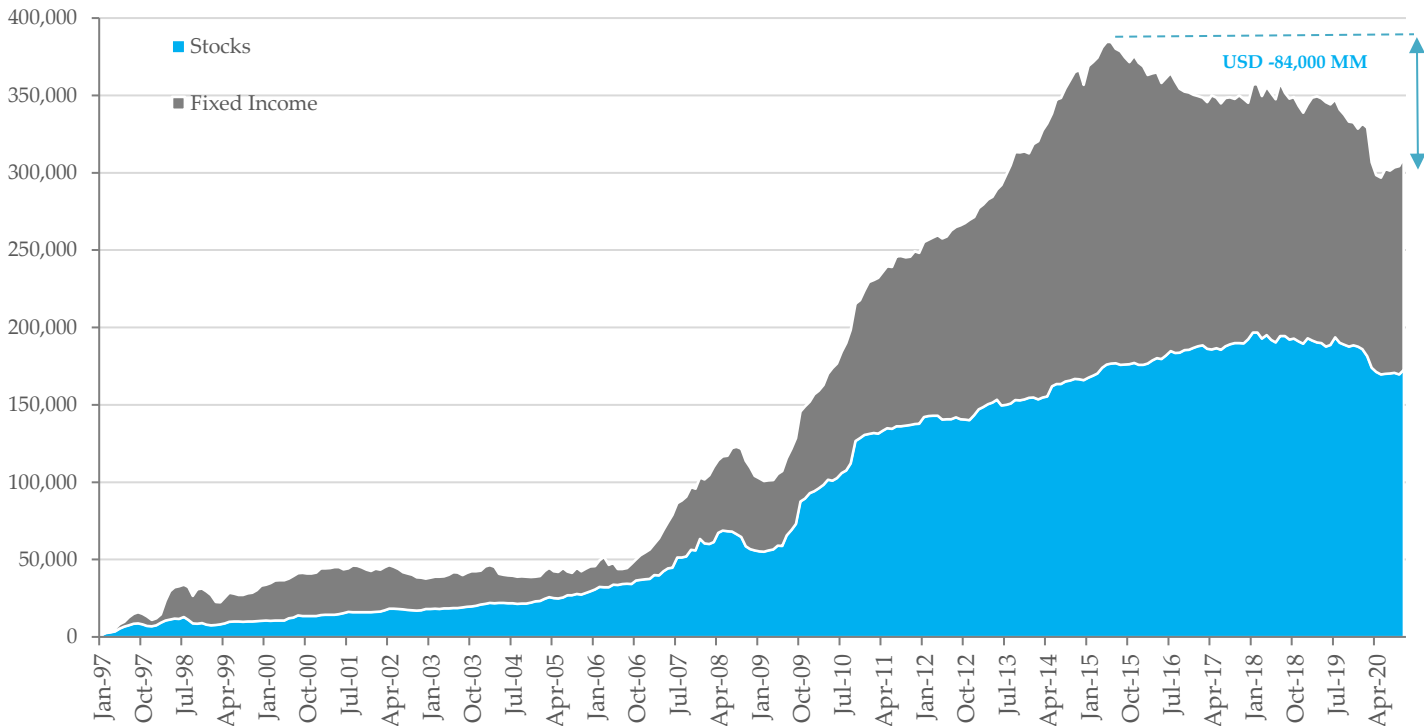
Central Bank resumed reducing the Selic rate from 6.50% to 2%. We can also see from the following chart that the investment in the stock market remained relatively stable.

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Figure 2: Breakdown of Portfolio Investment Assets

Accumulated values since January 1997 (MM dollars)



Source: BCB, Vinci Partners.

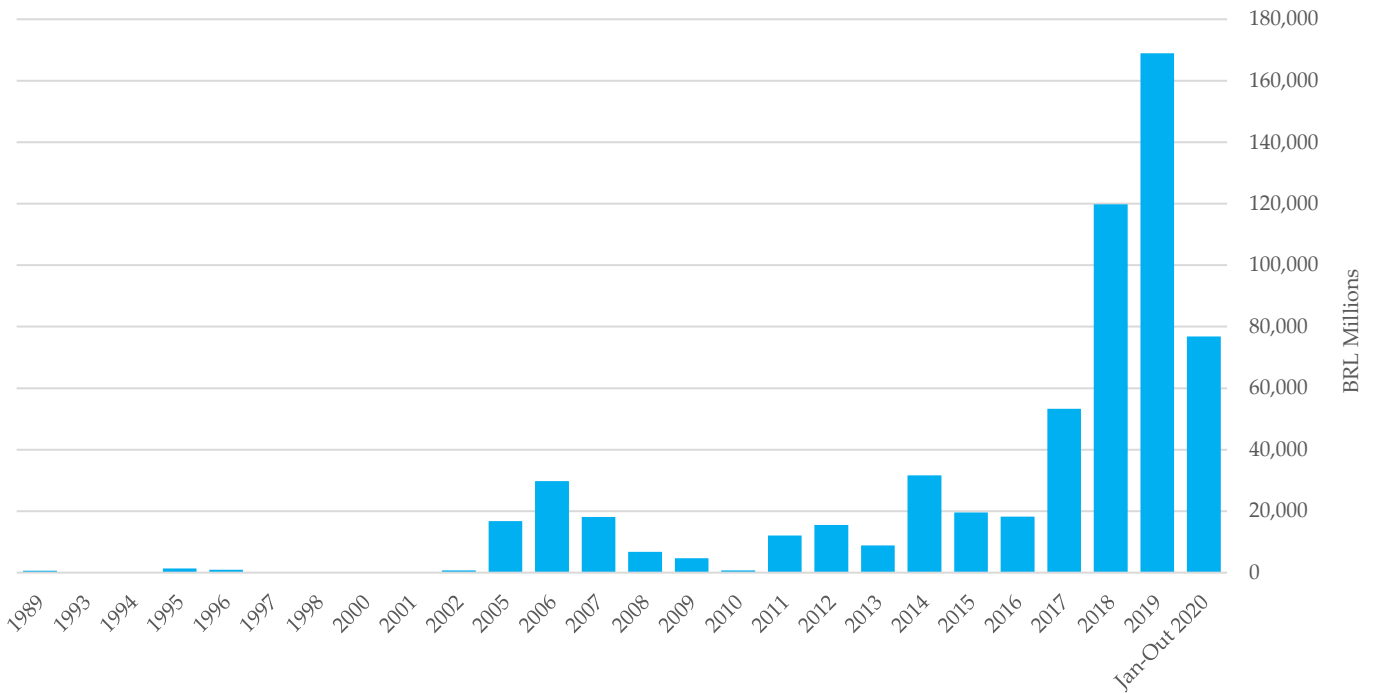
Another significant outflow in the current account is related to Brazilian corporate debt. In the past, big Brazilian corporations had to rely on the international market for loans – it was cheaper and longer tenors were available. This scenario changed significantly after domestic interest rates fell in Brazil. The local corporate bond (“debentures”) flourished. Not only did the domestic interest rate become lower than the hedged alternative in the foreign market, but Brazilian corporations were also able to issue local bonds with maturities as long as 10 years. Figure 3 shows the speed in which this debenture market flourished in Brazil.

In order to illustrate the magnitude of the issuance of “debentures”, it is worth noting that R\$ 80 billion is approximately 1% of the Brazilian GDP. Therefore, in 2018 Brazilian corporations issued approximately 1,5% of GDP in debentures. This number increased to 2% of GDP in 2019. In 2020, however, there was a sharp drop in new issues. This is due to crowding-out financing of the private sector by the Brazilian government in order to finance a primary fiscal deficit of 12% of GDP generated by extraordinary Covid-related expenses.

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Figure 3: New Issues of Brazilian Domestic Corporate Bonds (Debentures)



Source: Bloomberg, Vinci Partners.

Going back to the balance of payments account, Figure 4 shows the accumulated flows of bonds and loans issued by Brazilian companies abroad. After a peak in 2015, there was a significant drop as the environment of low domestic rates kicks-in. As companies issued local debt, they pre-paid their external debt, generating outflows of dollars. Although this could be negative in the short-term, it has the upside that the stock of external debt is reduced. Therefore, in the future, the annual outflows of dollars to pay interest on the corporate external debt will also fall. In the long-term, this is

an additional element that helps reduce the current account deficit.

Petrobras was a major player in the operation of issuing local cheaper debt to pay external dollar debt. Many corporates do hedge their foreign loans. However, Petrobras does not, as they see their oil sales in dollars as a natural hedge for their dollar debt. This means that the negative impact on the FX market is maximized. Earlier in 2020, Petrobras had suggested an intention of further reducing the external debt by an additional USD 25 billion. However, as we have seen above, the market for new issues of domestic bonds was squeezed by the



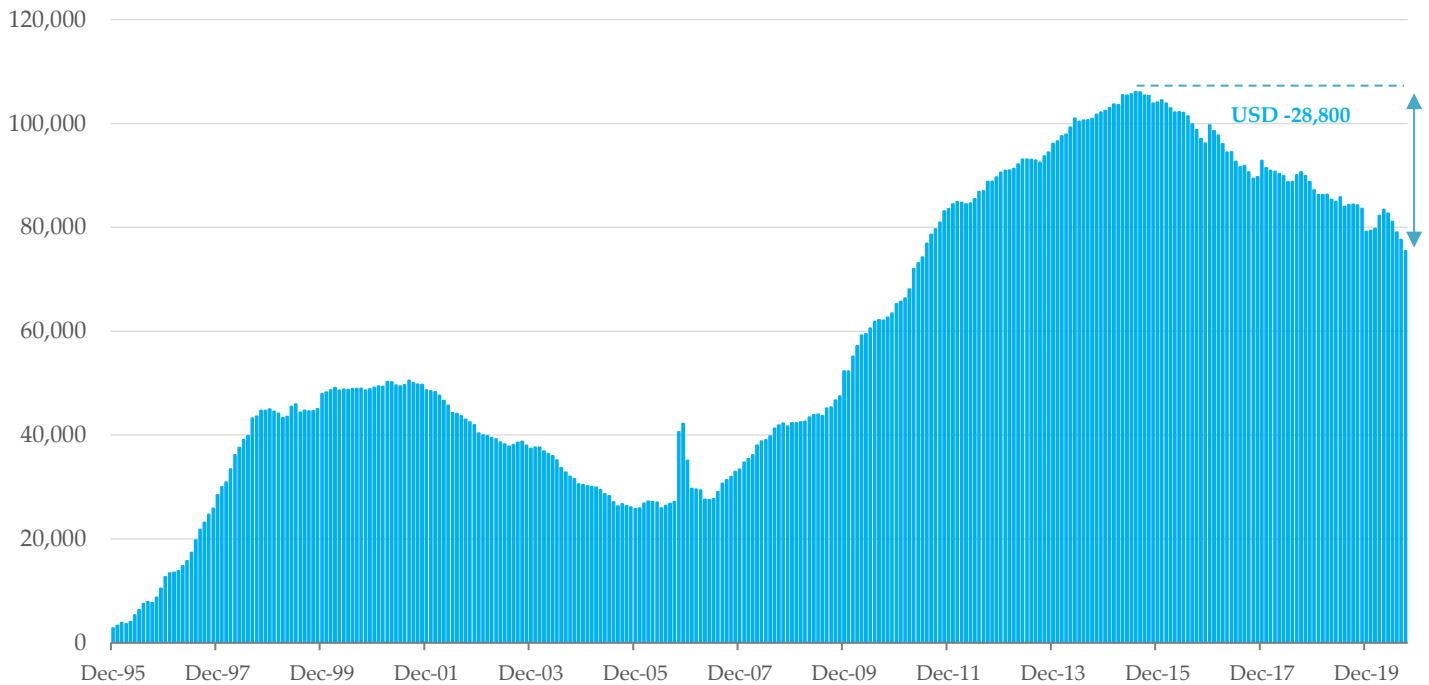
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gigantic financing needs of the Brazilian treasury in 2020. The rhythm of this debt swap may not be so fast going ahead.

Figure 4: Bonds + Loans from companies abroad
Accumulated values since January 1995 (MM USD)



Source: BCB, Vinci Partners.

The Adjustment Mechanism Working: Current account turning positive.

After the (fast) devaluation process is triggered, the (slow) adjustment in the real economy gets going. The price signal of the devaluation puts the engines of the economy in motion to generate a supply of hard currency. Figure 5 illustrates this adjustment mechanism. The gray line shows the real exchange rate for the Real. We have the monthly average for

each month and we set the base so that the last number pairs with the latest value of the Real/USD exchange rate. In the same chart, the blue line represents the current account balance (as a percentage of GDP, accumulated in twelve months). The blue line is depicted with an eighteen-month lag. This can be interpreted as the exchange rate goes first, and the full result of the incentives in terms of the current account is felt one and a half years later. To be honest, for the last decade, this lag became

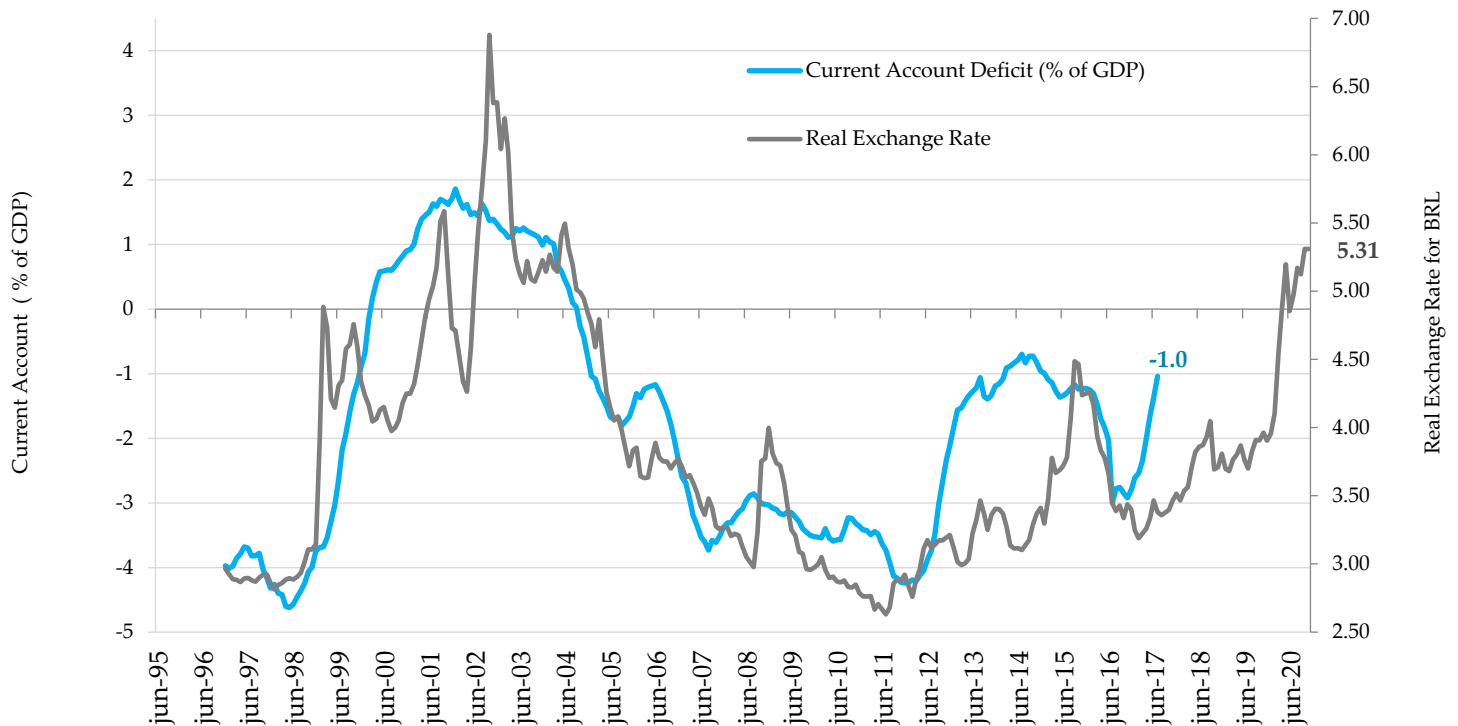
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shorter, close to just one year. It is easy to see this difference in the chart. However, the important point is that the current level of real exchange rate of the Real points to a current account surplus of approximately 1% of GDP soon. As a developing economy, that needs foreign savings to grow, it is

very rare for Brazil to post a current account surplus. Although the accumulated current account balance in 12 months is still negative, keep in mind that in the last seven months Brazil has already posted current account surpluses.

Figure 5: BRL Real Exchange Rate vs Current Account of Balance of Payments (lag 18 mths)



Source: BCB, Bloomberg, Vinci Partners.

The current account adjustment is the ultimate mechanism to generate a surplus of dollars for Brazil. This reversal coupled with a normalization of the capital account flows that we saw before lay the foundations for a future appreciation of the Real.

Banks Overhedge

Every country has its idiosyncrasies and in Brazil we have plenty. In the FX market we have the infamous “banks’ overhedge”. It all started when President Dilma, worried about high inflation due to the BRL



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devaluation, wanted to sell dollars without using FX reserves. To accomplish that, the government came up with a tax incentive for financial institutions. Since their balance sheet is accounted in BRL, Brazilian banks hedge the amount of capital they hold abroad. Dilma's government devised a tax scheme that induced banks to sell dollars in the futures-market in excess of their actual hard currency capital held abroad. The optimal number depends on the taxation bracket (which has changed during this period) and it is currently at 85% of the actual capital base held abroad. Therefore, after the introduction of this regulation, local banks sold dollars in BMF in excess of their capital position abroad.

The current government saw this type of scheme as artificial. Furthermore, in an environment of slow economic activity and reduced pass-through from FX devaluation to prices, an exchange rate devaluation became desirable in order to help boost

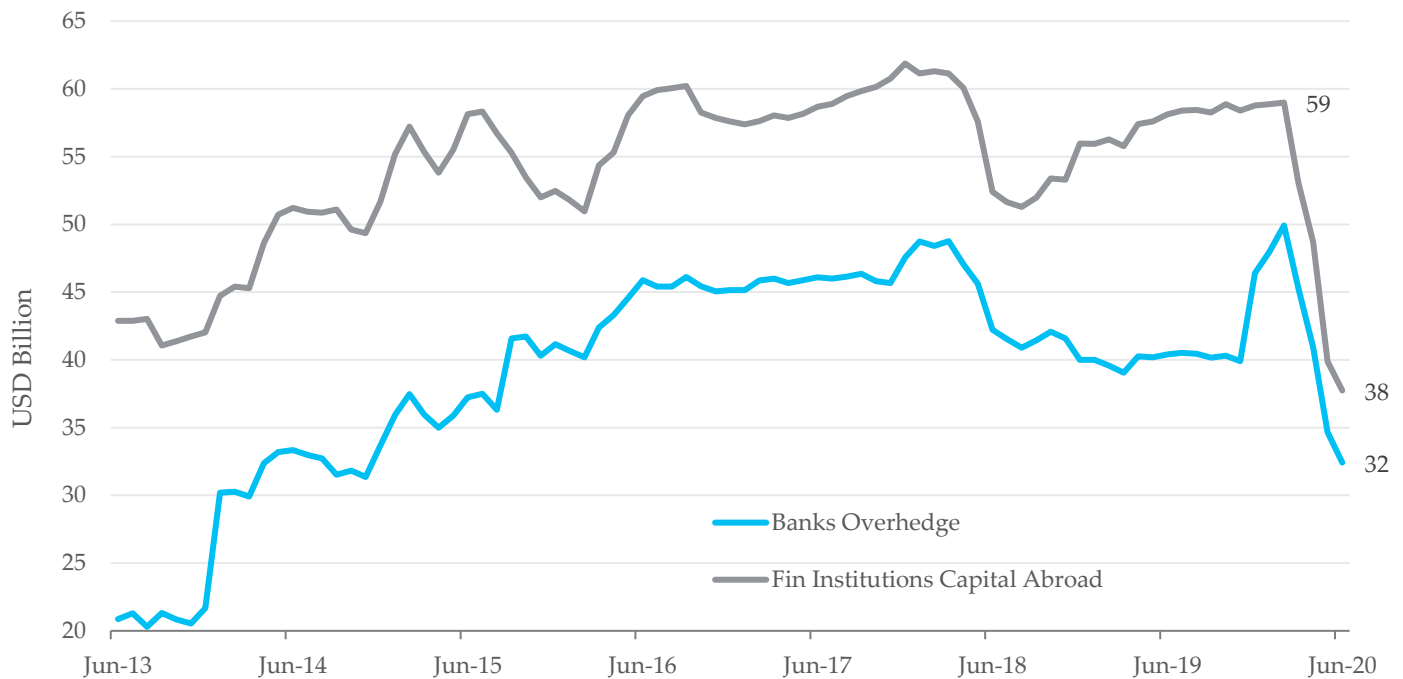
economic growth. Therefore, it made no sense to offer a tax incentive for banks to carry an overhedge position that did not align with the current economic policy targets.

The end of this tax incentive was approved earlier this year. In order to avoid a chaotic unraveling of those FX hedge positions, banks were asked to reduce half of their capital overhedge at the end of December 2020 and the other half at the end of December 2021. Figure 6 shows that according to the latest official data released by the Brazilian central bank, the total overhedge position summed USD 32 billion in June 2020. Therefore, banks will have to buy approximately 16 billion dollars in BMF in late December 2020. The following chart also shows that banks have significantly reduced their capital base abroad, as the reduction in the interest rate differential made it less profitable to do interest rate arbitrage. Keep that in mind because we will refer to it later in this paper.

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Figure 6: Banks OverHedge & Financial Institutions Investment Abroad



Source: BCB, Vinci Partners.

Although the release of official data on banks overhedge is not frequent, we can estimate the evolution of this variable by compiling balance sheet data from the main commercial banks in Brazil. Figure 7 illustrates the most recent picture. It shows the amount of capital held abroad changed little between June and September 2020. The balance

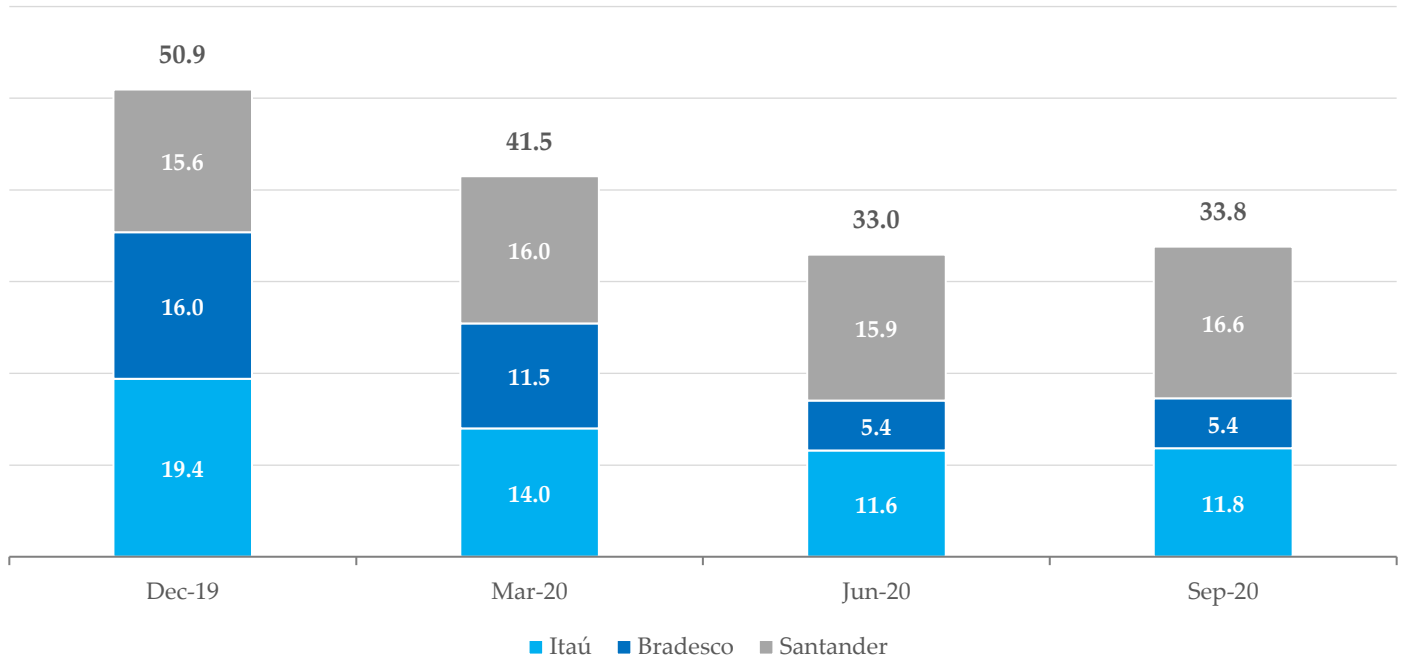
sheet data shows that in June the three main commercial banks in Brazil held USD 33 billion in capital abroad, out of the USD 38 billion total released in the central bank statistics. The three main Brazilian banks are a pretty representative sample of the total banking system regarding this specific variable.



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Figure 7: Main Commercial Banks: Capital Held Abroad
USD Billion



Source: Itaú, Bradesco, Santander, Vinci Partners.

The main message here is that, in the path towards the end of the BRL overshooting, there is a major bump coming this December 2020. Commercial banks will have to buy approximately USD 16 billion in dollar futures. There will not be an actual FX outflow, just a reduction in a financial hedge position in banks balance sheet. However, it will impact the exchange rate by the sheer reason of its significant magnitude. In financial markets we know that events that have date and time (and known size) to happen, tend to be anticipated. To comply with the law, banks do have to reduce their *overhedge* precisely in the end of December. But since

all this information is publicly available, it is possible that speculators have already been accumulating long dollar positions to unload when commercial banks unleash this huge demand. The Brazilian central bank has also released information suggesting that, should the market get too tight this coming December, it might increase the supply of dollar swaps to face this increased end-of-year extraordinary demand.



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All things considered: The actual flow of USD

In the short term, the actual flows of dollars may differ from the formal accounting of the Balance of Payments we have been discussing so far – although in the medium term they will converge. For example, an import of an oil rig may be financed abroad by a foreign bank. In that case we may see an import registered in the accounting of the balance of payments, but not an actual outflow of dollars. Conversely, exporters may anticipate the revenue of future exports (ACCs), meaning that the actual inflow of dollars might be larger than what is registered in the BP.

Figure 8 shows the actual flow of dollars into Brazil. Not what is registered in the balance of payments

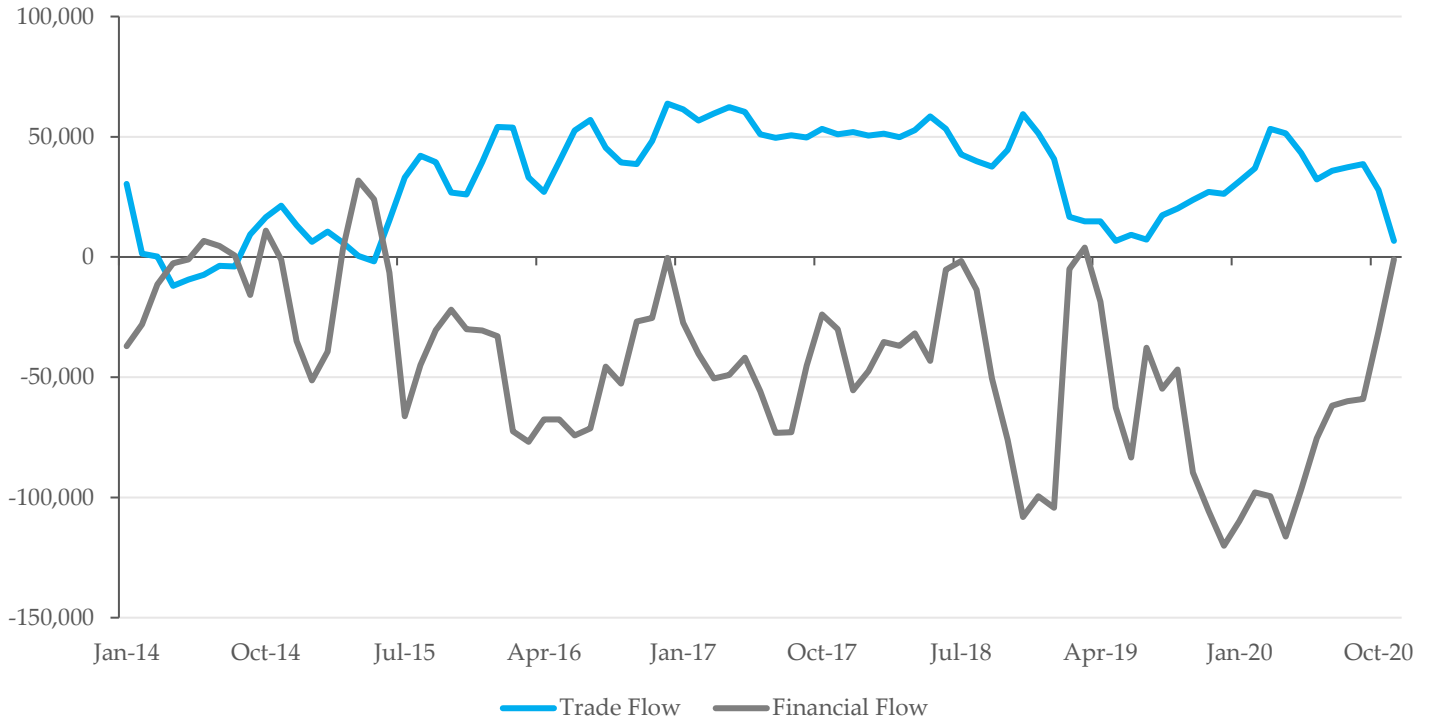
but what actually moved in or out in terms of dollars flows. The blue line shows the trade related flows. We can see that it is not improving as much as the trade balance mainly because exporters are withholding dollars abroad – hoping for a larger Real devaluation. Yet it has been floating around a net inflow of USD 30 billion per year. The gray line shows the actual flow of dollars related to financial transactions. This is where Brazil has been posting significant improvements. By late 2019, early 2020, these outflows were as large as USD 120 billion on an annual basis. These outflows have been reducing throughout the year and reached zero in the latest reading .

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Figure 8: Net USD Flows - Trade and Financial Net Flows

USD Bi - MovAvg 3 Mths Seasonally Adjusted Annualized



Source: BCB, Vinci Partners.

Figure 9 shows the combined effect of the two variables depicted in Figure 8. The net dollar outflows have been improving from almost USD 100 billion in the beginning of 2020 to slightly positive in the latest observation. If this trend persists – and

we have been arguing here it will – the actual flow of dollars will start to become significantly positive very soon in Brazil. Are we getting close to the point where the Real begins to appreciate? Figure 9 definitely points in that direction.

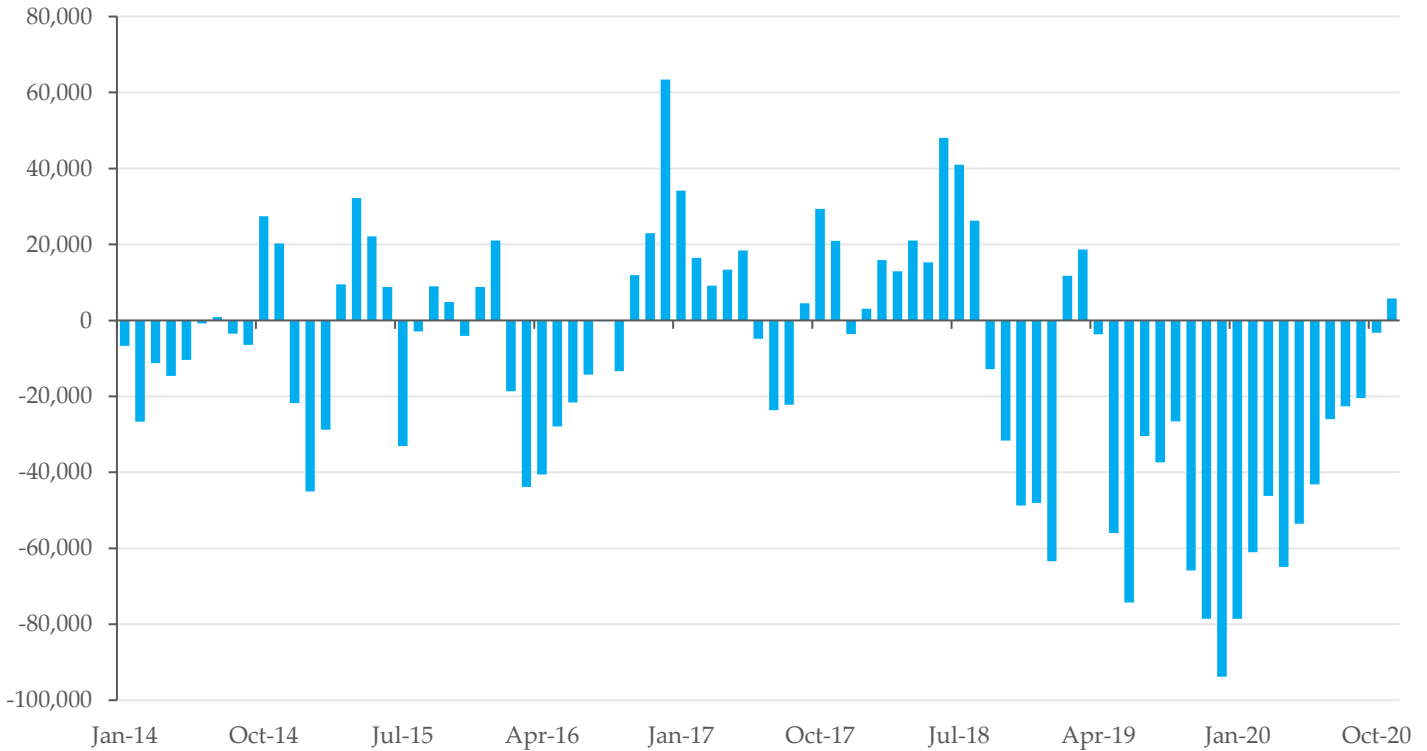


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Figure 9: Net USD Flows

USD Bi - Mov Avg 3 Mths Seasonally Adjusted Annualized



Source: BCB, Vinci Partners.

What about Brazilians sending their money abroad?

All the charts we have seen so far consider all the flows of dollars. Therefore the (out)flow of Brazilians is comprised within those numbers. However, one might consider strange not discussing “the most important flow of all”, the one from Brazilians sending their money abroad due to very low interest rates in Brazil. Well, the numbers for this specific flow are shown on Figure 10.

Contrary to the widespread “common sense” belief that major outflows took place in 2020, that is simply not true. Figure 10 shows that, from January to September 2020, there were inflows of USD 17.5 billion, i.e., Brazilians sending back dollars from abroad. This number was heavily influenced by Brazilian banks reducing their capital base held abroad in 2020. We have mentioned this capital reduction earlier (Figure 6) when we discussed the banks overhedge issue.

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The “Covered Interest Parity” also helps explain this flow reversal. The interest rate in Brazil must match the follow identity:

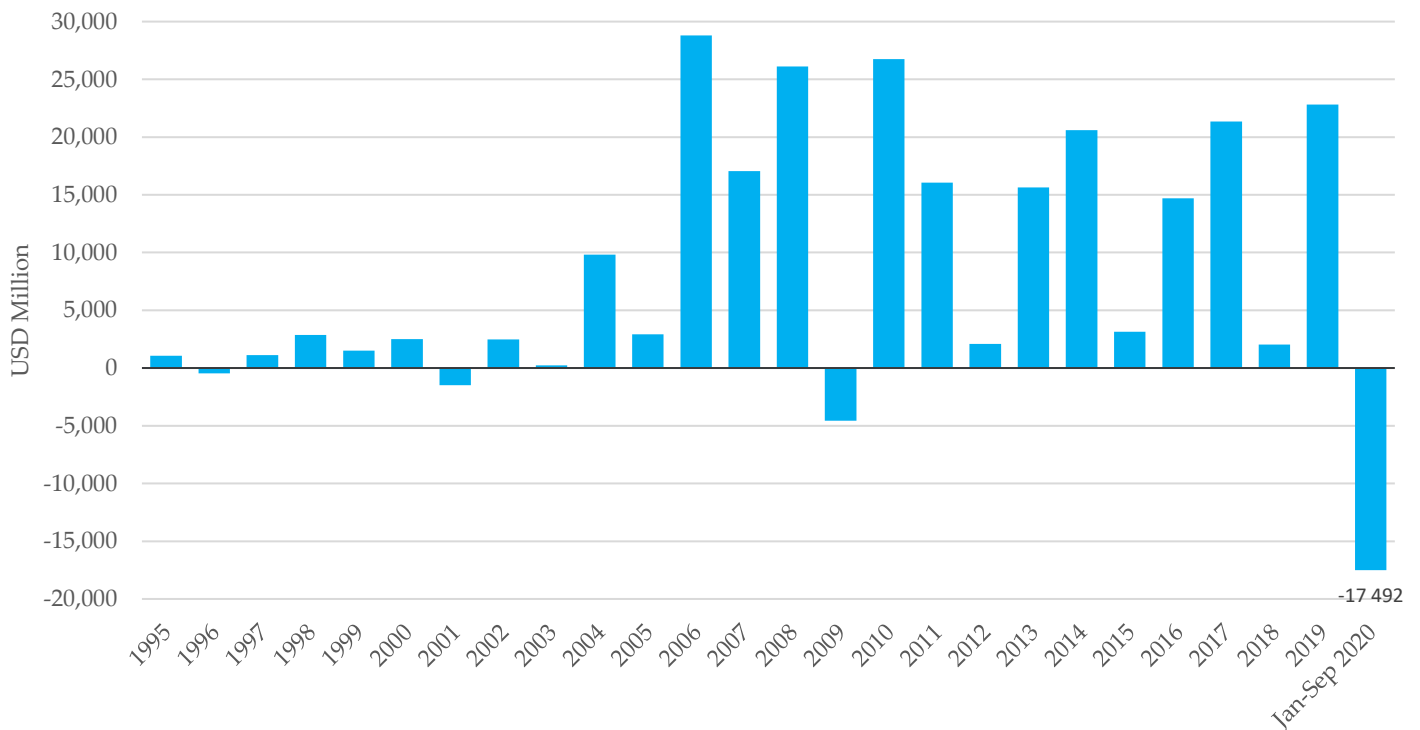
$$Rates\ Brazil = Rates\ US + Brazil\ Risk + Expected\ Deval$$

Will low rates in Brazil lead to an eternal outflow of dollars? Not necessarily. The key to understand this is the last term of the equation above. As the supply

of dollars becomes positive, the expected future devaluation goes to zero and eventually may turn into an expectation of a Real appreciation. In plain English, it is rational to send money abroad to get very low rates when the Real is at 4,00, local rates are low, and the flow of dollars is negative. It may not be so rational to do the same (with the same local rates) when the Real is at 5,60 and the flow of dollars is starting to become positive. At some point, the expected devaluation may become negative, ie, an expected appreciation of the local currency.

Figure 10: Net Investment of Brazilians Abroad

(positive = outflow of dollars from Brazil negative = dollars flowing back to Brazil)



Source: BCB, Vinci Partners.



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Comparing International Episodes of FX Overshooting.

Although different countries have different economic narratives, the process of currency overshooting is basically the same all over the world: an imbalance between demand and a lagged supply of hard currency. In this section, we show the results of a study we developed comparing FX devaluation episodes in the last 40 years worldwide.

We have crunched the numbers and tried to draw common ground conclusions in all overshooting episodes that were identified in the past decades. By comparing countries with similar inflation rates after the devaluation took place, we can get an alternative benchmark to infer in which stage of the overshooting Brazil is currently in, and also how much nominal currency appreciation is reasonable to expect after the peak has been reached.

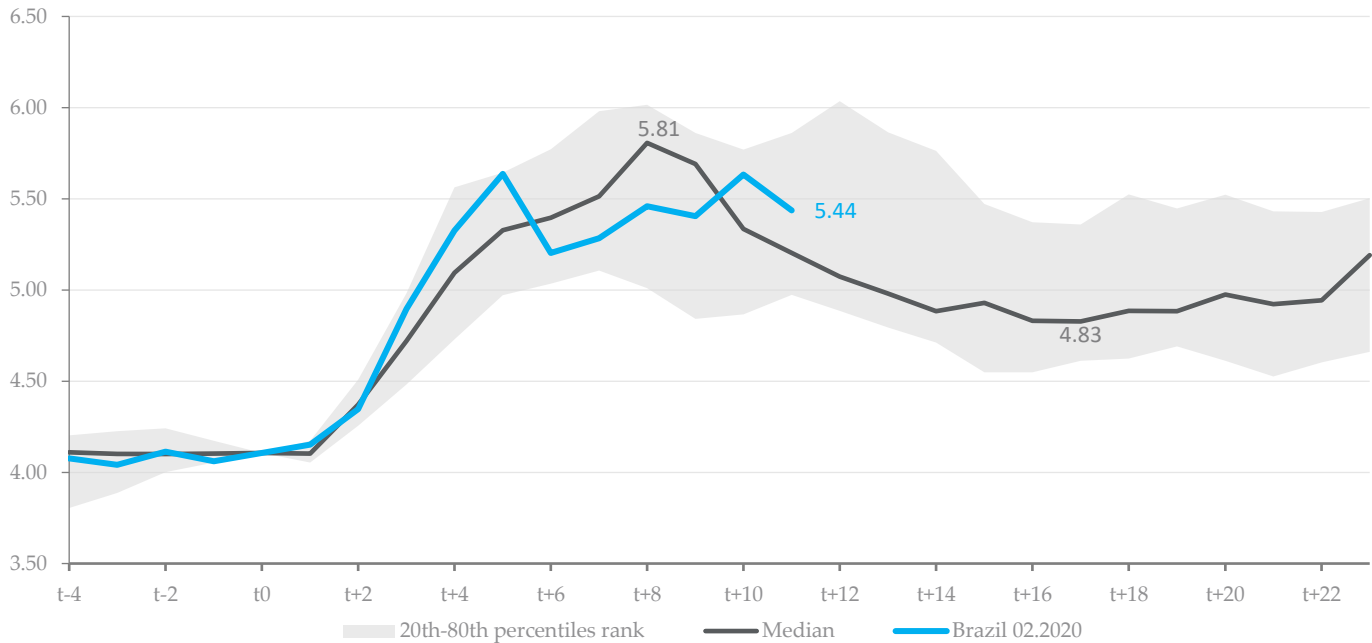
We posted a detailed methodology on how we selected the overshooting episodes from 1982 to 2020 in 57 countries in the annex. We have created a database, aligning the beginning of all of them – which we called t_0 . We have found 82 overshooting events in this search. Within this group it was easy to identify two different sub-groups. Those countries that had a significantly high inflation after the FX overshooting, and those who were able to accommodate the devaluation with low inflation. We hand-picked those episodes that had an accumulated inflation below 10% in the two years after the beginning of the overshooting – Brazil is expected to have 7%. This reduced the sample from 82 events to just 23. It is with this smaller sample of 23 overshooting episodes, with low inflation, that we have created a benchmark to compare the Brazilian case.

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Figure 11: Stable Overshootings & CPI Inflation<10 - BRL/USD Currency in t0

Base t0 = 4.11 for all countries



Source: Vinci Partners.

Figure 11 summarizes the results we have obtained. According to our methodology, the beginning of the overshooting was at R\$ 4.11, where we set t0. We have changed the base of all other countries to set their t0 to be 4.11 too, in order to make the chart more intuitive. The gray line shows the median of the sample of all 23 episodes. The gray shadow shows, in the upper limit, the countries with the most devaluation and the lower limit of the band the countries with the lowest devaluation. The blue line is the Real (on a monthly average). The last available observation is the average BRL exchange rate for

November: 5,44. Note that it is marked in t11, meaning that it took place eleven months after the start of overshooting. Brazil is now entering the phase when even the worst cases had nominal appreciations. Brazil's peak may be a little later due to the banks overhedge problem. On average, the chart shows approximately a 20% nominal appreciation after the peak – from 5.81 to 4.83.

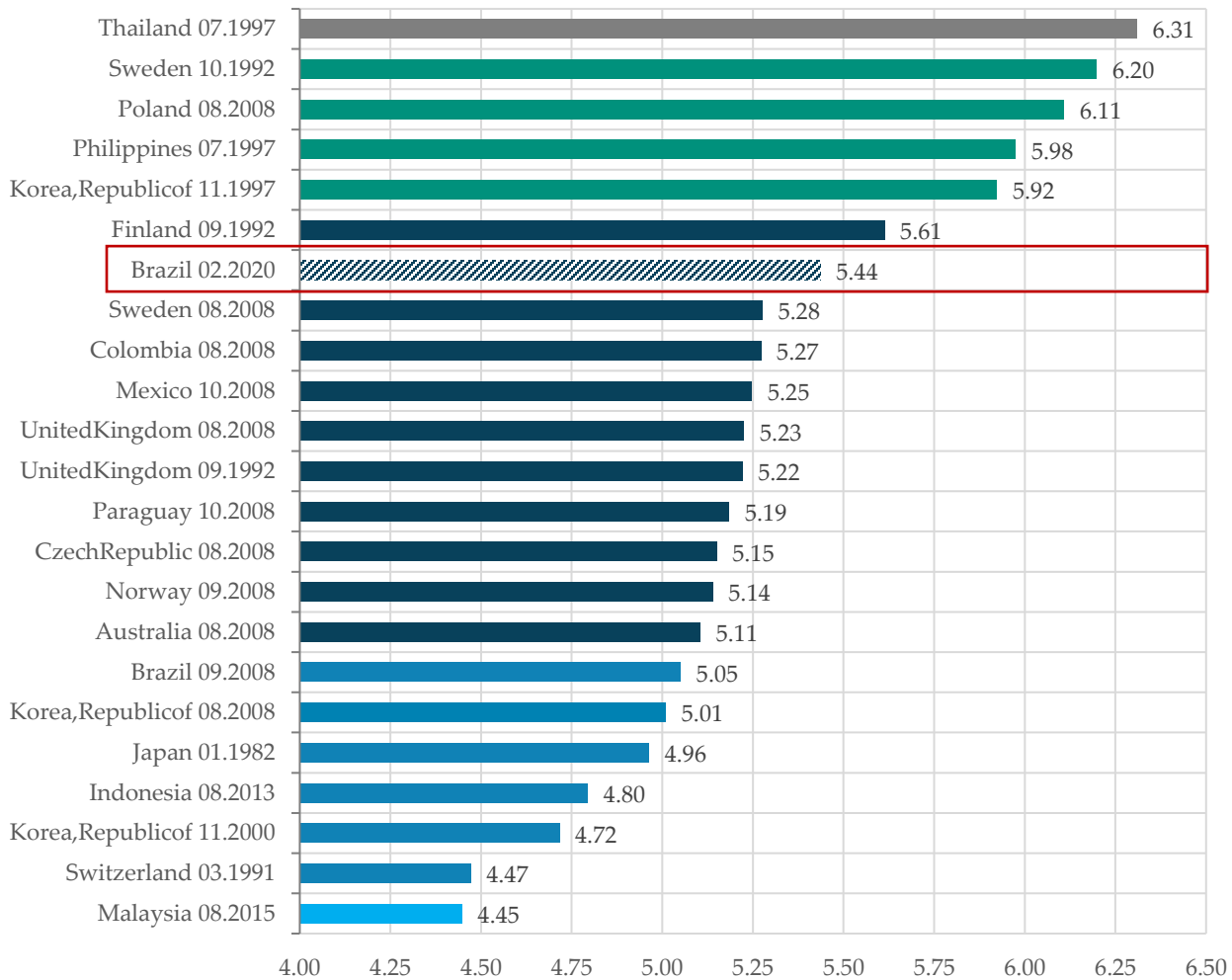
What were the other 23 countries and how were they performing at their equivalent t11? The answer to this question is shown in Figure 12.



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Figure 12: Exchange Rate Values in t+11 (Base t0 = 4.11 for all countries)



Source: Vinci Partners.

Figure 12 shows that eleven months after the beginning of the overshooting, six episodes were performing worse than Brazil (among the 23 countries that had inflation below 10% after two years): Thailand 97, Poland 2008, Philippines 97, Korea 97, Sweden 92 and Finland 92. Note that some countries appear more than one time. Our

methodology has selected, in Brazil, both the devaluation of 2020 and 2008. Korea shows up both in 1997 and 2000. UK is depicted in the Soros attack in 1992 and a more recent devaluation in 2008. Another interesting way to analyze the data from the chart above is to take these observed values and group them according to ranges in the current value



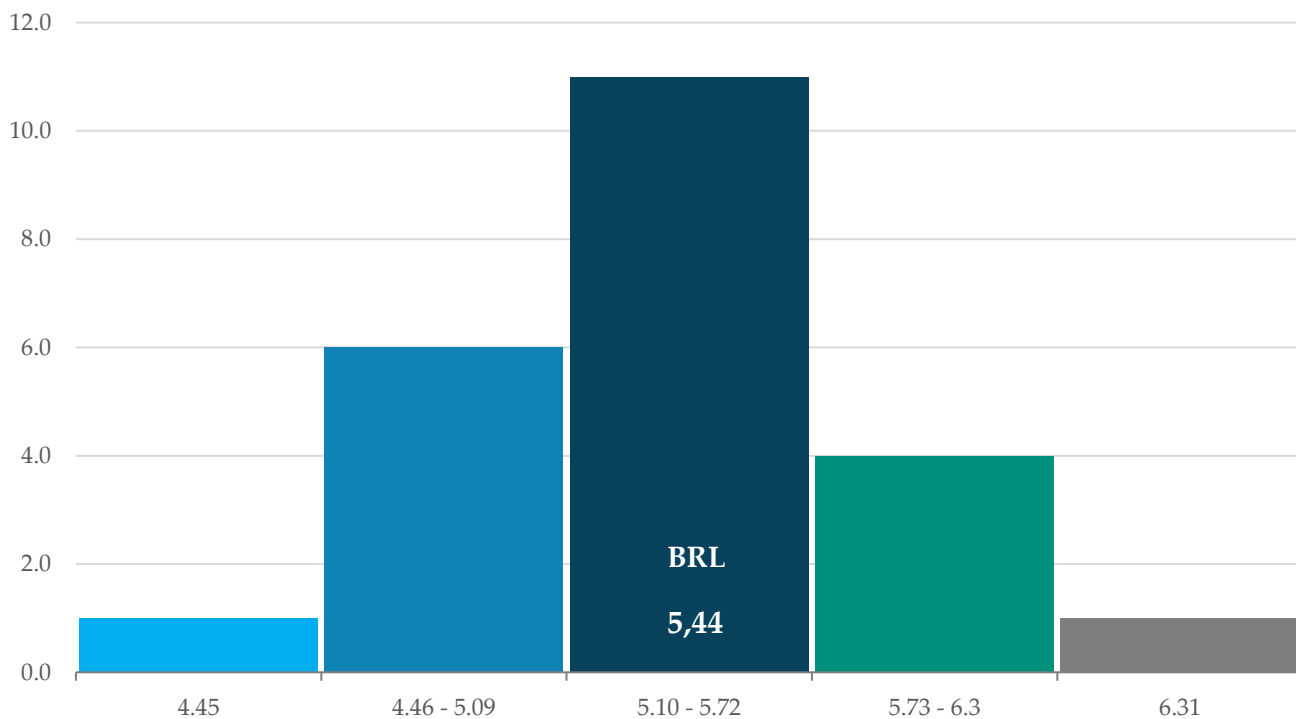
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of the exchange rate. This is shown in Figure 13. In the horizontal axis, we have different FX ranges. On the vertical axis, we have the number of countries in that range. Figure 13 shows that our sample of 23 countries follow approximately a Normal

distribution. Brazil is currently on average, as marked in the chart. Remember from Figure 11 that the average of the whole sample goes down as we move forward in time.

Figure 13: Histogram of values in t+11



Source: Vinci Partners.

Conclusion

Like most markets, the FX market is driven by supply and demand. However, the long lag between the devaluation and the reaction of the economy generates an “overshooting” in the currency depreciation. If the devaluation occurs in an environment of low inflation (like in Brazil currently) we tend to see a nominal currency

appreciation in order to adjust the real exchange rate.

We believe that the BRL is getting close to this critical point where the currency starts to appreciate in nominal terms. Firstly, both the current account and the capital account of the balance of payments show a trend towards equilibrium. Secondly, and most importantly, the actual flow of dollars in Brazil has moved from an outflow of approximately USD



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100 billion in early 2020 to slightly positive in the latest reading. We expect that this trend persists in the months ahead, meaning that the total flow of dollars is likely to turn positive in Brazil. In other words, after a long adjustment, the actual supply of dollars will become larger than the demand for dollars, leading to a nominal appreciation.

Additionally, we looked for international evidence of similar devaluation episodes in the recent history. Our aim was to provide an additional benchmark to measure if the BRL is moving towards a nominal appreciation, in line with the international experience. The conclusion was that it definitely seems to be the case. In a sample of 23 overshooting episodes, the currency tends to post a 20% nominal appreciation after the has been reached.

There is a major bump in this appreciation process this coming December, though. Commercial banks will have to reduce their overhedge position, leading to purchase of dollars of approximately USD 16 billion. However, after that, the BRL will face balanced external accounts and the strongest seasonal inflow of dollars due to the crop exports in the late first quarter.

We will follow closely the evolution of the dollar flows and check whether the improvement trend persists. We will be also monitoring the evolution of the Real performance when compared to the international benchmark that we have created. Updates on the major benchmarks we have discussed here will follow this initial report as soon as new data comes in.



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Methodology for International Comparison

In general, classic episodes of overshooting involve a large and fast devaluation of the local currency. To choose the start of these events, we use the monthly average of daily data on the bilateral exchange rate between a country and the US dollar. Our database includes 57 countries from 1982 to 2020. We evaluated 3-month rolling windows and used four criteria like those employed in *Culic (2020)*¹ capable of capturing the following characteristics:

i. The depreciation of the local currency must be large: for this, we only select devaluations above the 90th percentile among the devaluations recorded in the quarterly comparison;

ii. The devaluation should be larger than other recent devaluations: We evaluate this point by comparing the devaluation of a quarter against the devaluation of the immediately previous quarter, and we select events above the 90th percentile;

iii. The movement should start a new period of devaluation. In some cases, we observe countries that have their exchange rates involved in a devaluation trend, but that for some months experience some stability, just before returning to the devaluation trend. To exclude these episodes, we evaluated the currency devaluation in the quarter with the average devaluation recorded in the last 4 quarters and selected episodes above the 90th percentile;

iv. The Event must be relevant in the annual comparison: In certain situations, we may experience rapid and strong depreciation after an appreciation of the local currency, but which do not constitute strong enough or persistent movements of devaluation. To exclude episodes like these, we determined that the devaluation in at least one of the 6 months following the overshooting must be higher than the exchange rate for the same period one year before.

After applying the four criteria, we chose as *t0* the month immediately preceding the greatest monthly devaluation. Then, to group the cases and make a comparison with the strong devaluation of the real observed since February 2020, we analyzed the accumulated inflation in each episode two years after the beginning of overshooting.

We had identified 104 episodes of overshooting among 57 different countries. Following the definition adopted in *Culic (2020)*, we identified overshooting episodes that resulted in further devaluations within the two-year interval, called nonstable events - usually associated with hyperinflation environments - and overshooting events where the exchange rate showed at least stabilization after the devaluation peak, episodes called stable, which represent 82 cases in our sample.

Figure 14 shows a classic *stable* overshooting event, referring to the movement of the real observed in

¹ Culiuc. A. (2020). "Real Exchange Rate Overshooting in Large Depreciations: Determinants and Consequences." IMF Working Paper 20/60, International Monetary Fund.

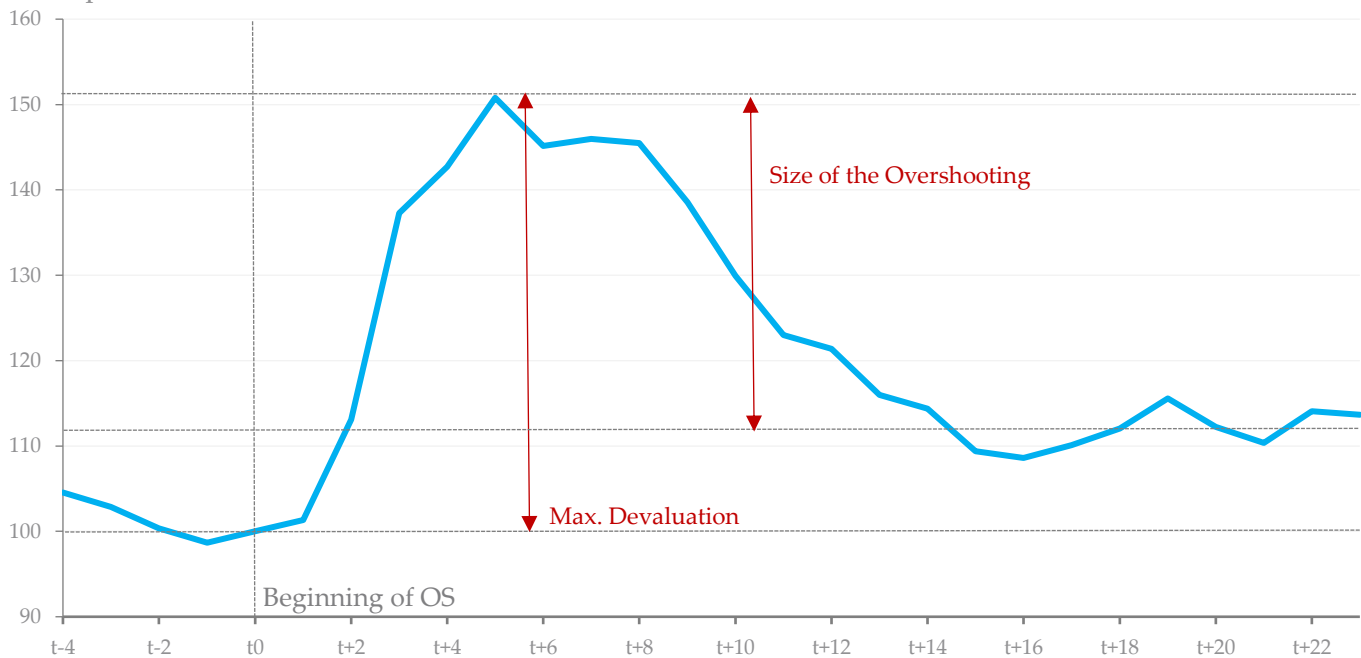
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September 2008 during the international financial crisis.

Figure 14: A Stable Overshooting Event

BRL- September 2008



Source: Vinci Partners.

Results

Looking at the median of all 104 events, illustrated in Figure 15, we see a maximum devaluation occurring after 8 months. At this time, the local currency registered an increase of + 36.3%, but what draws attention is that after the peak it is not possible to observe a significant appreciation of the

currency. The median movement was close to 5% appreciation, remaining stable after the tenth month since the beginning of overshooting. When looking at the upper limit, represented by events up to the 80th percentile, we noticed that many of them involved countries with a hyperinflation environment and had experienced a new devaluation process within the window of 2 years following the overshooting started in t_0 .

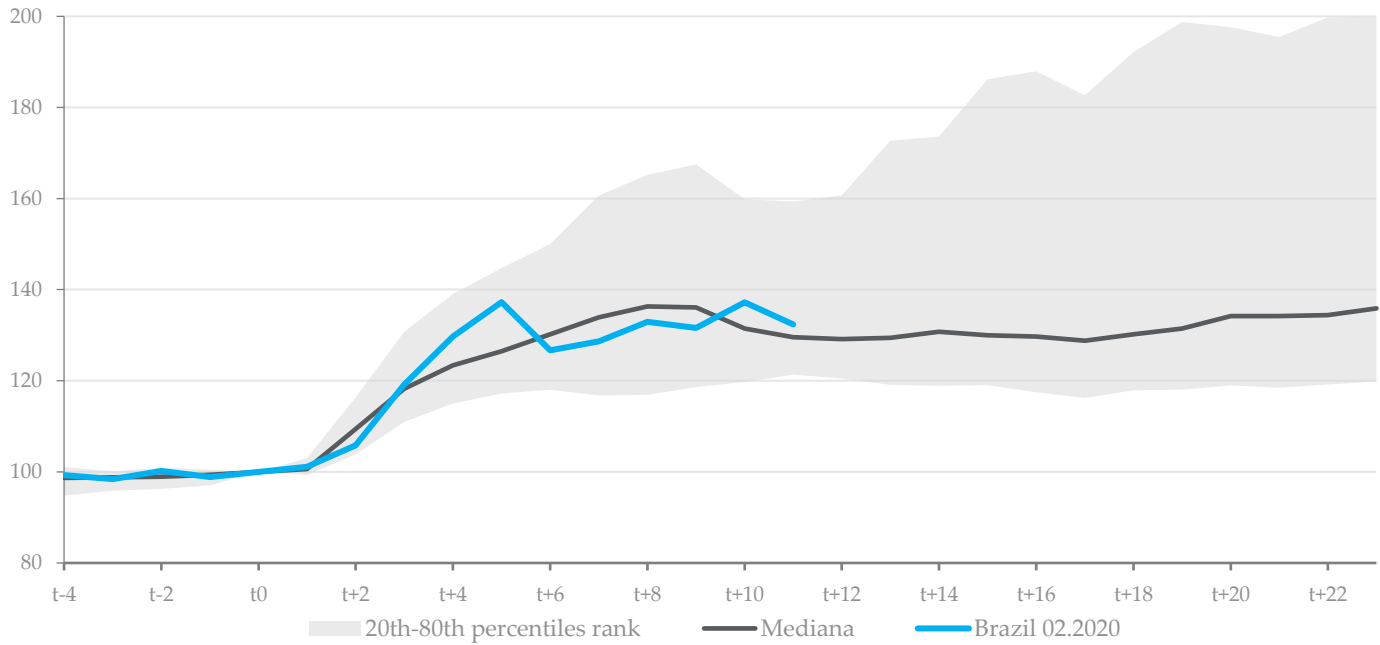


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Figure 15: All Events

Comparação entre 104 eventos de overshootings



Source: Vinci Partners.

Figure 16 exclude these events, plotting the Stable group, which consists of 82 events since 1982.

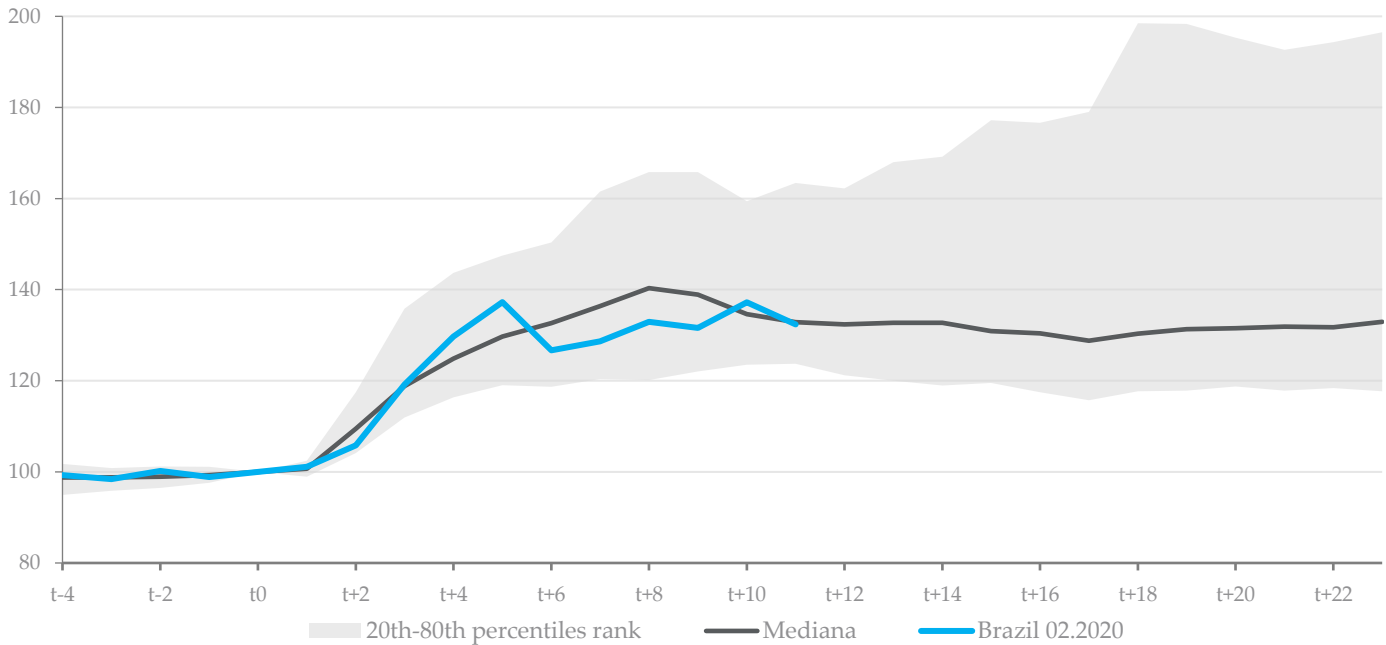


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Figure 16: Stable

Comparação entre 82 eventos de overshootings



Source: Vinci Partners.

Now, the devaluation continues to peak after 8 months from the beginning of the event, about 40%, followed by a trend of appreciation until the 17th month after the start of the devaluation, when the median starts to show some stability, at a value 7% below the peak, but still 29% above the pre overshooting period.

It should be noted that even after excluding *nonstable* events, the sample of episodes still includes 46 cases where inflation was higher than 20% two years after the beginning of overshooting.

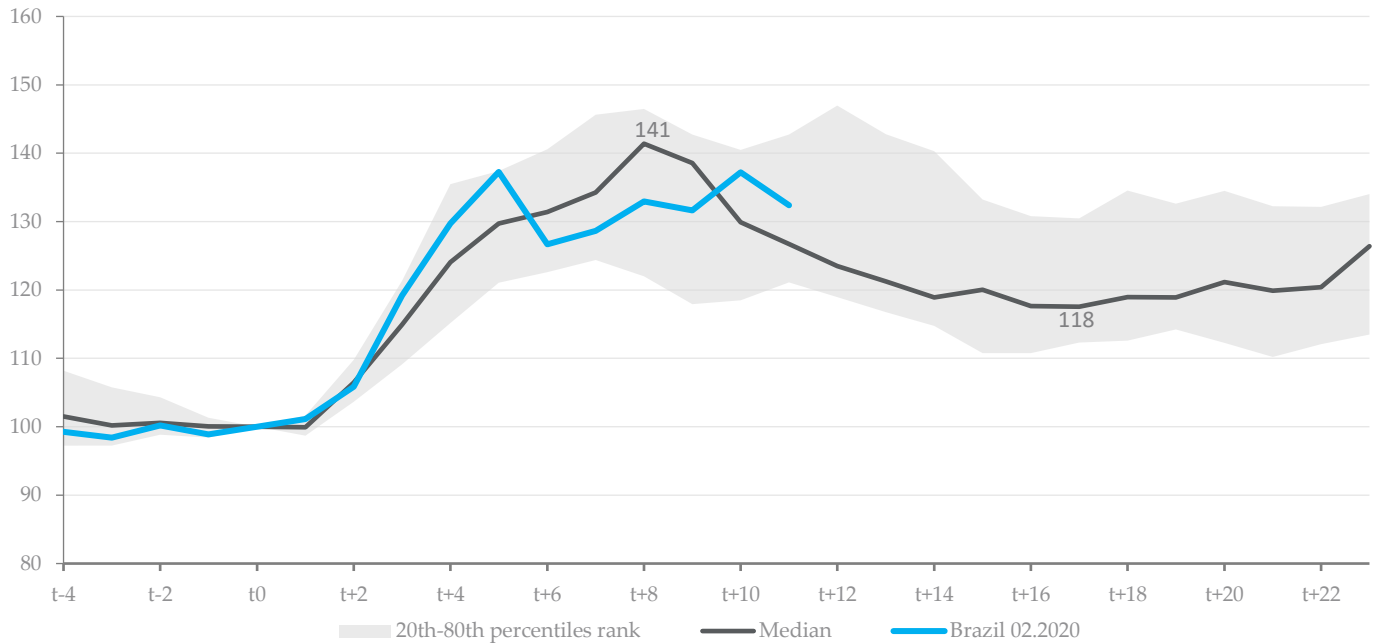
In Brazil, if we consider the IPCA accumulated since February 2020, with the focus projection until the end of 2021, we will have inflation close to 6.0% in the 2-year window. When comparing with episodes where the accumulated inflation two years after the beginning of overshooting was less than 10%, being more aligned with the Brazilian case, we were able to identify 23 events, which are plotted in figure 17.

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Figure 17: Stable & CPI<10

Comparison between 23 events of overshootings



Source: Vinci Partners.

Considering the median of the new sample, we observed a 41% devaluation after 8 months, followed by a long period of appreciation. After 16 months since the start of the event, there is a stabilization of the nominal exchange rate at a level 16% below the peak and 18% above the value before the overshooting.

To better compare the Brazilian recent experience and the foreign cases of FX overshootings, we plotted the same chart in Figure 18 (Figure 17) but we changed the index in t0 from 100 to 4.11, which was the BRL/USD currency just before the beginning of the devaluation. We can see that the median of the events reaches a peak at 5.81 and then appreciates to levels close to 4.8.

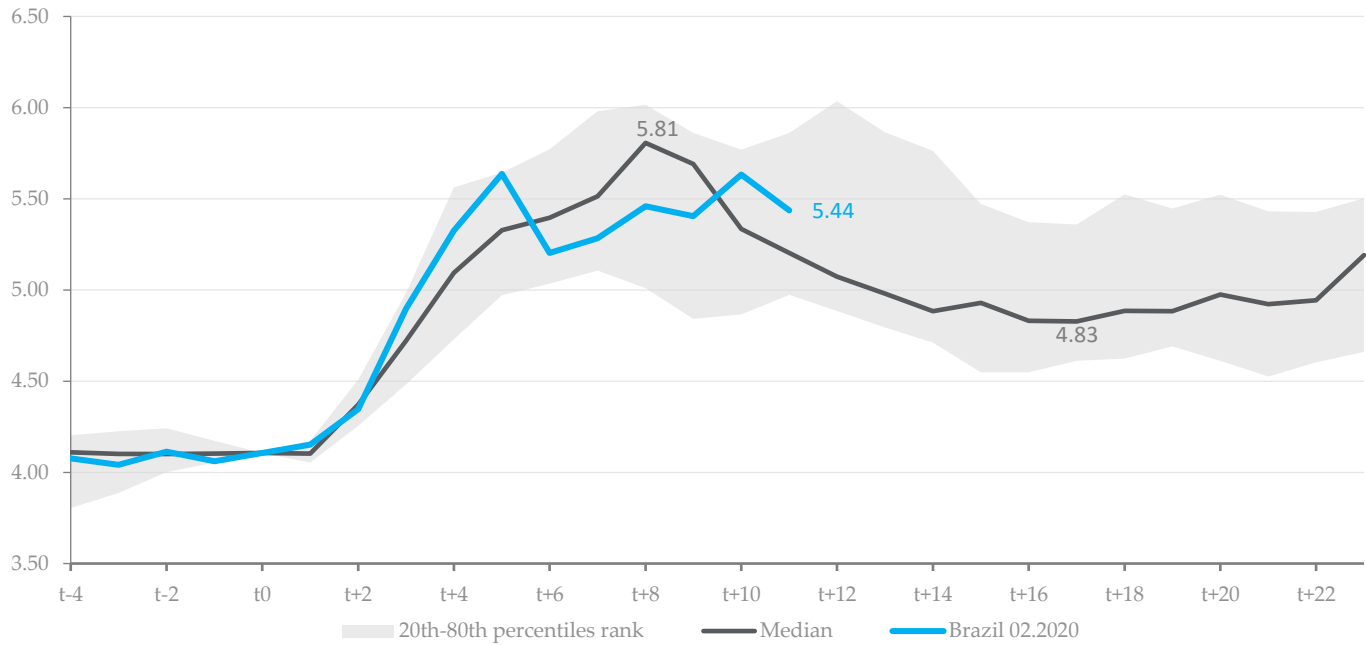


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Figure 18: Stable & CPI<10 - BRL/USD Currency in t_0

Comparison between 23 events of overshootings



Source: Vinci Partners.

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