International Macroeconomic Impacts on the Brazilian Economy: a note

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1 - Introduction

The impact of international macroeconomic policies on the Brazilian economy was evident in the subprime crisis period and its aftermath. The Brazilian economy faced a new economic environment with a lower growth rate in the developed world that changed relative prices, generating terms of trade gains that favored the services sector in comparison with industry. As a consequence, despite lower GDP growth the labor market continues to flourish (services are labor intensive but have lower productivity in Brazil).

In the years following the crisis the Brazilian economy observed lower interest rates, a real exchange appreciation and a loosening of fiscal policy that reduced the primary surplus (that maintained debt sustainability) and increased its vulnerability.

In this context, the impact of the tapering process on the Brazilian economy is an important topic that must be addressed in order to avoid/reduce its possible negative impacts in Brazil.

This note is organized in 5 sections including this introduction. The immediate post crisis and its effects on Brazil are reported in section 2. Section 3 shows the Quantitative Easing and Tapering effects on Brazil. Section 4 presents a Growth decomposition analysis and the fiscal policy shift after 2008. Section 5 summarizes the findings of this note.

2 – The Immediate post-Crisis Period

The Brazilian economy was doing well like many other countries before the subprime crisis. Brazilian GDP growth rate accelerated from 2002 until 2008. The average growth rate was 2.3% in the FHC government and increased to 3.4% between 2002 and 2006 and to 4.5% in the 2006-2010 period, during the Lula government.

Brazilian recovery in the immediate post-crisis period was remarkable, assuming the “V” shape format, as can be seen in Figure 1. The 4th trimester GDP deceleration (-2.7% compared with the previous trimester, more than 10% in annual terms) caused a recession in 2009 that was fully reversed in 2010, when the country grew 7.5%. The

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combination of expansionary monetary and fiscal policy helped the quick recovery in an election year.

Despite the fast 2010 economic recovery, the Brazilian economy suffered some permanent effects, especially due to relative price changes caused by weak world economic growth.

2.1 – Terms of Trade

The world economy has observed a commodities boom since 2002, with commodity prices presenting a very high growth rate. The commodities prices boom did not change substantially the terms of trade of the Brazilian economy. From 2002 until 2008 Brazilian exports prices increased 138% while the terms of trade only 17%.

This low improvement in the terms of trade is a consequence of the sharp increase in import prices. At the same time, that export prices increased (mainly primary goods in Brazil), import prices (manufactured goods) also increased sustaining a moderate terms of trade increase.
The high imported goods prices were signaling a high world demand for manufactured goods. This tendency changed after the 2008 crisis caused a demand drop on the developed economies reducing the demand for manufactured goods and therefore increasing Brazilian terms of trade.

Figure 3 shows the GDP growth rate in Brazil and in the world together with the terms of trade evolution. The terms of trade increased sharply in Brazil after the crisis but then its trend was reduced after 2010. However, the level remains much higher than that of 2008.

Source: Funcex.
2.2 – GDP

The huge post crisis impact on terms of trade generated permanent effects on the Brazilian economy. The increase in the terms of trade stimulates a real exchange rate appreciation that causes competitiveness losses to the industrial sector and favors the services sector. This real exchange rate appreciation is a change in relative prices between tradable and non-tradable. The increase in non-tradable relative prices moves allocation in the economy towards the services sector (labor intensive).

The positive impact on the labor market caused by this change is straightforward: a higher demand for labor causes unemployment rates to drop even more and allows for continuous real wage gains due to workers higher bargaining power.

Source: IMF, Funcex, IBGE.
The impacts on economic growth, however, might have been negative, especially for industry. The terms of trade shift towards services caused a real exchange rate appreciation the reduced the competitiveness of Brazilian industry. This reduced industry growth in Brazil. The 2010 high industrial growth was the effect of high non utilized capacity in 2009 and the result of fiscal and monetary expansionary policies until 2010. Once industry capacity was back to its historical levels, industrial growth was reduced, as can be seen in Figure 5.

Source: BACEN.

Source: IBGE
Brazilian industry is not very competitive. In this sense, one can view Brazilian industry as a “marginal industry” that operates only in “good times”. From 2002 to 2008, unit labor costs increased an average of 9.9% per year due to real exchange rate appreciation and despite productivity gains. An extra real exchange rate appreciation combined with productivity reductions would worsen Brazilian industry competitiveness. Thus, even during the period of faster growth rates industry lost some competitiveness in Brazil. The booming labor market, combined with the exchange rate extra appreciation, makes this situation worse.

<table>
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<tr>
<th>Table 1: Unit Labor Cost Decomposition</th>
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<tbody>
<tr>
<td>ULC</td>
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<tr>
<td>Wages</td>
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<td>Labor Productivity</td>
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Source: Mello and Barbosa Filho (2013)

Therefore, once the demand for manufactured goods decreased, Brazilian industry was not prepared to compete for new markets abroad. Brazil lost some of its traditional Latin American manufactured goods markets to other countries (China). As a result of the high costs (low competitiveness), Brazilian industry growth rates are low and not expected to recover in the short term.

3 - Quantitative Easing and the Tapering

3.1 - Quantitative Easing

The monetary stimulus caused by the 2008 crisis lowered US interest rates close to the zero lower bound. In this case, the FED lost its ability to use monetary policy to affect the economy through the standard mechanisms. The close to zero short term interest rates imposed an additional challenge on monetary policy at a time when the world economies (especially the American) were in the middle of a deep recession. The monetary policy in the US has a zero to 25-basis-point target for Federal Funds rate since December 2008.

This challenge made the FED adopt the Quantitative Easing (QE) Policy. This policy buys long term assets in order to reduce long term interest rates and as a result stimulates a faster economic recovery. In order to achieve this goal and strengthen economic activity the FED announced the Quantitative Easing 1 (QE1) in November 2008. The program was renewed in August 2010 with an extra US$600 billion to buy treasury securities until June 2011. Finally the FED announced the QE3 in 2012 promising to buy an amount of US$40 billion per month. In 2013, the amount was increased to a figure between US$40 to US$85 billion per month.
Table 2 reports the QE announcements and policy implementation schedule and shows that the FED announced the Tapering process in May 2013 and began in the first quarter of 2014.

<table>
<thead>
<tr>
<th>Table 2: Monetary Policy Announcements</th>
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<tbody>
<tr>
<td>Announcement</td>
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<tr>
<td>QE1</td>
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<td>QE2</td>
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<td>QE3</td>
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<td>Tapering</td>
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3.2 - Effects of the Quantitative Easing

The quantitative easing policy is a controversial one, in the sense that some analysts doubt the positive impacts of this policy on the economy. As a result of this “new policy”¹ several analyses of the impacts of the QE policies were conducted. Woodford (2012) undertakes a comprehensive literature review and separates the QE effects into two distinct groups: changes in the central bank balance sheet and forward guidance. The former analyzes the impacts of changes in central bank size and composition of assets on its balance sheet over the market rates. The latter studies the impact of central bank announcements on the market.

Woodford concludes that the results, so far, do not support the conclusion that the QE program was able to change asset prices and reduce long-term interest rates due to central bank’s balance sheet changes. The author argues that the effects on the market were through a forward guidance channel by signaling. This conclusion follows Krishnamurthy and Vissing-Jorgensen (2011) who argue that the purchases can be seen as signals about future policy strengthening forward guidance.

3.2.1 – Effects in Brazil

The QE affected the Brazilian economy through the same channel as it impacted the American economy. The QE announcement signaled a long period of low interest rates in the developed world and as a consequence a process of lower interest rates and exchange rate appreciation in Brazil.

An immediate result of the quantitative easing was an additional effect of this program on nominal exchange rates. The Brazilian finance minister called it “Guerra Cambial” (Exchange Rate war or currency war). As seen above, the relative price change by itself would result in exchange rate appreciation. The monetary stimulus of the QE policy might amplify this effect because commodities prices could be more affected by the QE policy. Therefore, it would amplify the terms of trade effects on the exchange rate. However, in line with Woodford’s conclusion, this effect must have been incorporated in the immediate aftermath of the policy announcements.

The nominal exchange rate has been appreciating in Brazil since 2002 due to a moderate terms of trade increase, with high export prices allowing the country to have

¹ A quantitative easing was already tried by the Bank of Japan and the results are not very positive.
strong trade surpluses. During the crises the flexible exchange rate regime protected the country from external negative shock through a huge depreciation\textsuperscript{2}. Despite the different conditions in the world economy (lower trade surplus), the exchange rate appreciated again in response to lower US interest rates turning the Brazilian economy more attractive to capital due to its better recovery perspectives. The real exchange rate continued to appreciate until July 2011.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure6.png}
\caption{Nominal Exchange Rate (R$/US$)}
\end{figure}

Source: BACEN.

The lower interest rates in the US allowed a reduction in Brazilian interest rates\textsuperscript{3}. This monetary phenomena can be seen in Figure 8. The real interest rates in Brazil had been dropping gradually for long time, a clear indication of institutional improvement. The US sharp interest rates reduction allowed Brazil’s Central Bank to reduce sharply its interest rates.

The real interest rate reduction was deeper than it should have been and caused inflation to increase in Brazil. This extra drop was not a consequence of international monetary policy but a Brazilian monetary policy mistake that put the interest rates below its neutral level.

\textsuperscript{2} Blanco, Barbosa Filho and Pessôa (2011).
\textsuperscript{3} Brazil is a small open economy. Therefore, US lower interest rates allowed a reduction in Brazilian interest rates (Selic).
3.3 - Tapering

In the same way that economic theory did not predict the effects of the quantitative easing (QE) policy, analysis of the exit from this policy is also controversial. However, if the QE effects were related to forward guidance in the sense that the policy measures reinforced communication effects on expectations, the main consequences of the tapering process for the Brazilian economy would be through this channel.

Figure 8 shows the effects of the “Tapering” on US future interest rate paths. Previous to any discussion on the beginning of tapering, interest rates were low and expected to increase only after the second quarter of 2016. The expectations provoked by the implementation of the tapering policy led to the anticipation of interest rates increases by a number of years. The announcement of the policy anticipated this to the last quarter of 2014 in comparison to late 2016. Therefore, the tapering process affected the economy in advance of its implementation.
At the same time, the tapering caused immediate currency depreciation in several countries in the world, especially in Brazil during 2013. In February 2014, Janet Yellen, president of the FED announced that the American economy was recovering but not at the expected speed. In the same speech, she also named Brazil as a vulnerable economy (to the Tapering process?), second in a list of 15 countries. She mentioned high inflation, current account deficits and an increase in debt as risk aspects in Brazil.

3.3.1 – Brazil´s Vulnerability

The impact of the tapering policy on future interest rates in the US also affects interest rates in Brazil. Figure 9 compares the increase of Brazil’s interest rates with the increase of US interest rates, showing the impacts of tapering policy over interest rates.

Source: Senna(2014)
The delay in increasing interest rates by the central bank allowed inflation to gain some momentum and demanded a contractionary monetary policy over the last year. However, inflation is way above the 4.5% inflationary target and must go beyond the 6.5% inflation roof during the next months. The delay to control inflation and maintain interest rates at low levels stimulated the government to control some important prices in the economy: energy and gasoline prices, for example. The prices controlled by the government are lagged to its real values and create a negative inflation expectations scenario for the next months.

The Tapering announcement triggered a lot of currency depreciations all over the globe and the Brazilian Real was one of the most affected currencies. In this section we show results on the long-run real exchange rate for Brazil and also estimate a model that explains the reasons behind the short-run exchange rate depreciation that happened in Brazil in 2013.

Long Run Real Exchange Rate

In order to analyze real exchange in Brazil, we computed a simple model that includes Net External Liabilities (NEL), Terms of Trade (TT) and the Relative Productivity (RP) between Brazil and US. We use quarterly data from January 1980 to January 2013 to estimate the real exchange rate.

\[ ER_t = \alpha_0 + \alpha_1 NEL_t + \alpha_2 TT_t + \alpha_3 RP_t + \varepsilon_t \]
The estimation results show the expected relation among the Exchange rates and the selected variables. On the one hand, an increase in net external liabilities and relative productivity causes exchange rate depreciation. On the other hand, an increase in the terms of trade generates an exchange rate appreciation.

<table>
<thead>
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<th>Table 3: Results of the Regression</th>
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<tbody>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>NEL</td>
</tr>
<tr>
<td>TT</td>
</tr>
<tr>
<td>RP</td>
</tr>
<tr>
<td>R2</td>
</tr>
</tbody>
</table>

* Significant at 5% level. ** Significant at 10% level.

The Figure 10 shows the graph that compares the actual real exchange rate with the one forecasted by the model.

![Figure 10: Real Exchange Rate – Forecast and actual](image)

The long-run real exchange rate predicted that the BRL should depreciate in the near future as a result of changes in fiscal conditions and terms of trade, especially the former, as can be seen in Figure 11. The Fiscal Policy change caused a huge deterioration on NEL, which causes an exchange rate depreciation.
**Short Run Exchange Rate**

Nominal exchange rates depreciated in many countries after the Tapering policy was expected to be adopted in the beginning of 2014. Therefore, we estimated a model to explain the reasons for the BRL to devaluate much more than other currencies. In order to do this we computed the exchange rate depreciation of several currencies from May 2013 until September 2013, the period of the BRL sharp depreciation. We use data from the Bloomberg for 18 countries on several variables. We estimated three different models: one that included Public Debt (PD) and Basic Interest Rates (BIR), the second that includes a combination of the PD and BIR, the service debt and the third that contains debt service (DS) and primary exports to China (PEC). The selected model has a combination of two variables: gross public debt and interest rates and the primary exports to China (PEC), as below:

\[
\Delta e_t = \alpha_0 + \alpha_1 DS_{2012} + \alpha_2 PEC_{2012} + \epsilon_t
\]

The model fit improves with the product of these variables that is a proxy for the debt service. The model explains 67 percent of total data variation (R²=0.67). We also add a variable that relates the importance of primary exports to the Chinese economy, and the model provided an R² equal to 0.86, as can be seen in Table 4.

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**Source:** Bloomberg.

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4. Australia, Brazil, Canada, Chile, Colombia, India, Indonesia, Malaysia, Mexico, New Zealand, Norway, Peru, Russia, South Africa, South Korea, Taiwan, Thailand and Turkey.

Table 4: Results of the regression

<table>
<thead>
<tr>
<th></th>
<th>model 1</th>
<th>model 2</th>
<th>model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 Public Debt</td>
<td>0.09*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Interest rates</td>
<td>1.26*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Debt</td>
<td></td>
<td>3.45*</td>
<td>3.99*</td>
</tr>
<tr>
<td>Primary Exports to China</td>
<td></td>
<td></td>
<td>1.29*</td>
</tr>
<tr>
<td>R2</td>
<td>0.74</td>
<td>0.67</td>
<td>0.86</td>
</tr>
</tbody>
</table>

* significant at 5%.

The results show that markets penalized economies with high debt services and high exposure to the Chinese economy. Figure 12 below shows the results.

Figure 12: Nominal Exchange Rate Depreciation

The results above show that the higher nominal exchange rate depreciation which occurred in Brazil and in many countries is related with these countries’ loose fiscal policies. In this sense, the Brazilian economy seems more vulnerable than others and this explains the BRL’s strong depreciation in the period. Since then, the BRL has been more stable indicating, once more, that the US monetary policy impacts on the Brazilian economy were incorporated immediately by the market and the adjustments made right away.

Therefore, the future effects on the Brazilian economy will be related to key real variables that may affect the terms of trade and international interest rates. Despite this, the tapering announcement has already affected Brazil.
4 – Growth Decomposition Analysis and Fiscal Policy Shift

4.1 – Growth Decomposition Analysis

A growth decomposition analysis helps to explain the GDP growth rate drop in the Brazilian economy. In order to do this we use a Cobb-Douglas production function given by \( Y_t = A_t (u_t K_t)^\alpha (L_t)^{1-\alpha} \), in which \( Y_t \) is the output, \( A_t \) is the total factor productivity (TFP), \( u_t K_t \) is the capital used and \( L_t \) is the labor factor. We use the production function to decompose the growth rate in three different components: TFP growth \( \left( \frac{A_{t+1}}{A_t} \right) \), increase in capital usage \( \left( \frac{u_{t+1} K_{t+1}}{u_t K_t} \right) \) and labor expansion \( \left( \frac{L_{t+1}}{L_t} \right) \), given by:

\[
\frac{1}{N} \ln \left( \frac{Y_{t+1}}{Y_t} \right) = \frac{1}{N} \ln \left( \frac{A_{t+1}}{A_t} \right) + \alpha \frac{1}{N} \ln \left( \frac{u_{t+1} K_{t+1}}{u_t K_t} \right) + (1-\alpha) \frac{1}{N} \ln \left( \frac{L_{t+1}}{L_t} \right)
\]

The results are presented in Table 5 and show that the main reason that explains the GDP growth reduction is the TFP stagnation. There was an increase in the capital contribution and a decrease in the labor factor. The main reason for the drop in Brazilian growth rates, however, was the lack of growth in productivity over the last three years.

<table>
<thead>
<tr>
<th>Table 5: Growth Decomposition Analysis</th>
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<tbody>
<tr>
<td>GDP</td>
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<tr>
<td>-------</td>
</tr>
<tr>
<td>2002-2010</td>
</tr>
<tr>
<td>2010-2013</td>
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<tr>
<td>Δ between Periods</td>
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</table>

Source: Barbosa Filho and Pessôa (2014).

In order to understand the drop in TFP we decompose it into labor (LP) and capital productivity (CP) as follows: \( \frac{A}{A} = (1-\alpha) \frac{LP}{LP} + \alpha \frac{CP}{CP} \). The TFP drop was caused by a sharp reduction in capital productivity and by a slowdown of the growth in labor productivity.

<table>
<thead>
<tr>
<th>Table 6: TFP Decomposition</th>
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<tbody>
<tr>
<td>TFP</td>
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<tr>
<td>-----</td>
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<tr>
<td>2002-2010</td>
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<tr>
<td>2010-2013</td>
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<td>Δ between Periods</td>
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</table>
4.2 - Fiscal Policy Shift

There was a huge change in Brazilian fiscal policy in the years that followed the crisis. The primary surplus that was consistently above 3% was reduced in 2009 to conduct a countercyclical fiscal policy. However, this policy has not been reversed generating lower primary surplus and an increase in the country’s Gross Debt. Figure 13 shows the primary surplus and the Gross debt.

Source: BACEN, FGV.

Despite the loosening of fiscal policy there was also the so called “creative accounting” in which the government used accounting mechanisms to generate primary surplus above the real ones, as can be seen in Figure 13. The blue line is above the actual primary surplus. As the fiscal policy maneuvers were easy to discover, there was also a credibility loss that might explain the vulnerable position several reports put Brazil in. Brazil is not as vulnerable to external crisis as it was in the nineties. However, this fiscal policy shift deteriorates future expectations about the country’s macroeconomic policies.

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6 Janet Yellen speech and a Morgan Stanley report are two examples.
7 Brazil has a US$ 375 billion in reserves.
5 – Conclusion

Brazil is a small open economy and as such is affected by American economic development and its economic policies. The 2008 crisis caused a deceleration of developed economies that decreased manufactured goods prices. At the same time, the prices of primary goods recovered sooner than manufactured prices. This generated huge terms of trade gains for the Brazilian economy and results in exchange rate appreciation that shifted resource allocation from industry to the service sector. This new resource allocation resulted in a slower GDP growth in Brazil due to the lower value added services with low productivity growth.

The set of QE policies seemed to have little impact on Brazil. First the effects should be limited to the timing of the policy announcement as the major effects of such policies occur through expectations. The real exchange rate drop is a result of a weaker world economy and not caused by the QE policy. The QE policy may have amplified the term of trade channel effect on Brazil if it caused commodities prices to increase even more. But the qualitative effect was already in place.

The Tapering process already affected the Brazilian economy. At the time of its announcement, the BRL depreciated and has been stable since then. The Tapering caused a reallocation of world portfolio towards the US direction and away from Brazil and other developing countries resulting in BRL depreciation.

The Tapering process signals a stronger American economy that will not need extra monetary policy stimulus. This stronger world economy will likely have an impact on Brazil changing, once more, its terms of trade and domestic relative prices.

References


