THEORY OF CENTRAL BANKING: BRAZIL AND THE GLOBAL FINANCIAL CRISIS

by

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- Bruno Guimaraes

Theory of Central Banking: Brazil and the Global Financial Crisis

Abstract:

The purpose of this paper is to assess the three major policies implemented by the BCB using the theories of central banking as a guideline for success. The BCB's policies pertain to three main theories of central banking: liquidity provision, interest rates, and market maker and lender of last resort. According to the theory, the policies implemented by the BCB were indeed successful and produced favourable outcomes for the economy, however, the recent and extensive restructuring of the Brazilian financial system played a large part in shielding Brazil from the crisis. This paper will provide a brief overview of the Brazilian financial system, delve into the three aforementioned theories of central banking, outline the policies implemented by the BCB, and assess their policies.

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1. Introduction

Brazil is one of the fastest emerging economies in the world, and has been growing substantially in recent years. Argued to be the best of the BRIC countries after its outstanding performance throughout the financial crisis, Brazil has been in economic headlines and introduced as a big league player in today's global economy. Since the Brazilian economy began its ascent, the country has become so important that it is has forced the United States to redesign its foreign policy "to take into consideration Brazil's prominence" (Zibechi, 2010). In 2007, the country was estimated to be the largest national economy in Latin America and the world's eighth larg1est economy, estimated at US$1.8 trillion with nominal GDP of $1664.7 and GDP growth of 5.1 percent (Saeed, 2009).

Since the beginning of the 21st century, Brazil has grown exponentially partially due to its undeniable comparative advantage in the production of highly demanded commodities. The benefits brought by the large increase in world trade were substantial. The exchange rate appreciation allowed for a reduction in Brazil's external debt and a remarkable increase in the prices of exports on investment for the production of raw materials (OECD, 2009). The price of Brazil's semi-manufactured exports rose by 43 percent and the price of its basic products by 59 percent (OECD, 2009). This prosperity came under threat in the second half of 2008 as a result of the global financial crisis. Though the crisis had fairly detrimental effects on Brazil, the country has shown to be by

far one of the most resilient. Not only was it affected by the crisis long after most countries were in peril, but it swiftly and abruptly put an end to its problems.

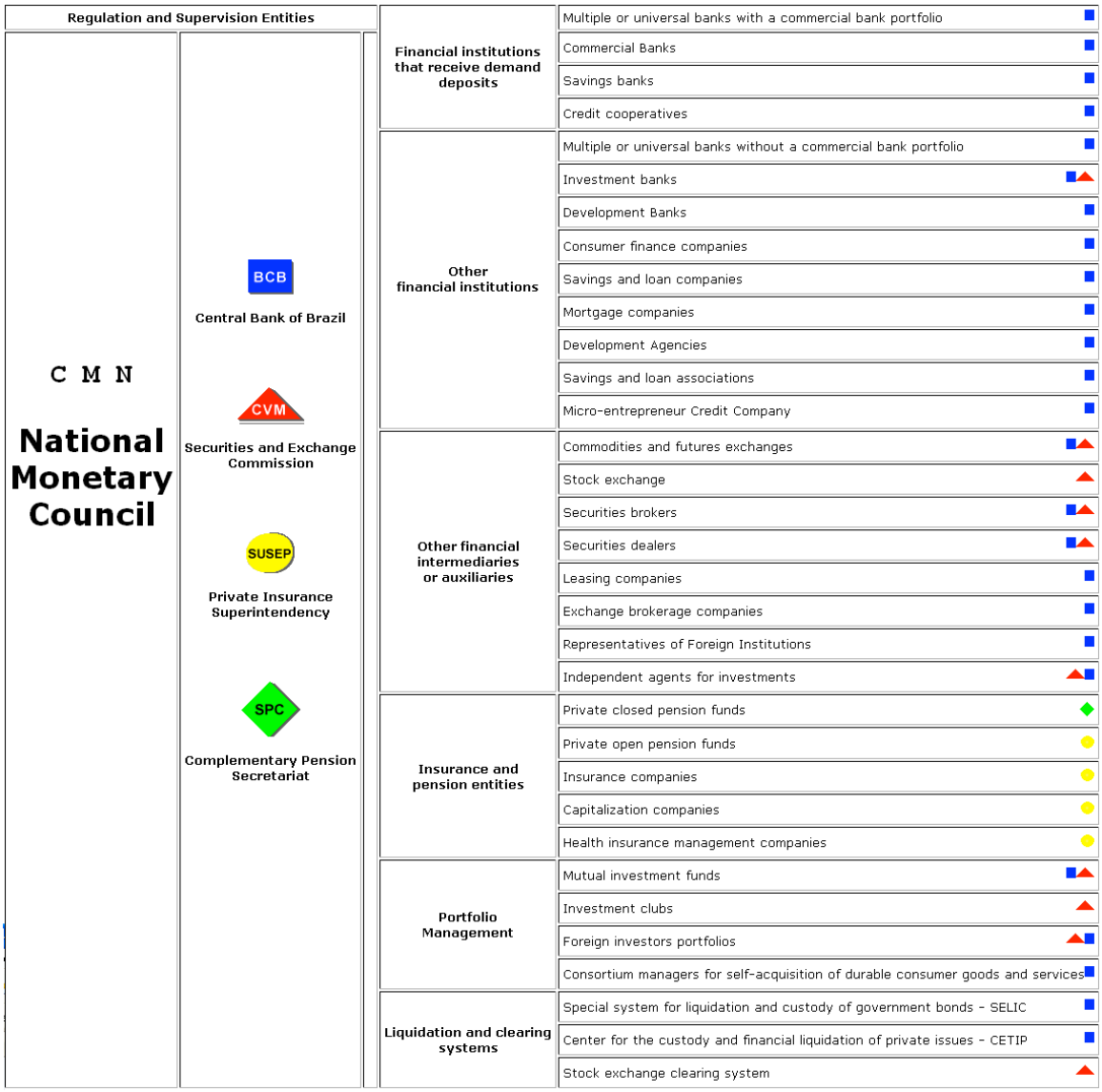
The Central Bank of Brazil (BCB) had the largest role to play in quelling the crisis through the stabilization of the financial system. The BCB was quick to take action and began implementing several new policies a week after the collapse of Lehman Brothers. Brazil's outstanding performance through the crisis is argued to have been a product of the successful policies implemented by the BCB. The policies did indeed produce the favourable outcomes for the economy, but it is important to note that the recent and extensive restructuring of the Brazilian financial system had a large role in shielding Brazil from the crisis.

The purpose of this paper is to assess the three major policies implemented by the BCB using the theories of central banking as a guideline for success. The BCB's policies pertain to three main theories of central banking: liquidity provision, interest rates, and market maker and lender of last resort. This paper provides a brief overview of the Brazilian financial system, delves into the three aforementioned theories of central banking, outlines the major policies implemented by the BCB, and assesses the policies. It is composed of five sections ordered in the following manner: Section 1. Introduction; Section 2. Brief Overview to the Brazilian Financial System; Section 3. Theory of Central Banking; Section 4. The Financial Crisis in Brazil; and Section 5. Conclusion.

2. Overview of the Brazilian Financial System

The Brazilian financial system is the largest of Latin America and boasts one of the most flexible and technologically advanced banking systems. The current structure of the Brazilian financial system originated from the institutional reform of 1965, when both the National Monetary Council (CMN) and Central Bank of Brazil (BCB) were created (Ribeiro, 2001). Since 1965 there has been drastic changes within the financial system, particularly within the banking system due to Brazil's constant struggle with hyperinflation. These changes will be discussed in the following section (Section 2.2).

Within the financial system there are five major regulatory and supervisory entities that are responsible for the entirety of the Brazilian financial system. They are the CMN, BCB, the Securities and Exchange Commission (CVM), Private Insurance Superintendency (SUSEP), and the Complementary Pension Secretariat (SPC). Each is responsible for regulating specific financial institutions outlined in the following figure:



Source: Central Bank of Brazil
Figure 1: Composition of the Brazilian Financial System

2.1. The Central Bank of Brazil (BCB)

The Central Bank of Brazil (Banco Central do Brasil – BCB) is the central executive institution of the financial system and is the main focus of this paper. The general role of the BCB is the stability of the purchasing power of the Brazilian currency and the soundness of the financial system (BCB, 2010). It oversees the majority of the

financial institutions including commercial, development, investment, federal savings banks, and credit, financing and investment companies (among others), and ensures their proper functioning.

The BCB has several areas of responsibility. Its core responsibility is the execution of monetary policy. Monetary policy contributes to solid economic performance and rising living standards with a primary focus of controlling inflation. One of the BCB's main tools in its execution of monetary policy is SELIC (Special System of Clearance and Custody), used for performing open market operations. The SELIC rate is the overnight lending rate (the rate that large banks use to lend and borrow funds to each other in the overnight market). Among monetary policy the BCB designs and issues bank notes, controls foreign capital flow, controls credit risk within the financial system, and supervises financial institutions in the intermediation and clearing systems (Ribeiro, 2001).

Central banks are by far the most important entity within a financial system and are the key players during a financial crisis. The BCB had the primary role in quelling the financial crisis in Brazil. As the Brazilian financial system began to feel the severe stress brought on by the crisis, the BCB was forced to intervene and take several actions. The policies implemented by the BCB during this crisis will be fully discussed in section 4, followed by an assessment of their policies in section 5.

2.2. The Banking Sector

After the financial crisis, the Brazilian banking model became internationally recognized as a highly efficient system. Its resilience to the crisis was astonishing and many attribute its recent success to the sophisticated mechanisms and regulatory systems that were previously created to combat hyperinflation. It is important to understand the recent history behind the banking sector in Brazil, as its developments will help explain why the Brazilian financial system faired far better than most.

Between 1980 and 1994 Brazil experienced chronic inflation, eventually becoming hyperinflation, due to the constant expansion of money supply. The government financed its operations and development projects not out of taxes or debt, but by simply printing more money. In 1990, inflation reached a record 30,377%, and needless to say, there were a lot of problems during this era. "Imagine that your rent doubled every 10 weeks, that your credit card charged 25% a month interest, that food and clothes went up 40% a month, that the value of your savings declined 2000% in a year" (Evans, 2002), this was Brazil for a decade prior to 1995.

Rates of Inflation in Brazil, 1981 to 1997	
Year	**Rate of Inflation**
1981	**100%**
1982	**100%**
1983	**138%**
1984	**192%**
1985	**226%**
1986	**147%**
1987	**228%**
1988	**629%**
1989	**1,430%**

1990	**30,377%**
1991	**400%**
1992	**1,020%**
1993	**1,929%**
1994	**2,076%**
1995	**66%**
1996	**16%**
1997	**7%**

Source: IMF Financial Statistics

Figure 2: % Inflation rates in Brazil from 1981 to 1997

This all changed after the Brazilian Finance Minister, Fernando Henrique Cardoso, introduced a macroeconomic stabilization program called the Real Plan in 1994 (Clements, 1997). The Real Plan was an effort to stabilize the Brazilian economy by addressing the root causes behind Brazil's hyperinflation. The plan focused on stabilizing prices while introducing a new currency, the real, and keep inflation under control (Paula and Sobreira, 2010). The plan was very successful, enabling Brazil to lower its inflation rates down from 2,076% in 1994 to an average less than 7% after 1997 (IMF Financial Statistics, 2010).

The sudden elimination of hyperinflation had a great effect on the banking system. The banking sector greatly depended on high and chronic inflation for profits, and the elimination of hyperinflation caused several banks that did not adapt quickly enough to merge or shutdown. After the Real Plan, fundamental changes took place within the banking sector to prevent a crisis and to promote profitability under the new macroeconomic conditions (Paula and Sobreira, 2010).

Before the Real Plan, banks relied heavily on floating schemes for profit. High

inflation created an incentive for banks to compete for deposits as they generated high profits by investing the deposit money on inflation protected public securities rather than extending credit to the private sector (Goldfajn et al, 2003). This competition induced banks to expand, open new branches, offer free bank services, and develop a high degree of technological progress, especially aimed at enhancing the speed of processing financial transactions (Goldfajn et al, 2003). With the elimination of high inflation, banks were forced to find alternative sources of revenue.

The low levels of inflation alongside the re-monetization of the economy stimulated consumer spending, and banks found a new source of profit through credit operations as the demand for loans increased and interest rates began to rise (Paula and Sobreira, 2010). As credit supply began to expand, the BCB became fearful of a possible consumption bubble, which had previously occurred in 1986 following their Cruzado Plan. Thus, in order to eliminate the risk associated with the rapid expansion of credit, the BCB increased the bank's reserve requirements (Paula and Sobreira, 2010). The bank reserve requirements in Brazil have been historically much higher than in most countries. This in turn gave Brazil a great ability to generate liquidity (by simply decreasing their requirements) and proved to be one of the BCB's primary policy measures during the 2008 financial crisis (see section 4).

In 1995, following the Real Plan, short-term interest rates rose from 20 to 65% per annum due to the Mexican Financial Crisis and created a large quantity of defaults that put much pressure on Brazilian banks (Paula and Sobreira, 2010) . This led the BCB

to intervene directly with the banking system by introducing two programs: PROER (Program of Incentives to the Restructuring and Strengthening of the National Financial System) and PROES (the State-Owned Banks Reduction Incentive Program) (BCB, 2010). The PROER offered "tax incentives and credit facilities to encourage rapid consolidation of the banking system through mergers and acquisitions", while the PROES essentially "persuaded public state-owned banks to be federalized at which point the federal government would either reorganize the bank for sale to a private institution or liquidate the institution" (Paula and Sobreira, 2010). This led the banking sector to become highly concentrated and allowed for greater leeway for governmental actions. For illustrative purposes, in the past two decades the number of operating banks dropped by more than 30% (OECD, 2010) and in 2007 Brazil had only 156 operational banking enterprises, while Germany and the U.S. had well over 2,000 (Valadao, 2009).

During this 1994-1995 restructuring, the banking system became quite unstable. In order to make the system more solid the BCB provided extensive regulation and stricter guidelines to banking institutions. The actions taken by the BCB during this period greatly contributed to the emergence of the highly efficient financial system that resisted the 2008 financial crisis (including the aforementioned). Among these actions were the implementation of the Basel I Accord and the loosening of restrictions placed on foreign entry into the Brazilian banking system.

The Basel I Accord is a set of international banking regulations with the goal of minimizing credit risk by imposing a minimum capital requirement on financial

institutions (Bank for International Settlements, 2010). In 1995, the accord was incorporated in Brazil, establishing the minimum capital requirements necessary for banks at 11% (BCB, 2010). Between 2000-2008, Brazilian financial institutions had a Basel Ratio far above the recommended 11% and most other countries (with most banks operating at over 17.5%) in order to insure themselves during a time of crisis (BCB, 2010).

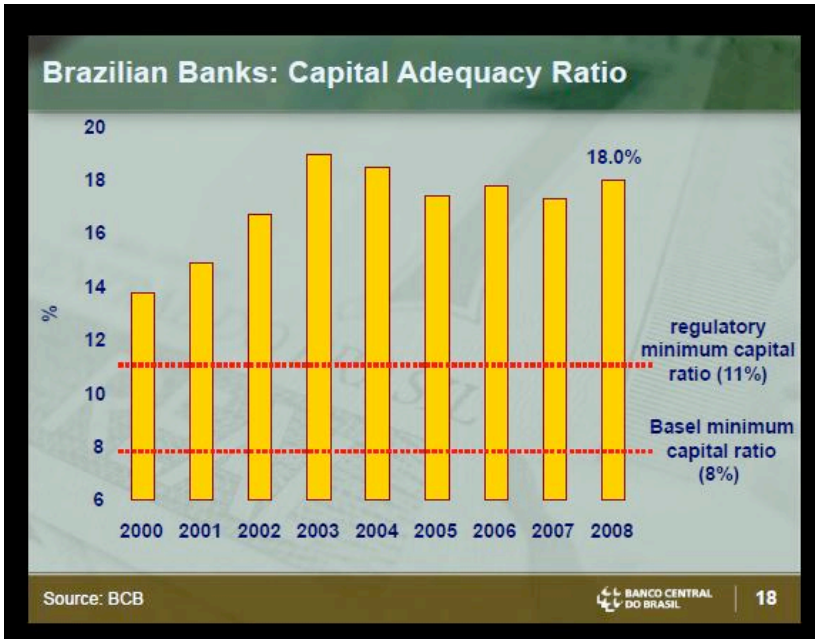


Figure 3: Basel Ratio held by Brazilian Banks from 2000 to 2008

At the same time, new legislation was introduced that allowed for the entrance of foreign banks in Brazil under a case-by-case review. Before the 1990s, there were restrictions placed on foreign entry into the banking system. With the regulated and limited entry of foreign banks Brazilian banks were able to decrease their operational costs and increase efficiency under the new macroeconomic conditions due to increased competition (Paula and Sobreira, 2010). Today, international banks are still a minority in Brazil (though

they are quickly growing in presence) and are responsible for only about 25% of lending and 20% of depositors (Valadao, 2009).

In summary, Brazil's past battle with hyperinflation and other crises has produced one of the most advanced and resilient financial systems in the world. Though the Brazilian financial system was well prepared, it has nonetheless taken a devastating blow from the financial crisis. With the system in distress, the BCB was called into action and has recently initiated a set of policies in an attempt to restore its stability. In order to better understand the actions taken by the BCB it is important to briefly delve into the theory behind central banking.

3. Theory of Central Banking

This section will briefly introduce three main theories of central banking. It is important to understand the theory, as it will aid in understanding the motivation and goals behind the actions taken by the BCB during the crisis. I will begin by delving into the theory of liquidity provision, followed by interest rates, and lastly, the market maker and lender of last resort.

3.1. Liquidity Provision

The financial crisis of 2007 was triggered by a global collapse of liquidity after the U.S. housing bubble burst. Trillions of dollars of assets within the global financial

markets were deemed worthless after the collapse of the U.S. housing market (referred to as toxic assets) resulting in a severe lack of liquidity. This resulted in the bankruptcy of several large financial institutions, and the need for intervention from central banks all around the world. The central banks' had a major focus in providing liquidity to the market. Without the provision of liquidity, several banks that desperately required funding would have collapsed leading to catastrophic results.

Liquidity as defined by Holmstrom and Tirole's paper (1998) is the availability of instruments (market and nonmarket) that can be used to transfer wealth across periods. Their paper establishes a demand for liquidity and the benefits of government supplied liquidity. They show that in the presence of aggregate uncertainty, government provision of liquidity during a liquidity shock creates a Pareto improvement. Since during a time of crisis firms cannot generate liquidity themselves, it is necessary for a higher power to step in. It is important to note there are several instruments available to the central bank to create liquidity within the financial system including the issuance of bonds, collateralized lending, and altering reserve requirements and interest rates.

The choice of instrument must be carefully considered due to potential side effects. For example, public liquidity provision through collateralized lending is found to create the perverse effects of encouraging hoarding and crowding out outside liquidity, and firms to hold onto risky assets (Bolton et al, 2009). The efficient provision of public liquidity requires detailed knowledge by monetary authorities of bank's balance sheets in

order to time the intervention optimally and sort solvency from liquidity problems (Bolton et al, 2009).

If central banks do not properly time an injection of liquidity, they risk crowding out liquidity in the market. When institutions are faced with a shortage of liquidity they may trade assets for cash too quickly in an attempt to avoid adverse selection problems in the future, which undermines the liquidity of future secondary markets (Adrian and Shin, 2008). Also, without the necessary information the injections, while alleviating the needs of sound institutions, will provide a "lifeline to holders of worthless assets" (Bolton et al, 2009). Since central banks are not always capable of distinguishing between the sound and worthless institutions, many believe there is a need for greater monitoring power over the financial system in the case of a future liquidity crisis (Bolton et al, 2009).

Tobias Adrian and Hyun Song Shin's (2008) theory present a strong correlation between monetary policy and balance sheet growth. By observing balance sheet management of financial institutions it was revealed that they increase their leverage during asset price booms and reduce it during busts. "This pro-cyclical behavior is likely to exacerbate financial market fluctuations as institutions overturn the normal supply and demand responses by buying assets when the price rises and selling them when the price falls" (Tobias and Shin, 2008). This led Tobias and Hyun to define liquidity as the growth rate of aggregate balance sheets.

Through the observation of fluctuations in balance sheets it was found that the main tool used in adjusting leverage is collateralized borrowing and lending. In studying the effects of monetary policy on liquidity conditions, they found that when central banks implement loose policy the balance sheets of institutions increases in value through collateralized borrowing, which leads to an increase in the supply of liquidity. In the opposite case, applying tight monetary policy causes the value of institutions' balance sheet to decline, reducing the overall supply of liquidity.

Thus, in accordance to the theories aforementioned, it is optimal for central banks to supply liquidity during a crisis, as without their intervention institutions would collapse and further deepen the crisis. In order to supply liquidity to the financial system, loose monetary policy should be implemented while considering timing and further monitoring of institutions. As a result, the balance sheets of institutions are predicted to grow through more collateralized borrowing. With the growth of balance sheets liquidity is restored, leading firms to become self-sufficient.

3.2. Interest Rates

An overview of central bank policy in various countries in the last few decades reveals that the main objective of policy has consistently been price stability (Gnos and Rochon, 2007). Price stability is seen as welfare maximizing monetary policy since it "anchors the markup at its profit maximizing value and thereby prevents fluctuations in employment and output that would otherwise occur due to sticky prices" (Goodfriend,

2004). To achieve price stability central banks around the world have traditionally targeted inflation. For about two decades low and relatively stable inflation around the world has proved its success. In order to stabilize inflation, several intermediate targets have been used in the past such as money supply growth, exchange rates or NAIRU. After no relationship between inflation and these past intermediate targets was found, the use of interest rates as an intermediate target has recently taken over (Gnos and Rochon, 2007).

Recently, the New Neoclassical Synthesis (NNS) theory (also referred to as the New Consensus) has emerged among policy-makers and economists whom see it as a simple and realistic representation of central bank policy (Goodfriend, 2004). The NNS combines aspects of both classical and Keynesian economics into a single framework and has the key conclusion that central banks determine the inflation rate (Gnos and Rochon, 2007). The NNS is composed of two key features. The first is an interest rate rule (Taylor Rule), which "emphasizes the exogenous nature of the short-run (real) interest rate" (Taylor, 1993). The second is an inflation targeting policy in which the central bank attempts to maintain the inflation rate stabilized at a specific level (Gnos and Rochon, 2007).

According to the Taylor Rule, central banks should raise interest rates if output grows beyond the targeted long-run value or if inflation grows beyond its inflation target, since higher interest rates will slow the economy and allow the central bank to achieve their inflation target. A higher interest rate counteracts inflation scares by decreasing current aggregate demand and employment, lowering real wages, and widening the

markup of prices (Goodfriend, 2004). Because of this, many central banks are hesitant to apply high interest rates, but, "such hesitation has lead to stagflation in the past" (Goodfriend, 2004). The system's stability is thus ensured by the central bank's countercyclical role in setting interest rates (Gnos and Rochon, 2007).

The second component of the NNS is achieving a target inflation rate (known as tolerance band or target range). There are currently over 21 countries that have adopted inflation targeting policies in their central banks, including Brazil, and it is believed to pose several advantages (Gnos and Rochon, 2007). In particular, advocates believe there are three important advantages. First, inflation targeting creates a 'nominal anchor for policy', which central banks can use to stabilize inflation and price expectations. Second, it creates more 'transparency and accountability' in the sense that the economy is better informed about the goals of monetary policy which reduces uncertainty. Third, if central banks reach their inflation target they gain credibility (Gnos and Rochon, 2007).

The question that remains to be asked is at what level the inflation rate should be targeted at? According to many economists, central banks should utilize neutral policy. Neutral policy is aimed at eliminating the output gap, which is the difference between actual and potential output. In the NSS, neutral policy is achieved through the adoption of the natural rate of interest, defined by Knut Wicksell as the "certain rate of interest on loans that is neutral in respect to commodity prices, and tends neither to raise nor to lower them" (Wicksell, 1936). Targeting inflation at a low level is consistent with neutral policy and presents several benefits such as low nominal interest rates, less

economization on the use of currency, minimizing costly pricing decisions and relative price distortions, and preventing disruptive inflation scares (Goodfriend, 2004).

However, there is a challenge associated with strict low inflation targeting since nominal interest rates cannot be negative. Marvin Goodfriend notes two problems for monetary policy can arise from the non-negativity of nominal interest rates given a low inflation environment. First, if expected inflation is near zero, central banks cannot make the real short-term interest rate negative in order to prevent deflationary shocks. Second, if "short-term nominal rates are zero further disinflation raises the real short-term interest rate and worsens the deflationary pressure" (Goodfriend, 2004). Goodfriend states that maintaining the inflation target between one and two percent is the best compromise since inflation is kept low but just far enough to avoid potential deflation problems. An inflation target above two percent would present high costs in the form of excessive inflation and potential credibility problems.

Interest rate policy's influence on employment creates the "fundamental credibility problem of monetary policy" (Goodfriend, 2004) that is accounted for in the NSS. As firms set prices at a profit-maximizing markup, the markup emulates a tax on consumption and labour supply that decreases welfare. This creates an incentive for central banks to engage in expansionary monetary policy to undo the 'markup tax' on households, especially when their credibility is most secure since employment can be temporarily expanded with almost no change to inflation and its expectations (Goodfriend, 2004). Thus, this may negatively affects the central bank's credibility if

firms recognize the their incentive to undo the markup and increase employment, which would lead firms to raise prices to restore their profit-maximizing markup and raise inflation (Goodfriend, 2004).

Manipulating interest rates has several impacts on businesses that are important to understand especially when considering a time of crisis. A high interest rate is found to affect firms financially both directly and indirectly through the balance sheet or net worth of the firms (Gnos and Rochon, 2007). There is a direct effect through the devaluing of collateral and increase of interest payments. A higher interest rate will cause asset prices to fall, which lowers the value of a borrowers' collateral. Furthermore, a higher interest rate will cause a firm's outstanding debt to become more expensive in the form of higher interest payments, which lowers the firm's cash flow and increases default risk. The higher default risk will then lead banks to raise loan rates to make up for the higher cost of funds. The indirect effects of higher interest rates operate through capital goods producing firms (Gnos and Rochon, 2007). Given a higher rate of interest, non-capital goods producing firms will decrease investment spending and create a lower net worth for capital goods producing firms through decreased revenues since costs will remain the same in the short-run. This leads to a decline in the value of collateral which will cause an increase in loan rates once again to compensate for the higher risk of the loan. In all the aforementioned cases, firms will have less collateral and will be less likely to secure a loan (Gnos and Rochon, 2007). Manipulating interest rates will affect the cost of borrowing and, inevitably, credit demand. The credit market is thus important to consider when applying interest rate policy (one of the central components of the NNS).

During a liquidity crisis, when credit is very scarce, setting high interest rates would only create further problems. Central banks should keep interest rates as low as possible during a crisis and in some instances even at zero, which was the U.S. reaction to the financial crisis. A lower interest rate stimulates the credit market, and presents several economic benefits such as stimulating consumption, output, and employment, which are all essential during a crisis. Goodfriend (2004) provides two sound suggestions for central banks during a potential liquidity crisis. First, he encourages central banks to follow the advice of Bagehot (1873) and introduce a short-term interest rate ceiling (the maximum interest rate that a financial institution can charge a borrower on a loan) to prevent interest rate spikes from creating widespread insolvencies. Second, in targeting the overnight lending rate the banking system is almost automatically protected against the risk of insolvency in the event of a liquidity crisis (Goodfriend, 1991).

The economy is a complex system and central banks should not use interest rate policies with only one objective in mind. Several factors influence the central bank's decision to change interest rates such as exchange rates, unemployment, growth, and productivity. However, these variables are found to push interest rates in the opposite direction, making it important for the central bank to carefully assess and manage their policy (Gnos and Rochon, 2007). Policy enforcing low interest rates is beneficial during a crisis, however, it is important to consider the potential side effect of inflation.

3.3. Market Maker/Lender of Last Resort

A liquidity crisis creates a large role for the central bank to become the market maker or lender of last resort (LOLR). During a crisis, there is an unquantifiable amount of risk and a fear instilled in the public that may severely limit or cease the trade of certain financial instruments. This happens when there is "no market maker with both the knowledge to price these financial instruments and the deep pockets to credibly post buying and selling prices" (Buiter and Sibert, 2007). If there is a micro-market failure (failure to find an acceptable price to match buyers and sellers) the central bank has a responsibility to act as the market maker of last resort (Buiter and Sibert, 2007).

Buiter and Sibert (2007) state there are two ways a central bank can act as a market maker of last resort. The first way is through open market operations. The simplest way to implement this is for the central bank to purchase a set amount of credit-impaired illiquid securities within a limited time frame at a risk-free price. The central bank should assess the risk and penalty required through the discount relative to the risk-free price and bid-ask spread in an attempt to avoid moral hazard. The second way is to accept illiquid securities as collateral for repurchase agreements and at the discount window, but only after creating a valuation for these securities.

Based on the accounts of previous crises, Buiter and Sibert (2007) go on to say that central banks have not been using their role as a market maker of last resort to their advantage. In the past, central banks tended to take the same approach, lower interest

rates and inject mass amount of liquidity under the condition that collateral provided was not illiquid. If instead illiquid collateral was accepted, the same results could be achieved with the use of a significantly smaller liquidity injection. They state that the result of this flawed approach would inevitably lead to the next credit boom and bust due to an abundance of "high-grade excess liquidity that was not withdrawn when market order was restored" (Buiter and Sibert, 2007).

Through the central bank's function as a market maker of last resort, they must assess and price credit risk, thus enabling them to influence the allocation of credit in the economy (Buiter and Sibert, 2007). This is an essential ability to possess during a financial crisis, as credit is hugely lacking. However, the central bank should only undertake such intervention in the presence of a micro-market failure.

The central bank can also respond to a crisis through its other function as a lender of last resort (LOLR). The LOLR role has been developed as early as the eighteenth century and has been widely used since. Historically, its use was found to be effective in many countries by providing monetary stability in the presence of adverse shocks (Wood, 2000). "If any bank fails, a general run upon the neighbouring banks is apt to take place, which if not checked in the beginning by a pouring into the circulation of a very large quantity of gold, leads to very extensive mischief" (Thornton, 1802). This is one of the earliest accounts of the LOLR theory and it provides an accurate summary. Simply, the central bank is seen as the "ultimate source of money", and if they fail to provide money

as a LOLR during a time of mass panic the crisis will worsen, leading to bankruptcies and a sizeable monetary contraction (Wood, 2000).

Within the LOLR literature there is one great dilemma. Economists agree on the role of LOLR interventions at the macro level, but there is much debate over its role at the micro level, in providing assistance to individual financial institutions (Freixas, 1999). Many economists, referred to as non-interventionists, believe that acting as a LOLR to individual banks instead of the market as a whole (through open market operations), is "fundamentally misguided" (Goodhart and Huang, 2004).

Non-interventionists believe that it is unnecessary for banks to lend to individual banks since the market is as or more informed than the central bank about the solvency and liquidity of a bank (Goodhart and Huang, 2004). Aiding individual institutions can lead to wasteful spending through forbearance, since the central bank may end up providing a lifeline to institutions that should have been shutdown. Furthermore, it is believed that focusing on this direct intervention may misguide the central bank from its ultimate goal to achieve price stability (Goodhart and Huang, 2004). With the availability of an adequate monetary base, illiquid solvent banks will have access to loans within the interbank market while those that are insolvent will be forced out (Goodhart and Huang, 2004).

On the other hand, interventionists do believe it is beneficial to act as a LOLR at the micro level on the basis that it eliminates potential contagion problems leading to systemic risk (Freixas, 1999). Contagious risk is defined as the situation in which adverse

developments of one bank due to either illiquidity or insolvency affects the viability of other institutions. It is very important for a central bank to implement LOLR in the case of contagion. There is a devastating contagious risk given bankruptcies as it leads people into a panic, creating unpredictable behaviour and making markets to become very volatile, thus increasing the likelihood to make policy mistakes (Goodhart and Huang 2004). Generally, there is no reliance on a single policy and central banks make decisions based on 'constructive ambiguity' or if the financial institution is sufficiently large they rely on the 'too big to fail' doctrine (Freixas, 1999).

The 'too big to fail' doctrine states that the failure of a major institution will produce a severe shock to the rest of the financial system. In particular, Geoffrey E. Wood (2000) provides evidence for four 'channels' through which the failure of a single institution can spread to the system. The first channel affects banks through their bilateral exposures. The second is due to the bankruptcy of an institution with a strong presence within a specific market that can spread to financial markets. The third is due to the loss of private information on borrowers that can reduce financial intermediation efficiency. Lastly, the fourth channel is the uncertainty created about the solvency of other banks given a single bankruptcy, which may create bank runs.

A theory presented by Goodhart and Huang (2004) also presents strong evidence for acting as a LOLR to individual institutions and a rationalization for constructive ambiguity. Their model is applied to both static and dynamic settings. Their results show that in a static setting a central bank would rescue banks only above a threshold size, which is consistent with the 'too big to fail' doctrine. If banks became informed of the

required threshold size, their risk preferences would be influenced. In order to avoid this, central banks should use constructive ambiguity to make their decisions on which banks to rescue. Within a dynamic setting, they found the central banks optimal policy relied on contagion and moral hazard effects. Contagion was found to be the key factor behind their incentives to provide LOLR services to individuals, and this creates an incentive to rescue bigger banks rather than smaller banks making the equilibrium risk level high. Moral hazard is not considered a key factor affecting the central banks decision as it was found to be a by-product of contagion.

Xavier Freixas (1999) adds to the LOLR theory in stating the optimal policy may be country specific for five reasons. First, the different banking regulations in each country create a different level of contagion risk, which is dependent on the operations of the derivatives markets, interbank market, and payment systems. Second, the regulatory regime affects the implementation and costs of bank's distress resolutions. Third, regulation and market liquidity can potentially impact the number of assets a bank will securitize, which decreases the cost of liquidation and bailouts. Fourth, the cost of raising taxes may differ in each country. Fifth, a bank's liquidation cost to businesses and to the local industry is likely country specific.

A financial crisis is extremely difficult to deal with. It exposes the central bank to massive credit risk and requires precise judgments about the creditworthiness of various institutions. Central banks are asked to act as 'servants of the public interest' by undertaking their role as market makers and lenders of last resort (Buiter, 2007). Though

there may be much debate on implementing LOLR policy at the micro level, it is mutually agreed upon at the macro level, and it has proved time and time again that its implementation is vastly beneficial in averting a crisis as it prevents contagion, which leads to mass panic and bankruptcies.

4. The Financial Crisis in Brazil

This section will describe the circumstances in Brazil once the financial crisis was introduced. First, I will begin by briefly describing how the financial crisis spread to Brazil and affected the economy as a whole, and more specifically, the financial system. I will then discuss and assess the policies implemented by the BCB since the introduction of the financial crisis.

4.1. Affects of the Crisis on the Brazilian Financial System

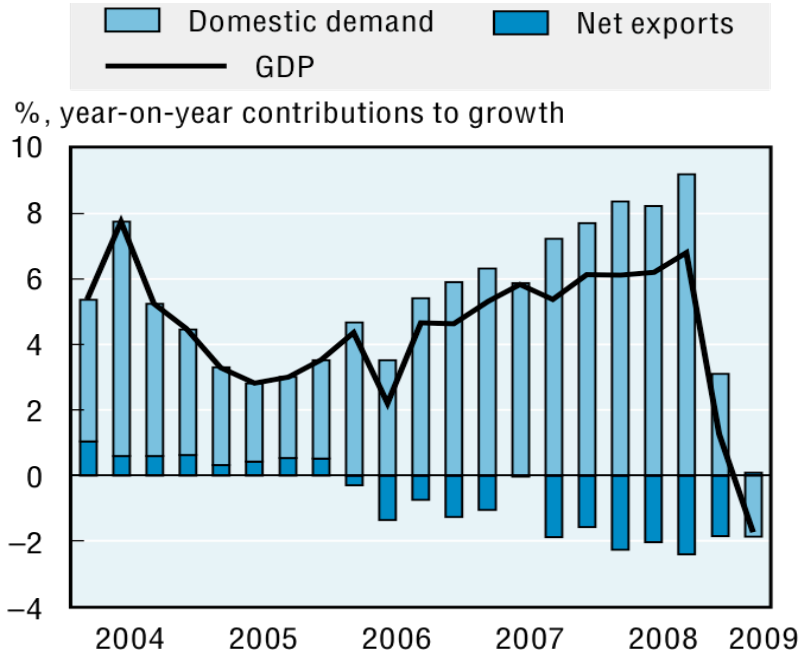
At first, emerging markets were believed to be safe from the crisis unfolding in the U.S. However, the crisis is one that has been felt worldwide as "countries felt the pain of the credit crunch, weakening commodity prices, and large currency devaluations" (Alfaro and Kanczuk, 2009). The suffering of the largest and most important economy in the world, began to spread to all other countries – rich, poor, and developing.

Not all countries were affected to the same extent. The U.S. and European countries have suffered immensely from the crisis while other countries tended to suffer

much less. From Brazil's perspective the crisis and its effects are "arguably exogenous" (Alfaro and Kanczuk, 2009). Most of the negatives expected in Brazil did not occur, or occurred at a much lower intensity than expected. Brazil's "resistance in entering the crisis and its swiftness in leaving it is somewhat remarkable for a country known for constantly living in crisis" (Valadao, 2009). This does not mean it was unaffected by the crisis in the United States. In fact, the drop in Brazilian output led to the most severe economic contraction Brazil has experienced in the last two decades. Brazilian industrial production was growing at a rate of about 5% per year since 2003, but following the collapse of Lehman Brothers, industrial production dropped by 21% within three months (Alfaro and Kanczuk, 2009). Perhaps the most interesting aspect is Brazil's resilience to the crisis. While most countries began suffering immediately following the crisis in 2007, Brazil did not begin to feel its effects until the latter half of 2008.

In 2008, the Brazilian economy grew more than 5% in real terms. However, the economy actually experienced a significant contraction in the final quarter of 2008, which continued into the first quarter of 2009. This contraction was rather severe and indicated that Brazil was technically in economic recession (Valadao, 2009). The figure below demonstrates the severity of the contraction given the very steep decrease in GDP, domestic demand, and net exports. The crisis began to jeopardize economic growth in Brazil. Through 2009, Brazil's GDP fell 0.2 percent, its worst performance since 1992 (SMH, 2010), and domestic demand experienced its first negative growth in a decade. According to the Brazilian Institute of Geography and Statistics (IBGE), the industrial sector suffered the worst setback in 2009, shrinking 5.5 percent, followed by agriculture,

which dropped 5.2 percent – both staples in the Brazilian economy.

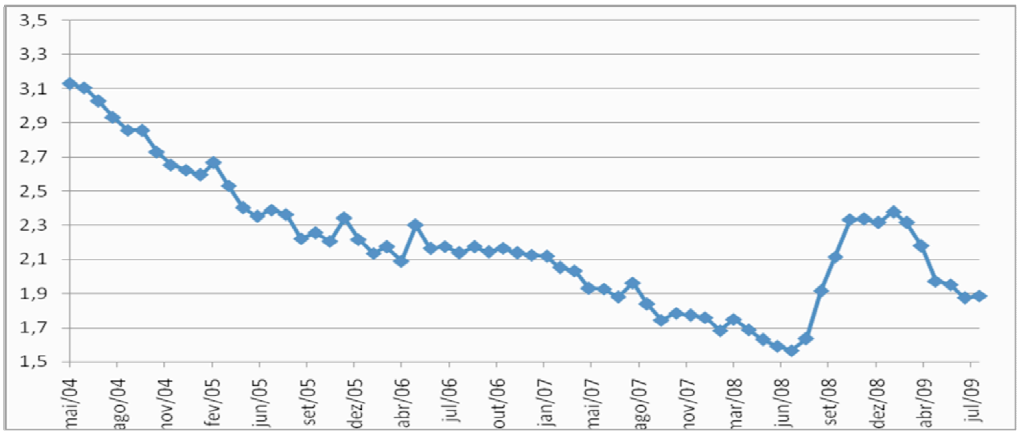


Source: IBGE and Central Bank of Brazil.

Figure 4: % GDP, demand, and net exports growth in Brazil

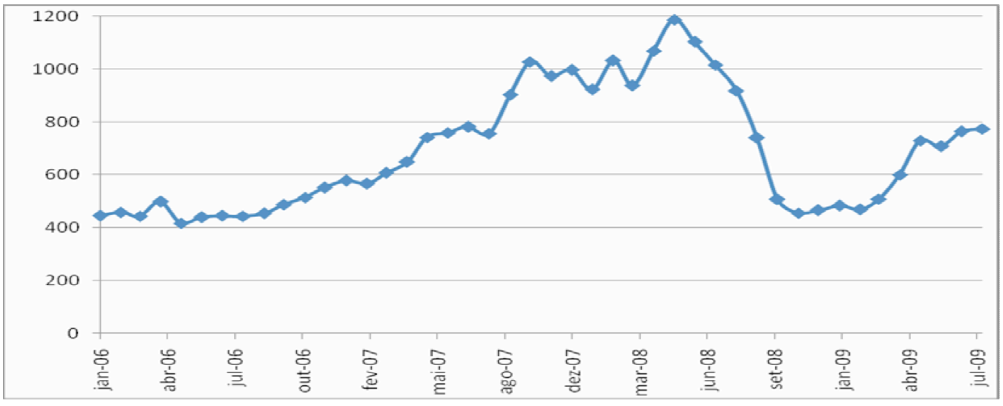
The main problem presented for Brazil (and Latin America in general) by the crisis is that foreign demand for its products and services decreased, while reducing excess international liquidity that financed a considerable portion of investments and the expansion of markets. Countries began suffering from the credit crunch, weakening commodity prices, contraction of world trade and the potential consequences of a deeper recession in the United States. Fearful investors began pulling investments from within these countries, which caused currencies and stock markets to collapse. In Brazil's case, the real had lost 40% of its value within a month (Alfaro and Kanczuk, 2009), and their stock exchange BOVESPA, the fourth largest in the world, plummeted. Figure 3 and 4 show the real's exchange rate and BOVESPA's performance during the crisis. According

to the data, around June 2008 the Brazilian economy began to feel the effects of the financial crisis – GDP, demand, real exchange rate, balance sheets of companies, and BOVESPA all experienced a significant shock at the same time. One very surprising aspect is that unemployment remained relatively unaffected.



Source: BACEN[14].

Figure 5: Exchange Rate – Brazilian Real vs. U.S. Dollar

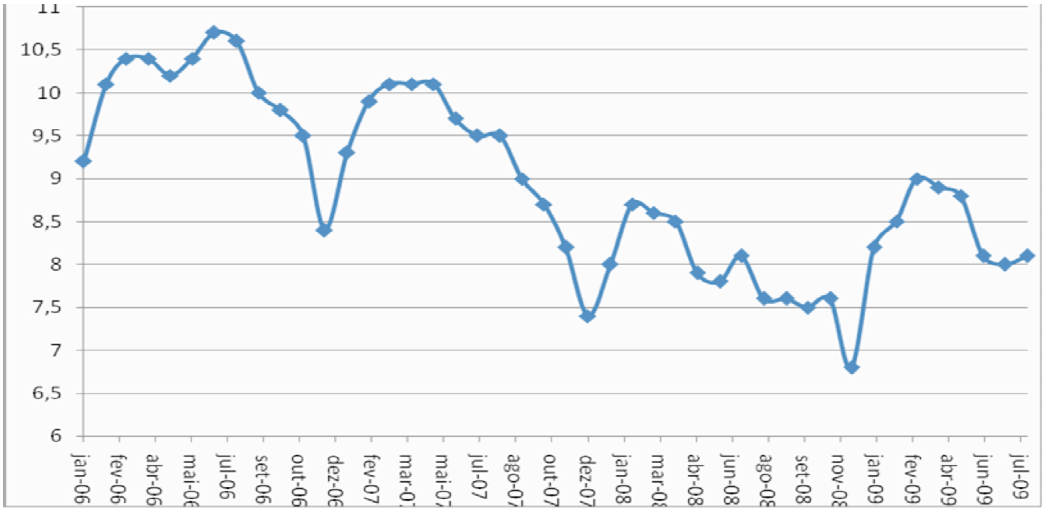


Source: IBOVESPA.

Figure 6: BOVESPA value in US$ (in billions)

Another consequence of any crisis is an increase in unemployment. Unemployment is a significant problem that some countries will have to battle for years to come since

this crisis unfolded. In recent years, the unemployment rate in Brazil has been fairly volatile, though it tends to have a downward trend. Surprisingly, the unemployment rate through 2007 when the crisis started was higher than that of 2008. In fact, near the end of 2008 the unemployment rate reached its lowest value in six years of 6.9 percent (Valadao, 2009). Soon after there was a significant increase in the unemployment rate, though it was seen as rather uneventful given the volatility and higher level of unemployment Brazil had experience in its recent past. However, it is evident the crisis contributed towards the spike in the unemployment rate during the first quarter of 2009 increasing from 6.9 percent in January to 9 percent in March.



Source: IBGE/PME

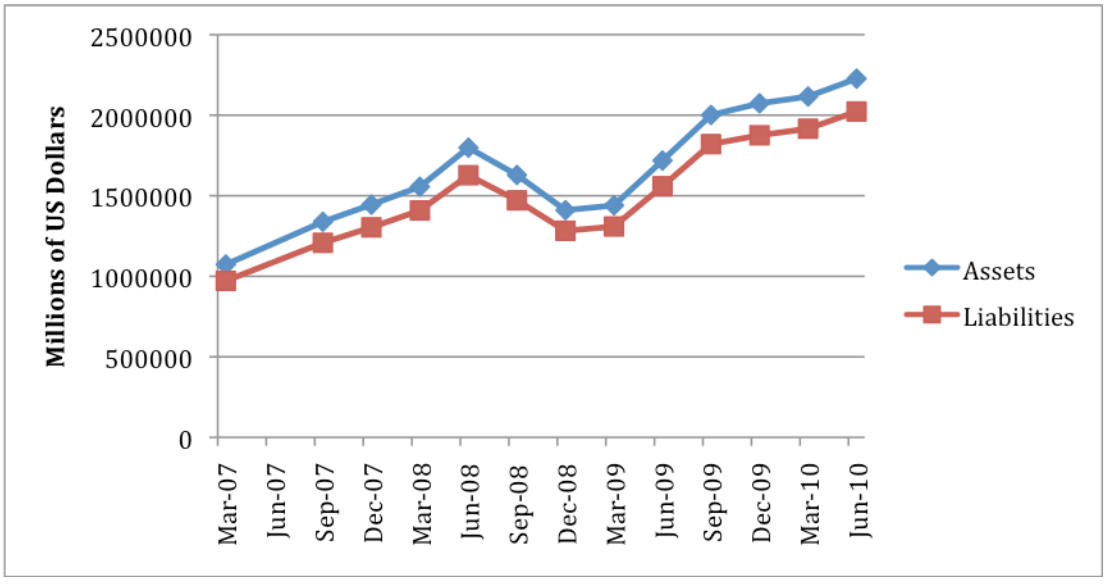
Figure 7: % Unemployment Rate in Brazil

Brazil's financial system was affected given the currency devaluation and reducing levels of global liquidity. Brazilian firms had total dollar debt of about 120 billion dollars, equivalent to about 8 percent of GDP, as of late 2008 (Stone et al, 2009). Many export firms depended on short-term trade lines of credit, totaling an average of 40 to 50 billion

dollars at any given time. Also, many firms undertook "speculative foreign exchange derivatives strategies" which depended on the real to further appreciate for profitability (Stone et al, 2009). The overall exposure of Brazilian firms to these currency derivatives was estimated at up to 50 billion dollars (BCB, 2010). The financial system suffered from a collapse of international credit and interbank markets, responsible for 19% of Brazil's credit supply (BCB, 2010). Alongside the tightening credit there was an extra demand on the domestic credit market by firms that previously financed themselves in international markets (BCB, 2010). There was an especially large amount of stress on small and medium financial institutions that threatened to become insolvent.

As financial institutions threatened to or became insolvent globally, the population began to lose confidence in the financial system. This risk aversion contributed to the liquidity problem (Alfaro and Kanczuk, 2010). However, this was not a large problem in Brazil. International banks are a minority (though they are quickly growing in presence) and are responsible for only about 25% of lending and 20% of depositors (Valadao, 2009). As a general rule, the local banks were much less exposed to risks than their North American and European counterparts (higher Basle index than recommended) and almost none took part in the derivatives festival. There were minor confidence disturbances as some deposit transferred from private to public banks due to the belief that public banks are less likely to go bankrupt, but general confidence was not really shaken (Valadao, 2009). The Brazilian banking sector's constant exposure to hyperinflation and change of currency and financial rules combined with its past experience with international crises created one of the world's most flexible and technologically advanced banking systems.

The Brazilian banking system's flexibility, highly regulated and concentrated environment, and strong local focus contributed to their financial system's resilience during the financial crisis. There were no bankruptcies within the Brazilian financial system due to the BCB's interventions and other favourable conditions. First, the new bankruptcy law introduced to Brazil in 2005 provides considerably improved protection and flexibility for debtors in financial distress to reorganize while continuing to operate their businesses (Standard & Poor's, 2005). Second, the central bank extended guarantees to sustain small banks (Alfaro and Kanczuk, 2009). Third, there were large amounts of mergers and acquisitions that occurred during this period. A few banks used the crisis to create mergers that would usually create antitrust concerns (such as the Itau-Unibanco merger), while the government created very strong incentives for larger banks to buy the portfolios of troubled medium and small banks, furthering the historical trend for concentration (Valadao, 2009).



Source: Bank of Brazil
Figure 8: Total Assets and Liabilities of Top 50 Banks in Brazil

The performance of banks in Brazil declined after the crisis hit in June 2008. The figure above shows there was an aggregate decline in the value of balance sheets for banks after June 2008. It is important to note that this figure is for the fifty largest banks in Brazil, and that small and medium sized banks likely experienced a more serious decline.

4.2. Assessment of the Brazilian Central Bank's Response to the Crisis

Soon after the shock experienced by the financial system in June 2008, the BCB introduced several countermeasures. I will discuss the main BCB policies introduced that are based on the theories discussed in section three. I will begin by reviewing their policies in liquidity provision, interest rates, and market maker/lender of last resort, followed by an assessment of each.

The BCB's main concern was in meeting the liquidity needs within the financial system. There were several initiatives concerned with injecting liquidity within both the foreign currency market and the domestic credit market. The BCB used derivatives such as swaps and futures to meet temporary foreign exchange liquidity needs (Stone et al, 2009). The BCB was authorized to engage in currency swap transactions with other central banks, with a US$30 billion swap line with the Federal Reserve. However, their successful utilization of derivatives reduced its dependence on reserves without tapping the Fed swap line (Stone et al, 2009). The BCB sold US dollar swap contracts, US dollars

in the spot market and in repurchase agreement auctions, and engaged in export financing all in an attempt to inject liquidity to the foreign currency market. This foreign exchange liquidity injection was implemented by several emerging market central banks and is one of the main policy innovations given the global financial crisis. In fact, at least 19 central banks in emerging countries introduced "special facilities to provide foreign exchange liquidity" (Stone et al, 2009). Many emerging country banks and corporations depend heavily on external funding and when the international liquidity crisis hit, many countries were in trouble. Brazil is a special case since the banking legal reserve is very conservative when compared to world standards. The BCB could easily generate liquidity just by relaxing their restrictions and that is exactly what they did (Valadao, 2009). The BCB's primary policy aimed at providing liquidity during the crisis involved lowering their reserve requirements and targeted both the foreign currency and domestic credit market. In the second quarter of 2009, the BCB lowered the reserve requirement of 260 billion reais (approximately 155 billion US dollars) to inject 99.8 billion reais (60 billion US dollars) into the financial system (BCB, 2010).

To judge the effectiveness of their liquidity injection, we turn to the theory discussed earlier. In order for public liquidity to be efficiently provided, the monetary authority must have detailed knowledge of bank's balance sheets. The solvency of institutions must be acknowledged and the timing of the injection appropriate to prevent the crowding out of liquidity. As mentioned, the Brazilian banking system is highly concentrated and regulated, not to mention the government owns large shares of several banks within the system. This means their banking system is highly monitored and the

BCB has detailed knowledge of the bank's performance and activities. There was absolutely no evidence of liquidity being crowded out and there were no bankruptcies within the system. Furthermore, Brazil has the rare ability to generate large amounts of liquidity almost instantaneously, which allowed for great control over the timing of the policy. In this regard, their liquidity policy was very successful. It is important to note that the incentives created by the BCB for larger banking institutions to acquire smaller institutions were rather helpful in preventing insolvencies within the system.

Tobias and Shin also state that after an injection of liquidity the value of balance sheets of banks will increase, and borrowing will increase. The figure below shows that an increase in the balance sheets of the fifty largest banking institutions began to grow almost in perfect correlation with the liquidity injection.

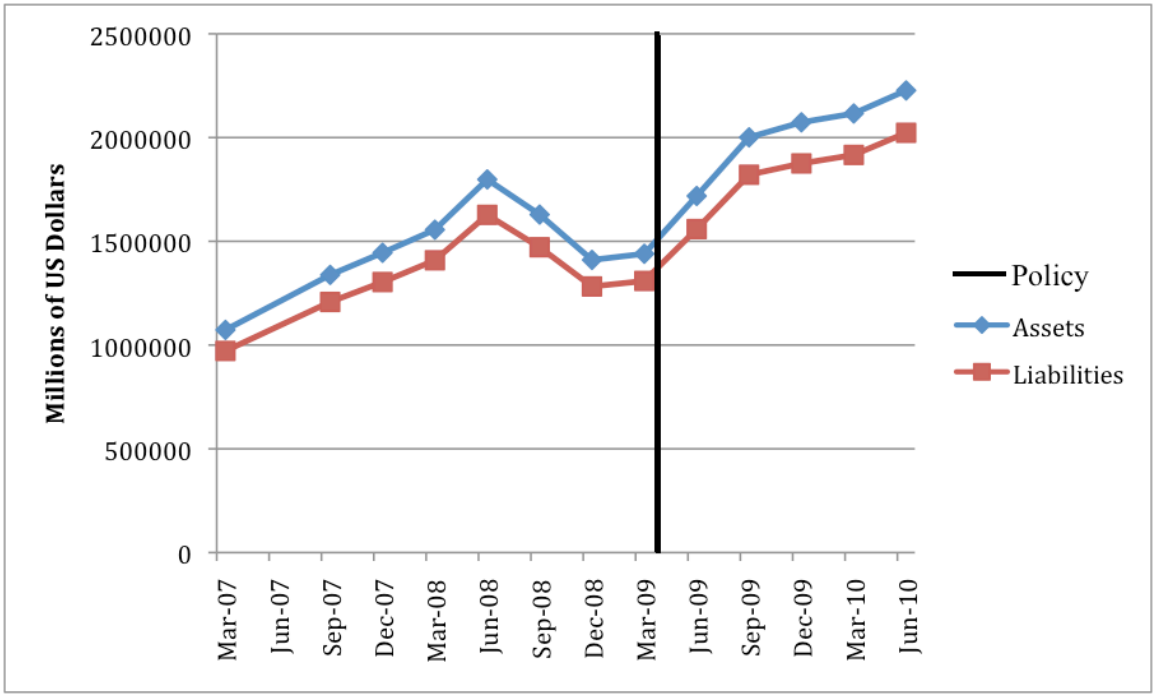


Figure 9: Total Assets and Liabilities of Top 50 Banks in Brazil and the Timing of Liquidity Provision Policy.

The BCB began to lower the SELIC rate for Brazil beginning in 2009. It was steadily decreased from about 14 percent at the end of 2008 to just under 9 percent in September where it was maintained until March. A lower SELIC rate makes it cheaper for banks to borrow within the overnight market and it is thus accompanied by an increase in borrowing. Comparing figure 8 and 9 one can see that the moment the SELIC rate began to drop in January of 2009, the decline in the value of firms' balance sheets halted and soon after began to grow. This shows a negative correlation between the value of balance sheets and the SELIC rate. Thus, it is safe to say that an increase in the value of balance sheets was partially due to an increase in borrowing. When BCB introduced the lower reserve requirements with a lower SELIC rate, the value of bank's balance sheets skyrocketed.

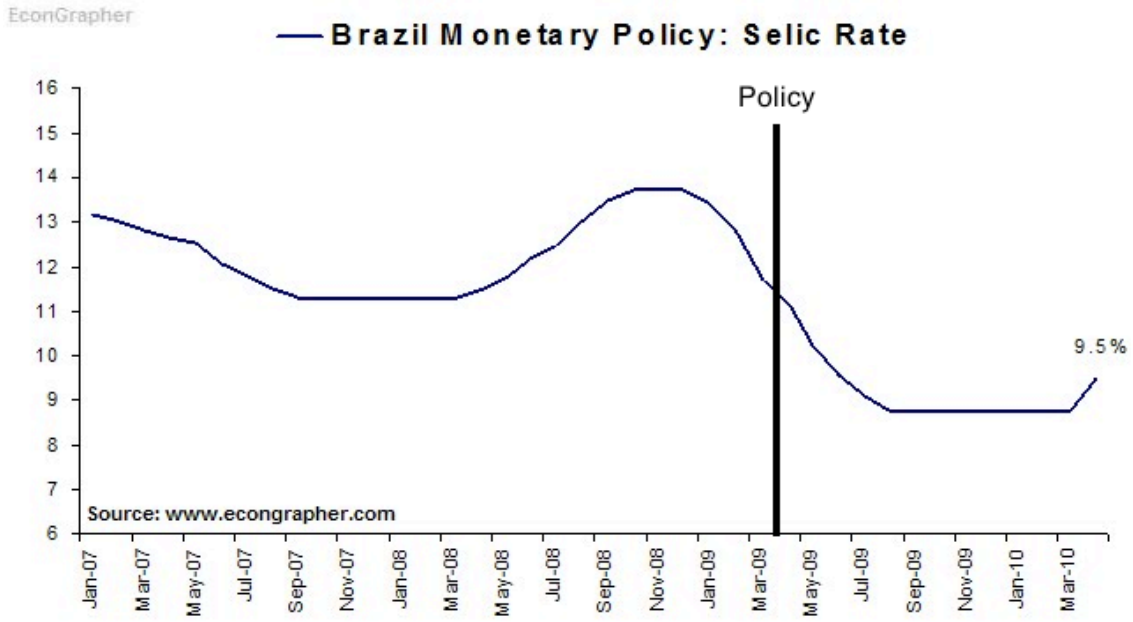


Figure 10: % SELIC Rate in Brazil from June 2007 to March 2010 and the Timing of Liquidity Provision Policy.

The measures the BCB took in providing liquidity to the financial system produced all the outcomes predicted by the theory outlined in section 3. The BCB's liquidity provision policies can thus be said to have been very successful. There are concerns with the main instrument used by the BCB to inject liquidity. There are possible negative effects associated with lower reserve requirements in terms of money market volatility (Brunner and Lown, 2001). However, these effects tend to be experienced in the longer term and the BCB has already begun increasing reserve requirements in 2010 and will soon reinstate the original requirement (Bloomberg, 2010). Also, as previously mentioned, their use of other instruments such as derivatives created a much smaller reliance on reserves than would be necessary.

The main conclusion of a paper written by Stone et al (2009) further supports the liquidity easing measures undertaken by the BCB in the crisis. According to their results, the BCB successfully alleviated the various market stresses arising from a local dollar liquidity shortage. The announcements and interventions reduced the cost of onshore dollar financing while the varied foreign exchange operations appeared to stabilize market expectations of exchange rate volatility (Stone et al, 2009). The positive effects of the announcements of the currency swap facility between the Fed and BCB alone strongly suggest an increase in confidence. The effectiveness of foreign exchange measures taken by the BCB is attributed to the financial system's sophistication, which allow for the effective use of derivatives. Furthermore, the BCB's performance during prior experiences with exchange rate instability has helped it to earn credibility,

especially since the adoption of inflation targeting in 1999 (Stone et al, 2009).

The next major policy implemented by the BCB was their manipulation of interest rates. To cope with the credit shock the BCB was forced to aggressively lower interest rates. In January 2009, interest rates began its decrease, being reduced by 100 basis points from 13.75 to 12.75 percent (BCB, 2010). This trend continued until September of 2009, when interest rates hit 8.75 percent – the lowest level in Brazil's history (Valadao, 2009). This type of expansionary monetary policy is predicted to bring about an increase in consumption, output, and employment.

The consumption levels within Brazil did experience significant growth immediately after the initial decrease of interest rates in January. In fact, consumption levels more than tripled within the first quarter of 2009 (BCB, 2010). This increase in consumption contributed to an increase in the GDP of Brazil. Output and GDP began its recovery in the first quarter of 2009 after a serious decline. The figure below shows the marked recovery experienced by the Brazilian economy through the first quarter of 2009. This upward trend continued into 2010 where GDP grew 9 percent in the first quarter (BCB, 2010). This rapid recovery came immediately following the introduction of lower interest rates by the BCB just as predicted.

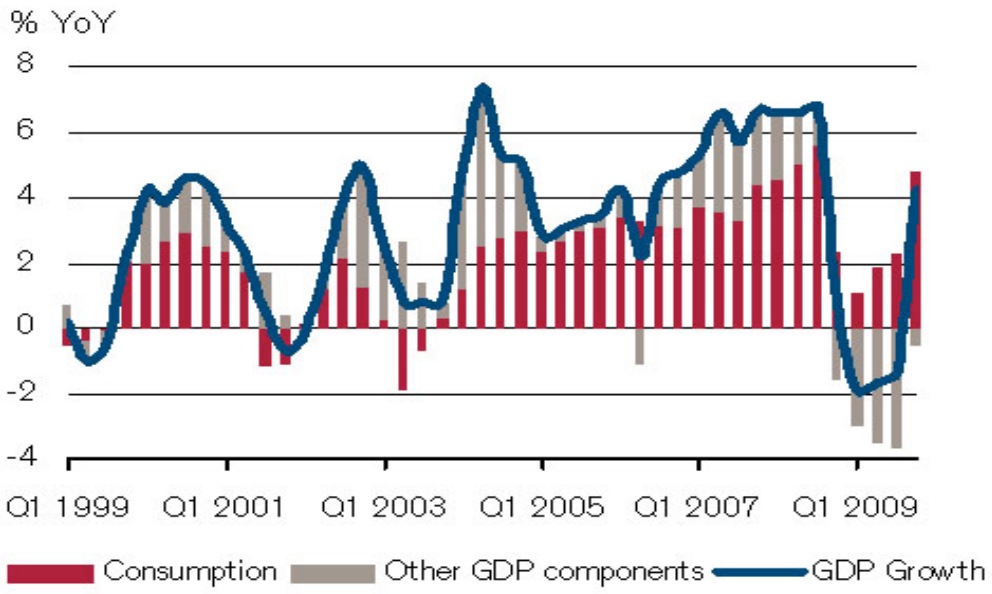


Figure 11: Brazil's % GDP and Composition (Consumption and Other GDP Components)

A conflicting result was the volatility of the unemployment rate. Theory predicts the unemployment rate would fall in conjunction with interest rates. However, this did not happen in Brazil. Near the end of 2008 when the crisis had peaked in Brazil, the unemployment rate reached its lowest level in about a decade at 6.9 percent. Once interest rates were initially lowered in January of 2009, their unemployment rate actually rose sharply up to 9 percent through the first quarter of 2009 (BCB, 2010). Following this sharp increase, unemployment gradually decreased, and in September when interest rates reached their lowest levels there was a sharp decline thereafter. This sharp decline (shown in the figure below) was in perfect timing with the lowest and most drastic decrease in interest rates by the BCB during the crisis. Though the initial decrease in interest rates did not seem to control the unemployment level, as there are several other factors to consider that may have affected it, it is clear that the continued aggressive lowering of interest rates contributed to its sharp decline at the end of 2009. The

unemployment rate in Brazil has always been very volatile and it is not a factor that was greatly affected by the crisis.

Figure 12: % Unemployment Rate and Timing of Interest Rate Policy

It is necessary to take into consideration the main consequence of lowering interest rates, inflation. Interest rates cannot stay low forever as it could pose problems to the economy in the long term through high inflation. The BCB took quick countermeasures to maintain its target level of inflation. As previously mentioned, targeting inflation brings about several benefits and is considered an optimal monetary policy. Soon after Brazil's re-stability, the BCB announced interest rates were going to rise in April 2010 to 9.5 percent, being the first Latin American bank to increase interest rates in more than a year (BCB, 2010). So far they have been extremely successful in controlling inflation, being within their target of 4.5 percent (plus or minus 2 percent) before, during, and after the crisis (Bloomberg, 2010).

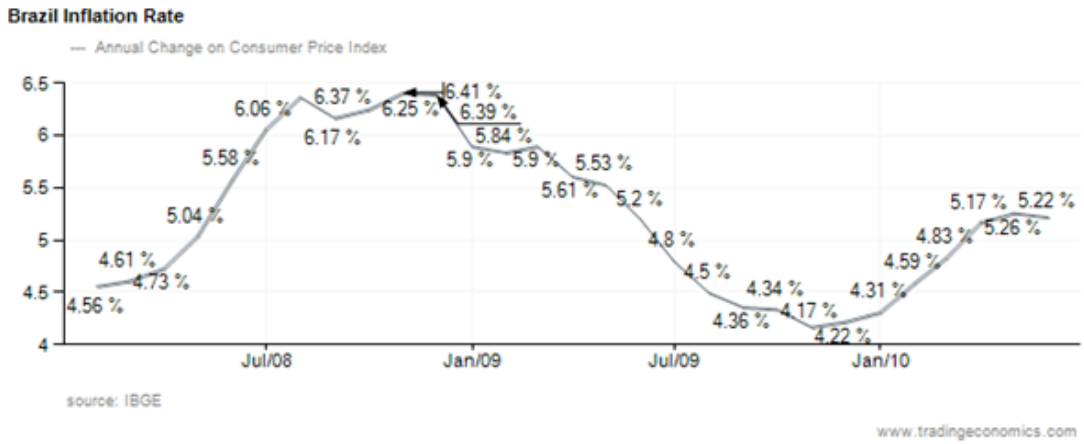


Figure 13: % Inflation Rate in Brazil from 2008 to 2010

A potential problem is Brazil's high inflation target. Goodfriend states an inflation target above two percent presents a high cost in the form of excessive inflation and potential credibility problems. A primary tool in decreasing inflation is increasing interest rates. However, this is not a viable option for Brazil since it would worsen the effects of the crisis, and interest rates in Brazil are already far higher than world standards. Even outside of a crisis, increasing interests above Brazil's average (average of 12-13% from 2007 to 2008) would create adverse effects by decreasing borrowing and investment levels domestically. The excessively high interest rates within Brazil have been heavily criticized (though it does present a benefit in the form of increased incoming foreign investment) but economists are fearful that lowering interests rates will further increase inflation. The BCB must assess potential actions it can take to lower inflation without creating any serious adverse effects. A possible solution may be to gradually lower interests when exchange rates are favourable so that inflation will be withheld by an

increase in imports. Nonetheless, given Brazil's previous history with hyperinflation, their current ability to maintain a relatively low inflation target is seen as quite a success.

Overall, the lower interest rates effectively mitigated the effects of the crisis within Brazil. The BCB's quick response produced a quick recovery in consumption and output, and a modest improvement in the unemployment rate. It is important to note that since Brazil has a very high interest rate compared to world standards, they have great flexibility in manipulating interest rates unlike the U.S., which can no longer rely on interest rate policy as it has already been driven down to near zero percent. Furthermore, the BCB immediately targeted the overnight lending rate (SELIC), which according to Marvin Goodfriend ensures the automatic protection of the banking system against the risk of insolvency in the event of a liquidity crisis. The BCB's second major policy was thus also successful in quelling the crisis by quickly stimulating the economy.

Lastly, I will discuss the market maker and lender of last resort policy implemented by the BCB. Understanding the necessity of a quick intervention, the BCB's ability to intervene in failing financial institutions was substantially broadened. The two major federal financial institutions, Banco do Brasil and Caixa Economica Federal, were authorized to buy struggling financial institutions including insurance and social security companies without having to follow the public procurement law (Valadao, 2009). An investment bank within the Caixa Economica Federal was created, allocating a billion dollars to buy shares of troubled firms, especially real estate firms. Lastly, up to US$20 billion dollars of the country's reserve were allocated towards granting loans (with

several financing options) to aid companies refinance their external debts. An estimated 4,000 enterprises are said to have benefited from these measures (Valadao, 2009).

The BCB implemented a macro level LOLR intervention, providing facilities to any institution within the financial system that required assistance. Intervention in the macro level is widely accepted unlike micro level intervention, which is seen as misguided and controversial by non-interventionists. It is important to note that it is much easier for BCB to intervene in the macro level than most other central banks because its financial system is one of the most concentrated in the world.

In assessing the BCB's domestic LOLR policy, I turn to Bagehot's description of good LOLR practice. According to Bagehot, when acting as a LOLR it is important to consider the counterparty, timing, market stress and confidence, magnitude, collateral, and transparency. The majority of domestic LOLR policies are directed towards banks because they are the natural central bank counterparties (Stone et al, 2009). During Bagehot's time banks were the counterparties for LOLR and he shared his views that during a panic central banks should provide liquidity to institutions other than banks. The current LOLR policy implemented by emerging market central banks, including the BCB, still use banks as primary counterparties but also extended their facilities to other financial and nonfinancial institutions (Stone et al, 2009). Bagehot states proper timing means central banks should lend immediately after the system experiences liquidity pressures rather than wait, which is the typical approach of central banks today. The BCB followed suit, beginning its operations a week after the failure of Lehman Brothers (Stone

et al, 2009). In terms of market stress and confidence, a crucial objective of the LOLR is to prevent concerns of troubled banks from creating a loss of confidence in the currency. As previously discussed, confidence problems within the financial system in Brazil was a mild problem, and the announcements and interventions undertaken by the BCB were shown to substantially increase confidence within the system. The magnitude of the policy should provide the amount needed to restore confidence as acting cautiously can lead to further problems (Bagehot, 1873), but, the "provision of foreign exchange liquidity is limited by availability" (Stone et al, 2009). In the case of Brazil, the BCB used instruments that allowed it to meet the foreign currency demand while limiting the impact on its reserves and without using the Fed's swap line (Stone et al, 2009).

As theory suggests good practice LOLR requires lending to illiquid but solvent institutions, but distinguishing between solvent and insolvent institutions is difficult especially during a time of crisis. Bagehot argues collateral standards should be relaxed if necessary to provide sufficient liquidity to the system. The BCB's provisions were collateralized, just as most other central banks during this crisis (Stone et al, 2009). Furthermore, the Brazilian financial system's highly regulated and concentrated environment alongside the BCB's large participation within the banking industry and broadened ability to intervene allows for greater monitoring and thus a greater ability to distinguish between solvent and insolvent institutions. Lastly, Bagehot talks about transparency in policy. The recognition of the central bank's LOLR role helps maintain confidence in times of stress. The BCB made it clear that it would provide liquidity immediately after the first sign of trouble, making announcements a week after Lehman

Brother's collapse, unlike other emerging market central banks that were much less transparent (Stone et al, 2009).

Given Bagehot's LOLR rules, the BCB policy was more than adequately structured. The theory of the market maker and lender of last resort is primarily concerned in the prevention of contagion, restoring confidence in the system, and distinguishing between solvent and insolvent firms. There were no bankruptcies within the Brazilian financial system and therefore no contagion. Confidence within the system is shown to have increased substantially since the introduction of the interventions. Lastly, as already mentioned that BCB has extensive monitoring power that allows for an enhanced ability to distinguish between solvent and insolvent banks unlike most other central banks. It is clear that their policy was successful in this respect. Without the LOLR intervention implemented by the BCB, the financial system would be in much worse shape. The 4,000 troubled institutions that were aided by these facilities would be worse off, potentially leading to bankruptcies, contagion and a loss in confidence.

The apparent success of the BCB's policies is more than likely overstated due to the Brazilian financial system's extreme resilience to the crisis. The recent reform undertaken within financial system after the introduction of the Plano Real created a much more sophisticated and resilient system that partially shielded Brazil from the crisis. The Brazilian financial sector was moderately healthy, almost free of toxic assets, and the average performance of Brazilian banks at the end 2008 was outstanding. Banks on average still announced large profits, only 2.8 percent lower than in 2007 before the crisis

hit (Valadao, 2009). As the crisis unfolded, Brazil had more than 243 billion U.S. dollars in foreign exchange reserves as a form of insurance against future economic problems – reaffirmed by the President of the Brazilian Central Bank who said, "it is better to self-insure even if there is a cost associated with that". (MercoPress, 2010) Even after Brazil took the first hit from the crisis, it still had more than 223 billion dollars in reserve and public debt barely grew, increasing from 41.8% of the GDP in 2008 to 44% in 2009 – "probably the lowest increase in the world" (Alfaro and Kanczuk, 2009). This gave them a great opportunity to implement countercyclical policies, which successfully alleviated the short-term effects of the crisis.

5. Conclusion

The BCB took immediate and appropriate responses in reaction to the crisis. Most of their policy results were within the expectations of theory and successfully alleviated the pressure created by the crisis on the financial system in the short-term. Even though GDP shrank in 2009 in real terms, Brazil's recovery came much sooner than predicted. Soon after the BCB's interventions, GDP grew in the final quarter of 2009 with a strong 4.3 percent increase. Currently, GDP growth in 2010 is at an even higher level than the pre-crisis levels. Though the success of the BCB's interventions was a major factor that contributed to Brazil's outstanding performance throughout the crisis, it was not the only factor. Brazil has an incredible ability to learn and adapt in response to its past experiences. Brazil's constant exposure to crises in the past led to a highly responsive, flexible, concentrated and regulated banking system and the government to take several

countermeasures as a form of insurance against future crises. In particular, the Brazilian financial system recently faced a major restructuring to combat hyperinflation with the introduction of the Plano Real, which made it practically impervious to external shocks. This created several favourable pre-existing conditions that alongside the success of the BCB's interventions left Brazil relatively unscathed throughout the crisis.

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