

**A Real Solution with Real Consequences:  
The *Plano Real*, Capital Flows, and the Brazilian Devaluation**

Matthias McCoy-Thompson  
Honors Capstone in International Studies  
Spring 2014

Professor Arturo Porzecanski  
School of International Studies  
American University

**Abstract:** In July 1994, Brazil implemented an inflation stabilization program known as the *Plano Real* that eliminated hyperinflation through the use of a crawling peg exchange rate anchor, a type of semi-fixed exchange rate regime. While this policy was highly effective at controlling inflation rates, it created macroeconomic distortions in the current account (trade balance), interest rates, and public debt that ultimately led Brazil to devalue its currency, the Real, in January 1999. This capstone explores the role of foreign capital during the *Plano Real* and its devaluation with a focus on how capital movements precipitated the crisis. The study was conducted in three parts: a historical overview, a statistical analysis, and an evaluation through the Mundell-Fleming framework, a model that explains the relationship between the exchange rate, interest rates, and capital movements. The paper focuses on policies of the Brazilian government and their effect on short-term and long-term capital. It also emphasizes the effect of global economic crises on short-term capital flows. The study found that Brazilian investment policies and the crawling peg system helped limit the macroeconomic adjustment after the devaluation. This paper offers important lessons on the costs and benefits of a managed exchange rate regime and provides a recent economic history of a rising economic power, Brazil.

In the wake of Brazil's strong economic performance in the past decade, it's hard to believe that only twenty years ago the country was experiencing hyperinflation. Brazil recorded annual inflation of 1,928% in 1993 and prices climbed even faster in the first half of 1994. Despite eight stabilization plans in the prior seven years, inflationary forces kept returning at faster and faster rates (Baer 2001). President Itamar Franco, newly sworn in after President Collor's resignation, appointed Fernando Henrique Cardoso as his finance minister and charged him with developing a new plan to control inflation (F Cardoso 2006). This plan, which became known as the *Plano Real*, introduced the Real, a new currency with a crawling peg initially set to the US dollar, and used a transitory price-indexation mechanism known as the *Unidade Real de Valor* for the transition from the old currency to the new (Da Fonseca).

The new currency, along with certain fiscal austerity and other economic measures, was wildly successful in eliminating hyperinflation for good. The year-on-year inflation rate collapsed from 4,922% when the *Plano Real* was implemented in July 1994 to 33% twelve months later and eventually to a low of 1.65% in January 1999 (IBGE 2014). However, this rock-bottom inflation rate coincided with a currency crisis in Brazil and the first major devaluation of the Real from 1.20 BRL/USD to 1.98 BRL/USD. And yet, despite the devaluation, Brazil was able to avoid a return to uncontrolled inflation largely thanks to conservative fiscal and monetary policies, which included a regime change away from exchange rate targeting and to inflation targeting (Bulmer-Thomas 1999). Although Brazil emerged from the currency crisis relatively unscathed, the question remains: in

what ways did the *Plano Real* contribute to the devaluation of January 1999, and why were the effects of that devaluation not disastrous in terms of precipitating banking, debt or growth crises?

This paper will examine Brazilian economic policies during the 1990s and their role in setting the stage for Brazil's devaluation in early 1999. A key aspect of any managed currency regime like the one Brazil instituted under the *Plano Real* is the central bank's ability to buy and sell foreign currencies in order to maintain the value of the exchange rate. Therefore, a significant portion of this analysis will focus on Brazilian policies regarding foreign capital inflows, the main source of foreign reserves for the Central Bank of Brazil. During the *Plano Real* years, Brazil's government used high interest rates, privatization campaigns, and capital control reforms to draw foreign investment into Brazil. The increase in investment inflows and a currency managed to stay strong, however, led to a reversal in the current account of the balance of payments, as Brazilians started to import more than they exported (Amann 2000). The relatively high interest rates, used to keep inflation under control and the currency strong, also contributed to keeping the Brazilian government in deficit because of mounting interest expenses (De Paula 2003).

In the months prior to the devaluation, domestic debt concerns and foreign crises abroad (mainly in East Asia and Russia) caused foreign investors to reassess their positions in Brazil. As contagion effects from the foreign crises spread, investors became concerned about Brazil's ability to defend its currency and pay its debts (Frieden 2001). As foreign capital movements reversed themselves, Brazil was forced to sell foreign reserves in order to maintain the value of the Real. With

foreign reserves rapidly declining despite an injection of funds from an emergency IMF loan, Brazil decided to devalue. Brazilian policies designed to attract investment during the *Plano Real* period had a profound effect on the country through the devaluation and beyond. While the *Plano Real* created an artificially high exchange rate that attracted foreign investment, it was careful management of investment policies, especially direct investment, that prevented economic collapse after the devaluation.

While most countries in Latin America now have a floating exchange rate, the lessons from Brazil's experimentation with the *Plano Real* are important today. Although the plan was extraordinarily effective at controlling inflation, it resulted in adverse consequences that made Brazil more vulnerable to a currency crisis. Understanding these consequences is especially important for the multitude of countries that still use managed exchange-rate regimes, including five that use a crawling peg system (IMF 2006). More specifically, Brazil's experience demonstrates the importance of good management of monetary, exchange-rate, and fiscal policies. Also, an examination of Brazil's policies and economy during the 1990s provides a strong foundation for understanding Brazil's reduced macrofinancial vulnerabilities nowadays, as evidenced by the successful way the country came out the global financial crisis of 2008-09 and the European financial crisis of 2010-11. Brazil radically changed its economy during the *Plano Real* and set it on the track of increased economic openness and stability. As Brazil continues to struggle with inflation, interest rates, and exchange rate issues, albeit much less so

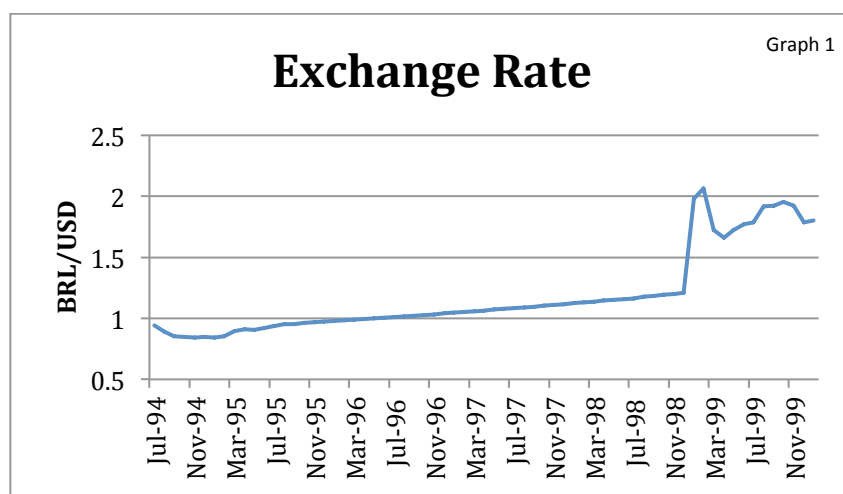
than before, we can look to the lessons of the past for ways to address these problems going forward.

### **Clarifying Key Concepts**

A few months before the conversion from the old *Cruzeiro Reais* to the new Real, the government created the *Unidade Real de Valor* (URV) that was indexed to the *Cruzeiro Reais* (Averborg 2002). All contracts were slowly denominated in the URV, which the Central Bank adjusted daily to parity with the US dollar. This method of indexing the URV to inflation kept its value constant and therefore the URV was used as a nominal anchor to keep relative prices stable. When the Real replaced the URV in July 1994, the people were already used to price stability in the new currency and the contracts prevented price inflation in the short term (Da Fonseca 1998). The Central Bank of Brazil (*Banco Central do Brasil*, BSB) would pursue a stable exchange rate through the use monetary policy, including through intervention in the market for foreign exchange. By stabilizing the Real to the US dollar at a rate of about one-to-one and guaranteeing that the BCB would keep it there through intervention, the Brazilian government was able to create confidence in the stability of the Real.

However, it soon became apparent that the relationship between the BRL and the USD was not a fixed-exchange rate in the traditional sense. Instead, it was a “crawling peg,” whereby the exchange rate was allowed to float within a highly restricted band and was depreciated slowly over time (Campa 2002). This differs from the two extreme types of exchange-rate regimes: fixed and freely floating. Under a fixed exchange rate, governments will always buy or sell currency at a

predetermined price. Under a floating exchange rate, governments do not buy or sell currencies but rather let market forces determine the relative exchange rate. The “crawling peg” system is a variant of the fixed exchange rate regime in that the authorities intervene in order to have the currency move along a predetermined path or corridor. The crawling peg system in Brazil and the subsequent devaluation can be seen in Graph 1 below:



The Mundell-Fleming model can portray both of the two types of exchange rate regimes in an open economy. This model helps explain the relationship between the balance of payments, monetary policy, interest rates, and output. Under this model, if the domestic interest rate changes due to changes in fiscal or monetary policy, then a differential will open up between the domestic and foreign interest rate causing capital to move into or out of the country (Sanders 2008). Under a floating exchange rate, the exchange rate will appreciate or depreciate to accommodate any resulting changes in supply or demand for foreign exchange. Under a fixed exchange rate regime, the central bank must buy or sell foreign currencies into or out of its official reserves in order to maintain the exchange rate

at the targeted level or range, which then increases or decreases the money supply, respectively. This model has been used to explain why governments cannot have a fixed exchange rate, run an independent monetary policy, and allow for free capital movements at the same time, because with free capital movements either the exchange rate will change or else monetary policy will do so (as a result of intervention operations) in order to accommodate movements of capital (Sanders 2008).

A central aspect of the Mundell-Fleming model is the concept of interest rate parity. The theory of interest rate parity holds that domestic interest rates in different countries with completely open economies will move towards equilibrium after accounting for each country's respective exchange rates and inflation rates (Chinn 2006). This is because foreign investors will always invest their money where real interest rates are the highest. In these countries, either the exchange rate will change or monetary policy will change to address the capital inflows causing the real interest rate to decrease. This has a profound effect on the balance of payments, or the net value of all trade plus the net value of all capital movements into and out of the country. In a floating exchange-rate regime, the balance of payments should be zero because the increased supply of money flowing into a country after an interest rate hike will appreciate the currency, giving residents increased buying power for imports (Sanders 2008). This causes a decline in net exports equal to the increase in capital inflows. However, under a fixed exchange-rate regime, the government buys and sells currency in order to maintain the exchange rate and without a change in trade volumes the balance of payments does



not adjust to zero. Finally, with this relationship in mind, central banks under a fixed exchange rate regime will manipulate the interest rate in order to attract the level of foreign capital necessary to maintain the balance of payments at the fixed-exchange rate.

### **Literature Review**

In the twenty years since the *Plano Real's* inception, there has been extensive scholarly work on its impact. The majority of this work has focused on the *Plano Real's* success in eliminating hyperinflation. Andre Averbug (2002) reviews the economic changes in Brazil during this period and specifically investigates the effects of the *Plano Real* on inflation. He found that not only did the *Plano Real* drastically reduce high inflation rates, but it also reoriented the economy towards economic growth.

While the effects of the *Plano Real* on inflation are fairly obvious, the reasons for its success are less so. Márcio GP Garcia (1996) makes the case that, prior to the *Plano Real*, interest-bearing assets could be considered domestic currency substitutes due to their high liquidity and therefore drove inflation as the value of these assets continued to increase. At the end of the paper he explains that by creating a new currency linked to the dollar, people no longer had to rely on interest-bearing assets to maintain their wealth and therefore the cycle of inflation ended. Manuel A. R. Da Fonseca (1998) takes the opposite approach and argues that the *Plano Real* reduced inflation by indirectly freezing government controlled prices and wages through the indexation process prior to the Real's introduction. He argues that by freezing government expenditures rather than reducing them in real

terms, Brazil did not address the large fiscal imbalances that caused inflation. This ensured that Brazil had to rely on high interest rates and a tight control of the exchange rate in order to keep inflation under control, resulting in increased government debt and trade deficits.

These two issues and their effect on economic growth have been explored further by a multitude of researchers. Alfonso Bevilaqua and Márcio GP Garcia (2000) examined the effect of the *Plano Real* on debt. They found that high interest payments due to a poor fiscal stance and semi-fixed exchange rate contributed significantly to the rapidly rising public debt during the 1990s. In addition, they found that short-term bonds with these high interest rates were driving the rapid rise in debt. Fernando Ferrari-Filho (2001) looked at the *Plano Real's* effect on economic growth and trade. He explains that the *Plano Real* developed into an exchange-rate trap that created macroeconomic imbalances and ensured a current account deficit. Bibiana Medialdea (2013) went even further and claimed that by relying on foreign investment to prop up the exchange rate and entering a strategy of growth by foreign savings, Brazilian governments had to prioritize financial markets over production activities. This meant that decisions on interest rates or exchange rates had to be based on international markets rather than domestic concerns. While she presents a quite critical view of these decisions, it still highlights some problems associated with Brazil's quest for foreign investment.

Researchers have investigated other factors related to foreign investment during this period. Marcus Valpassos and Márcio Garcia (2000) found that while the interest rate differential was the main determinant of short-term capital flows, the

privatization program of the Brazilian government was responsible for most of the long-term capital flows. He also found that the stability associated with low inflation helped draw more long-term and short-term capital as the *Plano Real* progressed. These capital flows were also impacted by capital controls, as explained by Ilan Goldfajn and Eliana Cardoso (1997). They explain how the Brazilian government used capital controls to try to control the level of short-term capital flows. They found that while these controls were effective at altering capital flows in the short-term, they had no long-term effects.

Eliana Cardoso (2001) expounds upon the problems associated with capital flows. She explains how an exchange rate anchor encourages investment in domestic financial assets with high exchange rate adjusted profits. However, if markets begin to doubt this anchor, the inflows reverse themselves causing a credit crunch and reducing international reserves. She makes it clear that without a genuinely floating exchange rate or an unquestionable target exchange rate, “the protracted use of the exchange rate as an anchor to reduce inflation makes the country vulnerable to external shocks and hampers growth performance.” While short-term capital can and did help Brazil grow during the boom times, it turned disastrous when markets doubted the viability of the exchange-rate regime.

While these papers have examined a variety of aspects of the *Plano Real* and Brazilian economic policies in the 1990s, none have assessed the impact of both short-term and long-term capital as precipitating factors in Brazil’s devaluation. Due to Brazil’s consistent current account deficit due to the overvalued exchange rate, the consistency, quantity, and composition of capital flows were important factors

throughout the *Plano Real* period, especially during the crisis. Long-term capital flows tend to be more stable than their short-term counterparts. Brazil tried fostering long-term capital flows through the attraction of foreign investment throughout the period, which provided some stability in overall capital flows. By doing a holistic assessment of the *Plano Real* and Brazilian economic policies during this period, we can examine how the *Plano Real* influenced capital flows, how successful Brazil was in limiting its exposure to short-term capital flows, and how long-term capital flows provided stable foreign currency inflows.

### **Methodology**

The research for this paper was conducted in three parts: a historical overview of the time period, an analysis of the economic data, and an examination of the Brazilian economy through the Mundell-Fleming framework. The historical overview presented a comprehensive view of the trends in the Brazilian economy, especially those related to capital flows. A variety of sources were used when conducting the overview including scholarly articles and books that are cited in the historical overview and listed in the bibliography. These sources brought together an empirical picture of the Brazilian economy and a wealth of data and analysis. Primary sources like IMF reports, investor reports, and first-hand written accounts were also used to give a sense of domestic and foreign reactions to different Brazilian policies, including the devaluation of early 1999. In the overview the focus was on foreign capital movements, investor reactions, Brazilian policies related to capital flows, and the relationship between foreign capital inflows and other economic indicators.

Next, economic data on a variety of indicators was collected and analyzed. Most of the data came from the Central Bank of Brazil, although year-on-year inflation data came from the Brazilian Institute of Geography and Statistics. The data spanned the years 1994 to 2000 although some data only started in 1995. All of the data collected was monthly. The data used included the Brazilian overnight interbank interest rate (SELIC), exchange rate (USD sale for end of period), money supply (M1 BRL for end of period), current account (USD), financial account (USD), international reserves (USD net end of period), GDP (USD equivalent), public debt (USD equivalent end of period), net foreign direct investment (USD), net foreign portfolio investment (USD net), U.S. overnight interbank interest rate (Federal funds rate), inflation rate (measured by consumer price index), and interest payments on public debt (USD net).

Most of the analysis involved graphing the statistics over the time period in order to find trends, events, and correlations. The real interest rate was calculated using inflation and interest data and also the interest rate spread between the Brazilian interest rate and the federal funds rate. Correlations were calculated for changes in interest rate spreads vs. changes in portfolio investment, net portfolio investment vs. changes in international reserves, and net direct investment vs. changes in international reserves. Finally, an Exchange Market Pressure index was developed using the methodology used by Stephen Hall, Amangeldi Kenjegaliev, PAVB Swamy, and George Tavlas (2013) that shows how both changes in international reserves and the exchange rate reflect pressure on the exchange rate from international investors. This calculation takes the change in exchange rate

adjusted international reserves and divides it by the exchange rate adjusted money supply before subtracting the change in the logs of the exchange rate. This provides a number between -1 and 1, to measure upward or downward pressures either on the exchange rate or on official international reserves. Large deviations from the normal indicate large amounts of exchange market pressure in either direction. After collecting all of this data, a series of graphs were developed in order to demonstrate the effect of interest payments on the debt, how exchange market pressure reacted to crises, and the differences between portfolio investment and direct investment.

After conducting the historical overview and data analysis, the information gathered was applied to the Mundell-Fleming model. First, the Mundell-Fleming model predicts that a fixed-exchange rate system with open capital movements will only be stable if monetary policy absorbs all changes in money supply due to capital movements (Sanders 2008). Although Brazil did not have a fully fixed exchange rate, its crawling-peg system is close enough when looking at short-term changes in capital movements and monetary policy that it was possible to assess Brazil's ability to maintain its exchange rate using its supply of foreign reserves. Second, the Mundell-Fleming framework predicts how changes in government spending should affect interest rates and monetary policy, which were also assessed. Third, the Mundell-Fleming approach predicts how changes in the interest rates, and specifically the interest rate spread between domestic and global rates, should affect capital flows. These predictions were compared with actual capital flows. Finally, the impact of having a crawling-peg system rather than a fixed exchange-rate

system was assessed by looking at the effect of a semi-flexible exchange rate on the indicators. Each of these assessments focused on the impact on the Real's devaluation in order to understand the problems that caused it within the Mundell-Fleming framework. Overall, this analysis presented a strong holistic view of the *Plano Real* period and helped assess the influence of foreign capital prior to and during the devaluation of early 1999.

### **Historical Overview**

Prior to the *Plano Real*, Brazil engaged in no less than eight failed inflation stabilization plans. The first was the *Plano Cruzado* in February 1986. Annual inflation had remained above 100% since at least 1980 but had crept up to 256% by the time of the plan's implementation (Fishlow 2011). The main facets of the plan were wage and price freezes across the economy, a new currency, increased taxes, and a freeze of the exchange rate (Da Fonseca 1998). The plan was initially relatively successful, lowering annual inflation to 78% by the beginning of 1987 (Baer 2001). However, by November of 1986 the plan was in serious trouble as the increase in relative wages combined with price freezes caused massive shortages, and the relatively strong (overvalued) exchange rate caused a deterioration in the current account (Baer 2001). A second plan, the *Plano Cruzado II*, was implemented under which the price controls were removed and taxes were increased across the economy in order to control the fiscal deficit through tax revenue. Prices began increasing again, triggering clauses in job contracts that adjusted wages upwards in the face of monthly inflation higher than 20% per year. In June 1987, the government instituted the Bresser Plan with new freezes on wages and prices with

little result as year-on-year inflation jumped from 179.4% in June to 254% in July (Fishlow 2011). Between 1988 and 1989, the government implemented the *Feijão com Arroz* policy, *Plano Verão*, *Plano Collor*, *Plano Collor II*, and the *Plano Marcílio*. While some of these plans tried new currencies or higher interest rates, all of these plans relied mainly on wage and price freezes to stop hyperinflation. While some were more successful than others, none produced sustained price stability.

The economists that had developed most of these plans were part of the heterodox school of economics in Latin America, and felt that inflation was supply-side rather than demand-side determined, and thus could be controlled without contractionary fiscal and monetary policies (Baer 2001). These economists had dominated Brazilian policymaking for decades, advocating and implementing “developmentalist” policies including state-led industrialization through protectionism, tax breaks, directed credit, and stimulative fiscal and monetary policies which initially sparked rapid economic growth but over time generated faster and faster inflation. As inflation became ingrained in Brazilian society, contracts increasingly tied wages, prices, and interest rates to the inflation rate (Da Fonseca 1998). Widespread indexation would often amplify and perpetuate the inflationary consequences of any supply or demand-side shock to the Brazilian economy, and was not well addressed by any of the previous stabilization plans.

Although the stabilization plans failed, other policies implemented during this time period laid the groundwork for capital inflows in the late 1990s. The first is the implementation of a relatively restrictive monetary policy that featured high real interest rates. As part of the *Plano Marcílio* in 1991, the Central Bank used high



interest rates to try to reduce inflationary pressures (Valpassos 2000). Although bonds prior to this change were linked to inflation, they tended to yield a negative real interest rate because their adjustments could not keep up with the extreme hyperinflation of the time period (Purcell 1997). Instead, the central bank increased the nominal interest rate to as high as 15710% in the time prior to the *Plano Real* in order that the real interest rate might be positive (Valpassos 2000). While at the time the macroeconomic instability of hyperinflation dissuaded many investors from investing, when the *Plano Real* brought some stability to the Brazilian economy, these interest rates attracted large flows of foreign capital from the start.

The second important policy of the period was the National Privatization Program instituted in April 1990 (Petras 2003). Between 1990 and 1994, there were several privatizations and the sale of state assets generated \$11.8 billion for the national government (Ministry of Development 2002). However, under the new program, the government raked in \$77.8 billion between 1995 and 2000. These privatization programs were a significant attraction for foreign capital and 28% of all foreign direct investment between 1990 and 2000 went towards the purchase of state-owned assets (ECLAC 1998).

The third policy initiative was the reduction of trade and investment restrictions. Like many Latin American countries, Brazil opened up economically in the early 1990s after decades of protectionist measures. Trade policy reform was instituted in 1990 and reduced the average import tariff from 45% to 12% in 1994 (Fishlow 2011). Many capital controls, especially on outflows, were also lifted during the period. Although exact information on capital controls is difficult to

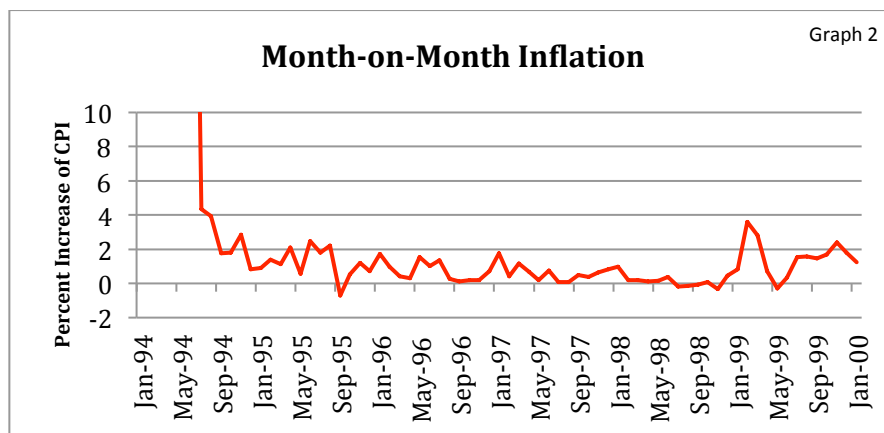
discern, Eliana Cardoso and Ilan Goldfajn (1997) found a distinct decline in the restrictions on capital movements between 1990 and 1995. The result was an increase in net private capital flows from an average of \$39 million per month between 1988 and 1991 to \$970 million between 1992 and 1995, a 25-fold increase. These policies helped set the stage for large capital movements in the second half of the decade.

The *Plano Real* was developed in late 1993 by then-finance minister Fernando Henrique Cardoso and a team of top Brazilian economists who were not members of the heterodox school. The plan differed substantially from the previous stabilization plans and had three main components. The first, as mentioned previously, was the creation of a new currency, the Real, with a crawling peg linked to the US dollar initially at a rate of one-to-one (Da Fonseca 1998). The Real and its crawling peg system was the cornerstone of the *Plano Real* and essential to keeping prices stable in the long-term.

The second component, as also discussed briefly earlier, was a de-indexation program designed to build confidence in the Real and remove the automatic price increases built into the Brazilian economy with one major, and transitory, exception. In March 1994, *Cruzeiro Reais* and *Unidade Real de Valores* were listed next to each other on all prices and these URVs were used in all government contracts. This allowed people to become used to seeing stable UVR prices and the automatic price increases were removed from contracts. This created the illusion that prices and wages had been stabilized rather than attempting an actual halt to inflation via price and other controls which previous stabilization plans had implemented.

The third part of the plan was a series of government budget cuts implemented through the creation of a Social Emergency Fund. The fund essentially gave control of the equivalent of \$15 billion, a fifth of the government budget, to the finance ministry, which would spend it or save it as needed (F Cardoso 2006). The fund allowed the government greater fiscal flexibility in order to address the fiscal mismanagement that was one of the roots of inflation. Prior to its implementation, many inside and outside of Brazil felt that the plan would fail like the previous attempts (Independent Evaluation Office 2003). The only similar plan ever attempted had failed spectacularly in Hungary in 1946 (Da Fonseca 1998). But despite the naysayers, the plan was fully implemented with the introduction of the Real on July 1<sup>st</sup>, 1994.

The *Plano Real* was an unprecedented success at controlling Brazilian inflation. In July 1994, monthly inflation was only 4.3% compared to 45.21% for June (Central Bank of Brazil 2014). This figure fell to less than 1% by the end of the year. Unlike previous plans, the reduction in inflation was not just dramatic but also sustained. In fact, monthly inflation never went above 2% until after the devaluation of January 1999. The reduction in inflation can be seen in Graph 2 below:



The dramatic reduction in inflation coupled with nominal interest rates between 45% and 60% led to increased capital inflows to Brazil. This caused the exchange rate to actually appreciate against the dollar, and by January 1995 the Real was trading at a rate of .85 BRL/USD with very limited intervention by the Central Bank. Although by June 1996 the exchange rate was back to one-to-one, this demonstrates the attractiveness of Brazilian high interest rates to foreign investors almost immediately after Brazil brought inflation down. The inflows were so great that within three months of the *Plano Real's* implementation, the country's current account surplus of \$792 million in July 1994 had fallen to a current account deficit of \$1.6 billion by October. This current account deficit would not reverse itself until 2002, three years after the devaluation of early 1999.

The large capital inflows throughout the period of the *Plano Real* had to go through a process of sterilized intervention. Under a fixed exchange rate system, the central bank must purchase any excess foreign capital after all imports have been financed. This difference is the balance of payments deficit or the difference between the financial account surplus (net capital inflows) and the current account deficit (net imports minus exports). The central bank must purchase this extra currency because otherwise the excess supply of foreign currency compared to domestic currency will cause an unwanted appreciation in the exchange rate. A buildup of official foreign reserves is beneficial in case there should ever be a reversal of capital, because during such times the central bank must sell foreign currency in order to finance the balance of payments at the current exchange rate. While purchasing foreign currency can provide a safety net during crisis periods, it

also increases the domestic money supply as domestic currency replaces foreign currency in the market. Therefore, the central bank can sterilize its foreign exchange intervention by selling bonds in an open market operation in order to reduce the money supply by a similar amount as its purchases of foreign assets. In order to sell bonds, the central bank may cause interest rates to increase.

High interest rates are crucial for an exchange rate anchor system in three ways. First, they reduce the demand for money, which can reduce inflationary pressures. Second, they attract foreign investment necessary to finance the balance of payments deficit caused by an overvalued exchange rate. Third, bonds with high interest rates attract the necessary domestic currency to reduce the increase in the money supply caused by purchasing foreign assets. Therefore, Brazil had to keep relatively high interest rates throughout the period of the *Plano Real* in order to keep foreign capital coming in while maintaining the exchange rate and preventing inflation. In fact, under the Mundell-Fleming model, if a government wants to maintain a fixed exchange rate without effective capital controls it must take the money supply and therefore interest rates as endogenous. This suggests that high interest rates were simply a necessity of having an overvalued exchange rate with free capital movement.

The capital controls that Brazil imposed during the *Plano Real* period were not designed to limit overall capital flows but rather change the composition of these flows. Brazil focused on developing controls on capital inflows specifically to limit the volatility of short-term debt and equity flows (Goldfajn 1997). While foreign direct investment was considered to improve the productivity and efficiency

of the Brazilian economy, many short-term capital movements like portfolio investment either aimed at arbitraging short-term interest rates or targeted fixed income investments. Additionally, while foreign direct investment tends to be illiquid and difficult to move out of a country during a crisis, short-term portfolio investments could exit the country at the news of any possible deterioration in the macroeconomic situation of Brazil. Therefore, Brazil implemented a series of measures to limit the amount of short-term capital flowing into the country. This included increasing the minimum number of days or months different financial assets needed to be held for, imposing entrance taxes on a number of short-term financial assets, and limiting the financing of Brazilian exports (Valpassos 2000).

According to Márcio Garcia and Marcus Valpassos (1997), the level and number of these capital controls fluctuated in response to changes in capital flows. During periods of global financial instability like the Mexican Peso crisis, Asian financial crisis, and Russian crisis when foreign capital was fleeing all emerging markets, Brazil removed some of its capital controls to attract additional foreign capital. During the periods of relative financial stability between these crises, Brazil consistently increased capital controls to limit short-term inflows. However, Garcia and Valpassos make it clear that these controls were only nominally effective in the short-run and ineffective in the long-run. While the level and composition foreign capital inflows did change slightly in the immediate month after implementation of new capital controls, it did not cause any long-term changes in capital flows as financial markets found new ways to circumvent the controls.

Brazil's efforts to limit short-term capital were fairly ineffective, but the country was far more successful at attracting foreign direct investment. After the implementation of the *Plano Real*, net foreign direct investment jumped from \$798 million in 1993 to \$1.46 billion in 1994 and continued to increase throughout the decade peaking at \$30.49 billion by the end of 1999 (Central Bank of Brazil 2014). The Economic Commission for Latin American and the Caribbean (ECLAC 1998) released a report that detailed the reasons why FDI increased so dramatically. The first reason is that foreign companies engaged in a wave of mergers and acquisitions in order to improve domestic market penetration. The *Plano Real* increased real wages by eliminating inflation and increased price stability creating an attractive market for foreign companies. These mergers were often readily accepted by Brazilian companies who were facing increased foreign competition as Brazil lowered tariffs and other barriers to entry. The second reason is that transnational corporations already present in Brazil made new investments designed to improve efficiency. With the establishment of the Mercosur customs union in 1994, multinational corporations with operations in Brazil would have full access to markets in Argentina, Paraguay and Uruguay providing incentive to increase investment.

The final explanation from ECLAC's report on FDI's increase was deregulation in the service industries and generally on foreign capital. In the 1990s, Brazil deregulated a number of service industries including finance and information technology and opened them up to foreign investment. This led to a major shift in foreign investment towards services, especially deregulated services. At least 80%

of all FDI inflows went towards the service sector and 94% of that was in services that had been deregulated. Also, while Brazil changed its capital controls based on the investment climate, it continually reduced capital controls on FDI. The government reduced taxes on long-term productive investments and removed restrictions on the types of industries foreigners could own. These major policy changes across the Brazilian economy, including the *Plano Real*, lower tariffs, Mercosur, and deregulation, all contributed to the dramatic increase in foreign direct investment.

A substantial portion of the new FDI inflows also came from new privatization initiatives started in the 1990s. Although the National Privatization Program was started in 1990, the majority of privatizations took place between 1995 and 1998 (Ministry of Development 2002). As Brazil moved away from the state-led economy of the previous decades and toward a more market approach, the government began to sell off significant state-owned industries. The Brazilian government sold off mining companies, electric utilities, petroleum companies, financial institutions, steel refineries, and most importantly Telebras, the behemoth telecommunications company (Petras 2003). As seen in Table 1 below, while Brazilians purchased some of these institutions, foreign investors made up 53% of the total investment in privatization (Ministry of Development 2002). These purchases made up 28% of all foreign direct investment during the period (Valpassos 1997). Investors brought in expertise and additional capital in order to improve the efficiency of the former state-owned enterprises, further increasing the



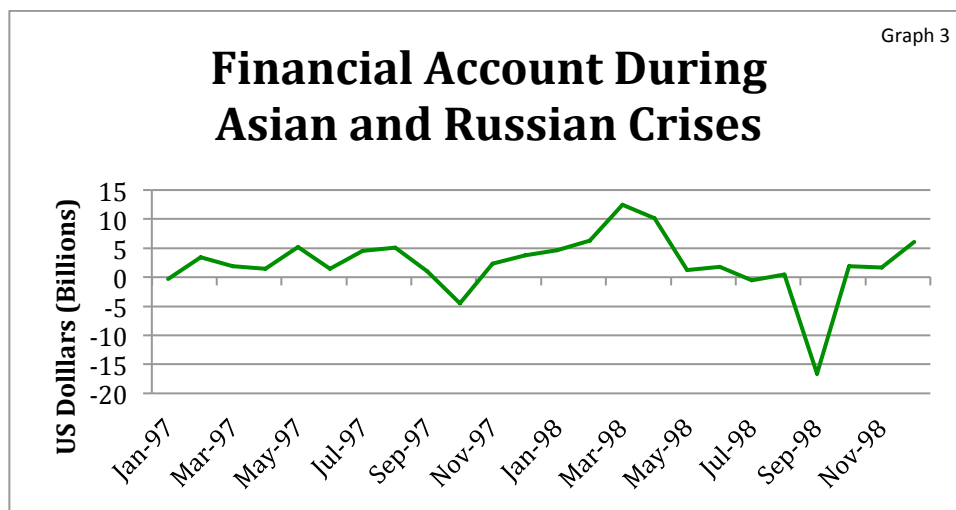
foreign direct investment from privatization. Overall, privatization had a substantial effect on capital inflows to Brazil after the institution of the *Plano Real*.

<b>Privatization Sales by Type of Investor (Table 1)</b>	
Foreign Investor	53%
Domestic Company	26%
Domestic Financial Sector	7%
Individuals	8%
Private Pension Funds	6%

Between the implementation of the *Plano Real* and its devaluation, three major international crises affected Brazilian financial markets. The first was the Mexican Peso Crisis in December 1994 when Mexico was forced to devalue the peso and entered a severe recession (Medialda 2013). Foreign investors began pulling out of emerging markets in order to protect against contagion risk and cover their losses in Mexico. By March 1995, this so-called “Tequila Effect” was in full swing and Brazil’s financial account reversed itself from a \$1.31 billion surplus in February to a \$2.08 billion deficit in March (Central Bank of Brazil 2014). The central bank raised the interest rate in April to 85% from 58% the month before and was able to reverse the flows again, this time for a financial account surplus of \$388 million. As capital flows returned to Brazil at their prior levels, Brazil continued to slowly lower the interest rate, which reached 26% by May 1996.

After a period of relative calm, the Asian financial crisis occurred in July 1997. Once again, contagion fears and guarding against losses prompted investors

to pull out of emerging markets. As seen in Graph 3, the financial account fell from a surplus of \$5.11 billion in August to a deficit of \$4.53 billion in October (Central Bank of Brazil 2014). The central bank again increased interest rates from 19.9% in October to 45.9% in November. Foreign investment returned at even higher levels, with the financial account peaking at \$12.41 billion in March 1998. But in August 1998 the Russian financial crisis hit and by September the financial account fell to a deficit of \$16.66 billion. This time, interest rates were increased to 41.6% in October from 19.2% in August. Although the financial account reversed to a surplus of \$1.87 billion in October, Brazil was unable to recover from the effects of the Russian crisis before facing a crisis of its own.



One of the main reasons why Brazil faced a crisis in late 1998 was the deteriorating fiscal situation. Prior to the *Plano Real's* implementation many financial actors, including the IMF, predicted it would fail because it did not include significant fiscal adjustment (Da Fonseca 1998). Although the Social Emergency Fund did allow for more flexibility in reducing government spending, it did not produce the fiscal adjustment necessary to reduce inflation without the exchange

rate anchor (Ter-Minassian 1998). In fact, the fiscal position of the Brazilian government worsened substantially with the implementation of the *Plano Real* as real wages increased and public sector prices remained stable (Independent Evaluation Office 2003). Prior to the *Plano Real*, the government relied on inflation to erode budget expenditures, but with inflation under control the real problems of fiscal mismanagement began to emerge. Although some efforts were made at comprehensive fiscal reform during the *Plano Real*, the majority of the plans failed due to congressional intransigence (Bevilaqua).

Instead, the primary fiscal balance deteriorated from a surplus of 4.3% of GDP in 1994 to a deficit of 0.1% of GDP in 1998 (Central Bank of Brazil 2014). The problem was made worse as interest payments continued to rise. As a consequence of the high interest rates necessary to attract foreign investment and sterilize foreign currency, the government had to pay a substantial and increasing portion of its budget towards interest payments. Interest payments per month grew from 51 million Reais in 1995 to 72 million Reais in 1998. The result was a dramatic increase in government debt in Brazil from \$72.7 billion at the time of the *Plano Real's* implementation to \$191.5 billion at the time of devaluation. Despite this large increase, Gustavo Franco, the Governor of the Central Bank of Brazil, was not concerned about the widening deficit because long-term external financing came from capital inflows (Franco 2000). But, as Alfonso Bevilaqua and Márcio Garcia (2002) explain, the availability of external financing was exactly the problem. By providing external financing, capital flows ensured that the necessary fiscal adjustment was delayed until the capital flows disappeared.

The devaluation in January 1999 was the result of macroeconomic imbalances exacerbated by external events. With a widening fiscal deficit, Brazil was under pressure in 1998 to reduce its expenditures. Social security reform had failed two years earlier and new attempts were facing increased opposition (F Cardoso 2006). In the wake of the Russian currency, banking and debt crisis of July-August 1998, foreign investors began to get scared of weakening fundamentals in Brazil and capital inflows began to slow down in the expectation of an eventual devaluation. Many investors felt that Brazil bore many similarities to the Russian financial system including a large government deficit, an exchange-rate anchor, increasing current account deficit, and large short-term capital inflows based on high interest rates (Alves 2000).

Beginning in May 1998, international reserves began declining as short-term investors left the country. Brazil reacted slowly to the decline and only increased interest rates in September when foreign reserves dropped by \$21 billion. Foreign capital, especially short-term portfolio investment, continued to leave the country, resulting in a financial account deficit of \$5.4 billion in January 1999 (Central Bank of Brazil 2014). With the financial account in deficit and no improvement in the current account, the Central Bank had to sell foreign reserves. Brazilian foreign reserves declined a total of \$48 billion dollars over the course of the crisis. Despite an IMF rescue package of \$41 billion implemented in December 1998, investors continued to pull out of Brazil (Independent Evaluation Office 2003).

The fiscal situation in Brazil also continued to worsen. As investors left Brazil, it had to rely on bonds with shorter and shorter maturity in order to finance

the deficit (Alves 2000). In May, only 21% of bonds were indexed to the short-term interest rate but by December the figure was 70%. Many bonds had turnover as little as three months, and with interest rates rising in defense of the currency peg, Brazil had to pay extraordinarily high interest payments. The short-maturity had a limiting effect on increasing the interest rate in order to attract foreign currency to staunch the outflow of foreign reserves because otherwise interest payments would have been unreasonably high (Frieden 2001). When Itamar Franco, the governor of Minas Gerais, declared on January 6, 1999, that his state would default on its debts, investors were scared off and they started to stampede out of the country in droves at a rate of \$1 billion per day (F Cardoso 2006). The Brazilian government realized it would have to devalue or face a total loss of foreign reserves. On January 13, the Brazil widened the exchange rate band resulting in 9% devaluation (Bulmer-Thomas 1999). Within two days, Brazil abolished the exchange rate band altogether and the crawling peg, the cornerstone of the *Plano Real*, was eliminated.

The *Plano Real* contributed to causing the devaluation in several key ways. First, it created a system in which high levels of foreign investment were necessary to sustain the balance of payments. The overvalued exchange rate ensured that Brazilian imports would exceed exports, and that therefore external financing was required to pay for the difference. This created an environment where Brazil was overly reliant on external financial markets in order to sustain its macroeconomic stability. While the capital inflows provided foreign reserves during stable times, when the external financial markets deteriorated, Brazil no longer had the necessary funds to sustain its current account deficit. Second, high interest rates

were required in order to attract foreign capital and sterilize foreign capital inflows. These high interest rates contributed to a dramatic increase in the net public debt, a major factor in the flight of foreign capital. Third, Brazil never completed the necessary fiscal adjustment to bring inflation under control because external financing ensured that it could continue to sustain budget deficits. Growing public deficits contributed to the increased public debt and overall macroeconomic instability. Finally, the government tried to sustain the high exchange rate for too long. Even Fernando Cardoso, the creator of the *Plano Real* and the President of Brazil during the devaluation, admitted that Brazil should have accelerated the depreciation of the exchange rate during a non-crisis period (F Cardoso 2006). Instead, when Brazil faced back-to-back crises in Asia and Russia, it could no longer sustain the elevated exchange rate with rapidly declining foreign reserves and had to devalue quickly.

Despite fears of a return of inflation, a major recession or even default, Brazil was able to recover relatively quickly from the crisis despite a weakened economy. Although the currency reached a peak devaluation of 78% in May 1999, it would eventually settle at a nominal devaluation of 48% (Giavazzi 2005). This represented a fall from 1.21 BRL/USD to an exchange rate between 1.7 and 1.8 BRL/USD. Inflation did not return as the central bank changed monetary policy from targeting the exchange rate to targeting inflation. The central bank increased interest rates to 43.25% in March and decreased the money supply by 6 billion Reais. Although year-on-year inflation did increase to 8.9%, this was only two percentage points higher than the average inflation during the *Plano Real* (Central Bank of Brazil 2014). The

financial account recovered quickly reaching \$1.8 billion by May 1999. Overall, GDP suffered an initial contraction for two quarters but actually ended the year with a net increase of 0.3% (Giavazzi 2005). While these are indicators of a Brazil in crisis and recession, they also represent a far milder crisis than the ones that plagued Asia, Russia, and Argentina around the same time period.

The currency crisis did not turn into a full-blown debt crisis due to strong policy decisions by the federal government. As mentioned before, the Central Bank switched to an inflation-targeting program in the aftermath of the devaluation and managed to keep inflation under control. Although interest rates increased to 43.25% under this inflation-targeting program and maturities remained relatively short, President Cardoso made a decision to continue paying dollar-indexed and foreign currency denominated debt despite the higher interest expense (F Cardoso 2006). This prevented a messy default that would have ensured Brazil did not have access to international capital markets and drastically decreased the available credit in the domestic economy.

The devaluation did not precipitate a currency crisis because of large reserves of dollar-denominated assets in the private sector (Independent Evaluation Office 2003). Prior to the crisis, actors in the financial system limited currency risk by hedging in the currency futures market and using dollar-indexed government securities. This limited the effect of the devaluation on company and bank balance sheets, preventing defaults and ensuring some access to credit in the aftermath of the crisis.

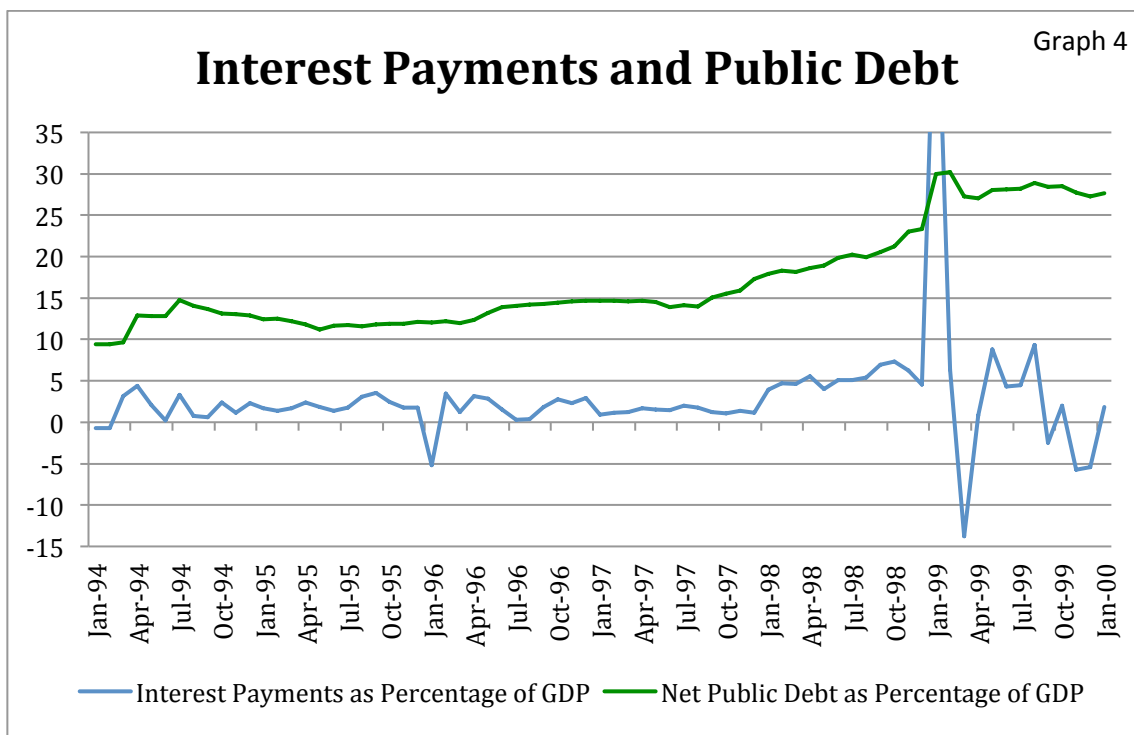
The *Plano Real* also had elements that limited the macroeconomic adjustment after the devaluation. The crawling peg system allowed the exchange rate to depreciate slowly over time. While the depreciation happened more slowly than necessary, by only having to devalue from 1.21 to 1.48 BRL/USD rather than 1 or even .85 BRL/USD, the Brazilian government prevented an even greater macroeconomic adjustment. Second, the high interest rates attracted large FDI inflows. By focusing on attracting stable FDI flows through privatization and other channels, the government prevented even more instability in the financial account. In fact, even in January 1999, at the worst of the crisis, FDI flows only fell from a \$2.6 billion surplus to a \$920 million surplus (Central Bank of Brazil 2014). The following month foreign direct investment increased to \$4.5 billion and remained relatively high and stable after that. This provided a much-needed cushion of foreign currency inflows during the crisis period. FDI flows also helped boost productivity by as much as 7 percent per year, ensuring the economy was more resilient to external shocks (Franco 2000). While Brazil had a similar exchange rate system to other countries that faced crises, the crawling peg system and focus on FDI helped ensure that Brazil did not face the worst effects of devaluation.

### **Statistical Analysis**

When conducting the statistical analysis of the period of the *Plano Real*, four trends were examined in order to assess how different economic indicators reacted to policies and external shocks. First, net public debt as a percentage of GDP was evaluated in relation to interest payments as a percentage of GDP as seen in Graph 4 below. A key reason why there was an initial attack on the Real in 1998 was



concerns about the macroeconomic fundamentals of Brazil, especially a public debt that that been rising steadily throughout the *Plano Real* period (Giavazzi 2005). By assessing how this increase relates to interest payments, we can determine the influence of high interest payments on the national debt. This is especially true considering that Brazil had a primary balance surplus in 1994 and 1995 and a very small primary balance deficit thereafter during the period of the *Plano Real* (Bevilaqua 2000). This meant that interest payments were the main contributor to the fiscal deficit and to debt accumulation.



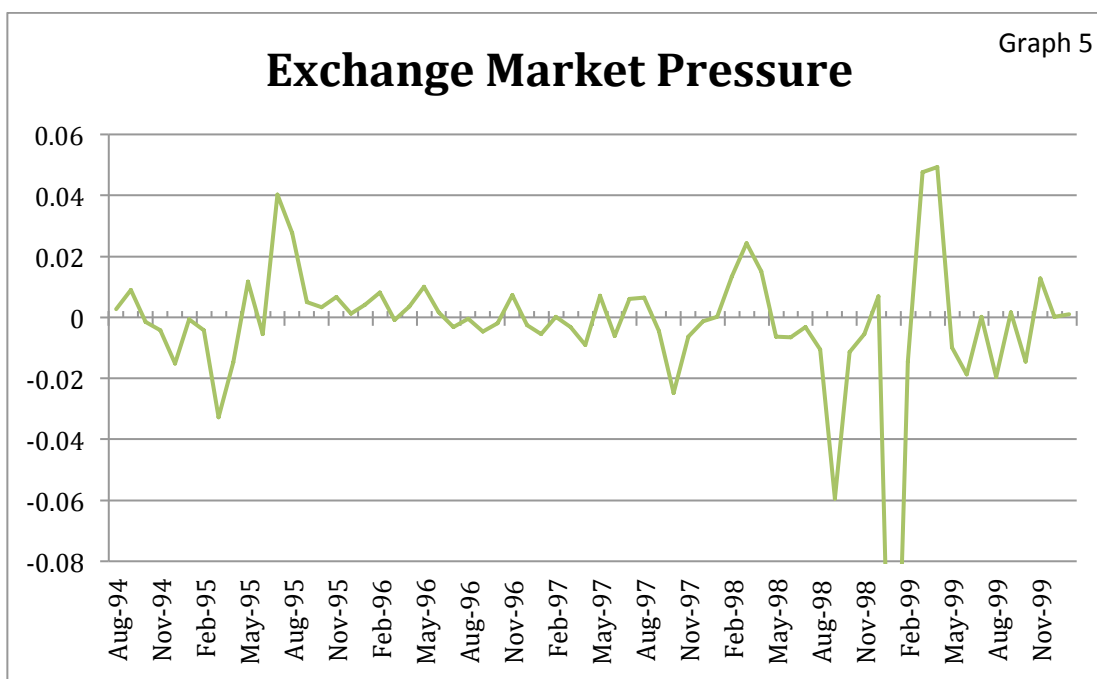
Both interest payments and public debt remained relatively stable until mid-1997. Public debt only had a 3.6% increase relative to GDP between October 1995 and October 1997. During this time period, interest payments relative to GDP

fluctuated but largely stayed between 0-3% of GDP. However, after the Asian financial crisis caused the SELIC interest rate to spike in October 1997 from 19.9% to 45.9%, both interest payments and public debt began increasing more rapidly. In the year leading up to the crisis, the public debt rose from the equivalent of 15.5% of GDP in October 1997 to 23.3% in December 1998. Interest payments also increased rapidly from 1.0% of GDP in October 1997 to 7.32% of GDP a year later.

As interest payments constituted 71% of public debt variation, such a rapid increase in interest payments must have contributed significantly to the increase in the public debt (Bevilaqua 2000). This becomes especially evident during the crisis period in January 1999 when interest payments spiked to the equivalent of 58% of GDP. This is due to a combination of high interest rates (31.2%) and rapidly falling bond maturity, up to the point where 70% of bonds were zero-duration bonds (Bevilaqua 2000). The constant bond turnover meant that a lot of debt was maturing and had to be rolled over at increasingly high interest rates, causing an increase in public debt from 23.3% of GDP in December to 30.0% of GDP in January. While a portion of this increase can be explained by the devaluation, foreign-currency denominated debt only constituted 30% of all debt. Therefore, although a portion of the rapid increase was due to the devaluation, a significant portion was due to the rapid increase in interest payments. This suggests that high interest payments due to high interest rates and declining maturity contributed significantly to the increase in government debt during the period.

Second, as explained above, an exchange market pressure (EMP) index was developed in order to demonstrate how changes in international reserves reflected

pressure on the exchange rate to appreciate or depreciate, as seen below in Graph 5. On this graph, negative values represent downward pressure on the exchange rate and positive values represent upward pressure. As changes in international reserves are the result of changes in supply and demand for Reais, it presents a picture of how investors changed their assessment of the Real during the *Plano Real* period. The EMP index also includes the changes in exchange rate, reflecting the gradual appreciation of the exchange rate and its effect on exchange market pressure.



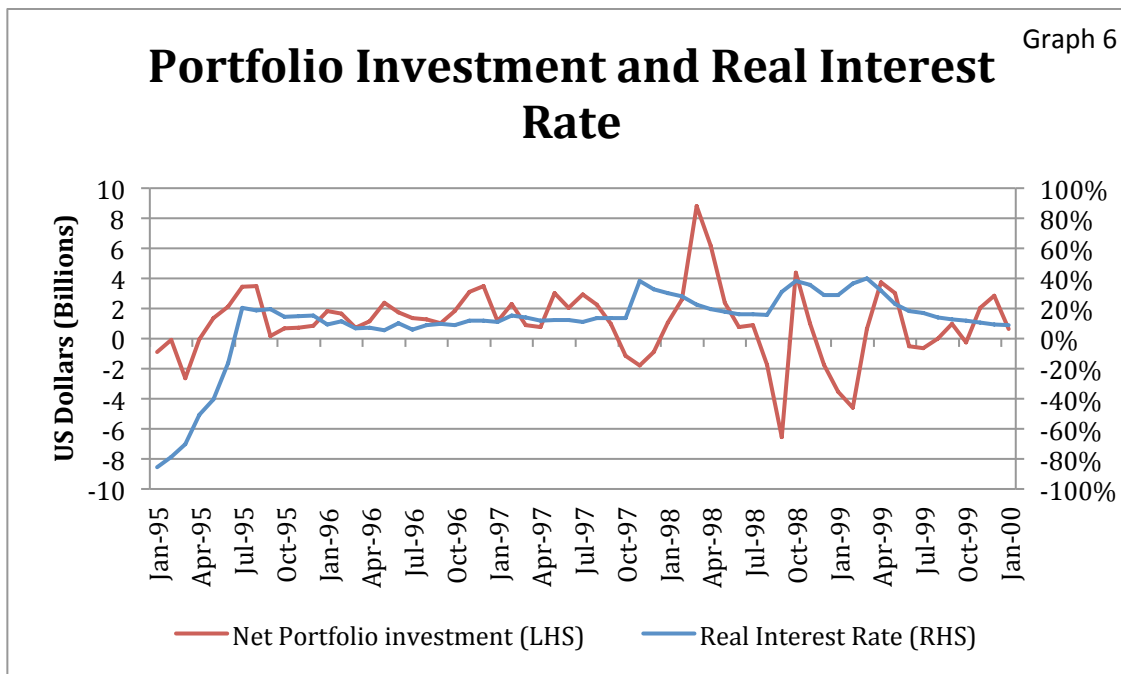
This graph reflects the three main crisis periods when investors were most fearful about a Brazilian devaluation. In early 1995, the Mexican Peso crisis created a crisis of confidence in other emerging markets, especially those with a fixed-exchange rate regime. Foreign investors sold Reais and foreign reserves declined by

\$7 billion in the first four months of 1995, creating downward pressure on the Real. This pressure was reflected in changes to exchange rate policy that tightened the crawling peg band and the depreciation of the exchange rate from .84 BRL/USD to .91 BRL/USD (Independent Evaluation Office). As the Central Bank raised interest rates, investors bought Reals and foreign reserves returned to the Central Bank creating upward pressure on the Real. The same pattern is observed in the aftermath of the Asian financial crisis as foreign investors flee causing downward pressure on the exchange rate before high interest rates create upward pressure. Almost immediately after the recovery from the Asian crisis, the Russian crisis caused renewed downward pressure. Although Brazil survived the initial speculative attack on the Real after the Russian crisis, in January the increased debt problems plaguing Brazil and especially the announced default of Minas Gerais caused another speculative attack resulting in the extreme downward pressure on the Real that caused the devaluation.

This graph helps demonstrate two things. First, the downward pressure caused by the Russian crisis was substantially more than the previous crises, reflecting increased investor skepticism over the ability of the Central Bank to maintain the exchange rate peg. As Brazil became increasingly indebted, more and more investors feared that there were major macroeconomic imbalances in the Brazilian economy. Second, the graph shows the relative stability of the exchange rate during non-crisis periods. Without external pressure, most investors had no reason to fear a substantial devaluation. However, during crisis periods the

exchange market pressure grew substantially, reflecting fears increased that reliance on external financial markets would result in Brazil devaluing.

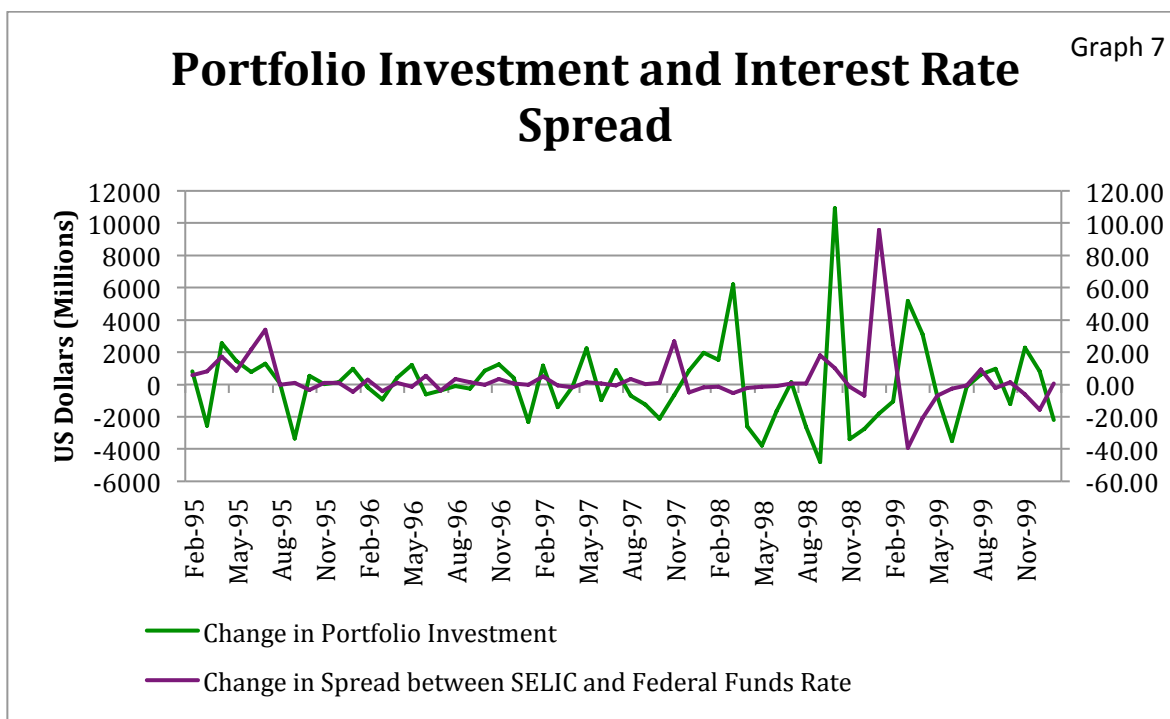
Third, the relationship between portfolio investment and interest rates was examined. The Brazilian government used interest rates in order to attract the necessary investment to finance the current account deficit that resulted from having an overvalued exchange rate. While the relatively high interest rate created distortions in the economy as seen in the increasing debt in Graph 4 above, it was absolutely necessary to maintaining the *Plano Real* system. Graph 6 below tracks portfolio investment (beginning in 1995, the first year available) and the real interest rate during the *Plano Real* period. The real interest rate was calculated by taking each month's nominal interest rate and dividing out the month's inflation rate. Therefore, the negative real interest rate initially is the result of inflation in the first half of 1994 causing year-on-year inflation for the first few months of 1995 to be quite high.



As can be seen, the real interest rate remained relatively low and stable after the initial price changes of the *Plano Real* and the shock of the Mexican Peso crisis. Portfolio investment varied substantially during this period due to changes in supply and demand, but tended to fluctuate around a mean of \$1.77 billion net capital inflow. With the Asian financial crisis, net capital inflows of portfolio investment reversed to a net capital outflow of \$1.77 billion. Interest rates responded by increasing from 19.9% to 45.9%. After this large increase in interest rates, investors returned to Brazil resulting in the largest capital inflows of the entire period, up to \$8.8 billion in March 1998. The Central Bank slowly lowered interest rates until the Russian crisis in October caused massive capital outflows again. The central bank increased interest rates again up to 41.6% but despite an initial recovery, investment continued to leave Brazil during and after the devaluation. This time, the central bank had to retain relatively high interest rates to control possible inflation and attract investment until the crisis abated around May 1999. This demonstrates a reactive interest rate policy that was ineffective at controlling the level of portfolio investment but fairly effective at reversing capital outflows. Although the interest rate was not enough to prevent the massive swings in portfolio investment during crisis periods, it was used to attract the necessary investment after the crises.

The relationship between portfolio investment and changes in the spread between domestic interest rates and global interest rates was also examined as seen in Graph 7. According to the interest rate parity theory, an increase in the difference between domestic interest rates and global interest rates should cause capital to

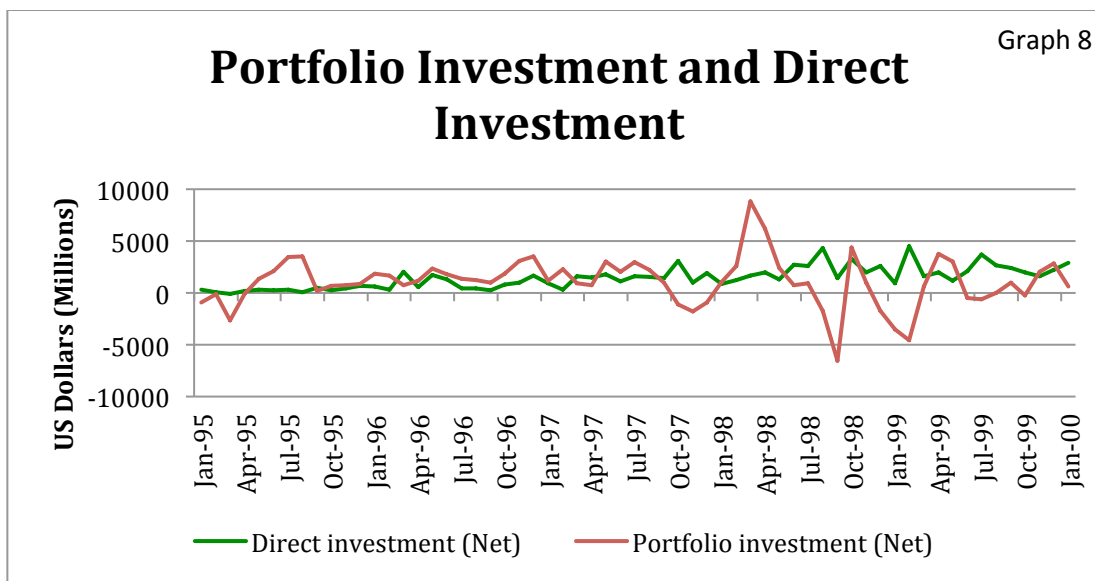
move to the domestic market as more investors take advantage of the interest rate differential. For the global interest rate the U.S. federal funds rate was used, a good indicator of the base interest rate globally.



There was not much if any correlation between changes in portfolio investment and changes in the spread. When a regression analysis of the two variables was conducted, there was a negative correlation of only -0.16, not enough to be statistically significant. When examining the graph there are some instances of increases in portfolio investment following an increase in the spread but in many instances the two variables move in opposite directions. The lack of correlation suggests that foreign investors did not react solely to the interest rate differential. In fact, investors were pulling out of all emerging markets during the crises even as

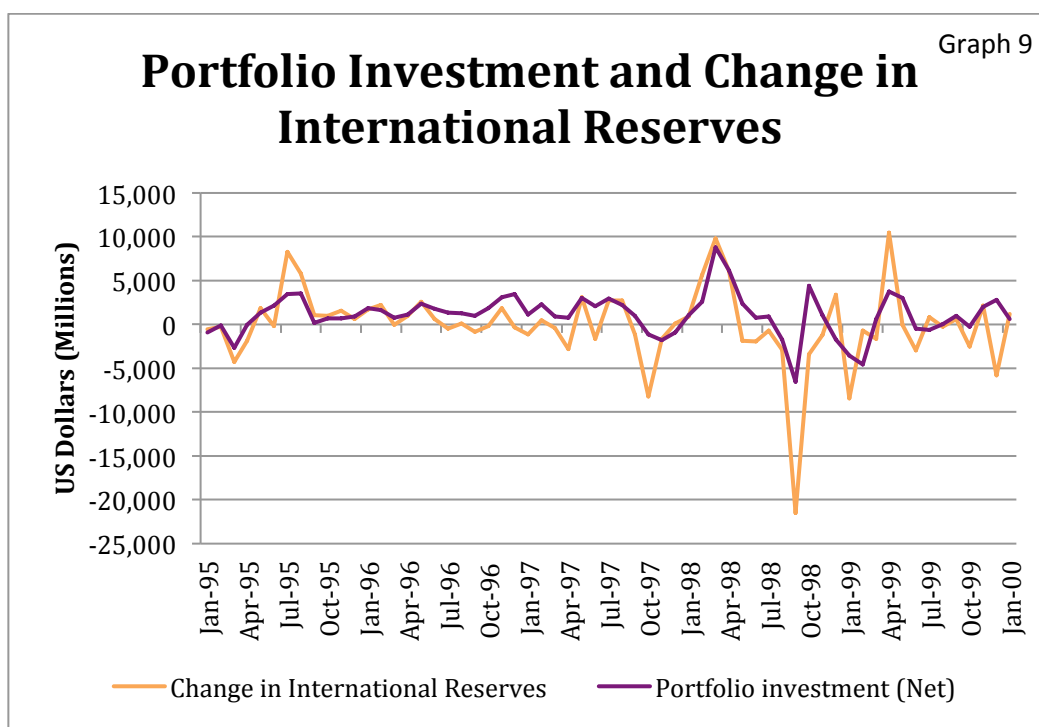
Brazil raised interest rates. Instead, these investors were trying to cover their losses and even though US interest rates were lowered during the Brazilian crisis, they were considered a much safer investment. Therefore the relative stability of emerging economies, including Brazil, had just as much of an effect as interest rates.

Fourth, portfolio investment was compared with direct investment and both were compared with international reserves. As explained in the historical overview, portfolio investment should be more volatile and FDI more stable because portfolio investment is far easier to liquidize in crisis periods. The volatility of portfolio investment compared to FDI can be seen below in Graph 8. During the *Plano Real* period, portfolio investment had a standard deviation of \$2.3 billion, more than twice the \$1.1 billion standard deviation of FDI. The graph also demonstrates the steady growth in direct investment throughout the *Plano Real* period and the increase in portfolio investment volatility after the Asian financial crisis. After July 1997, the standard deviation of portfolio investment increased from \$1.3 billion to \$3.0 billion while it only increased for FDI from \$609 million to \$930 million.



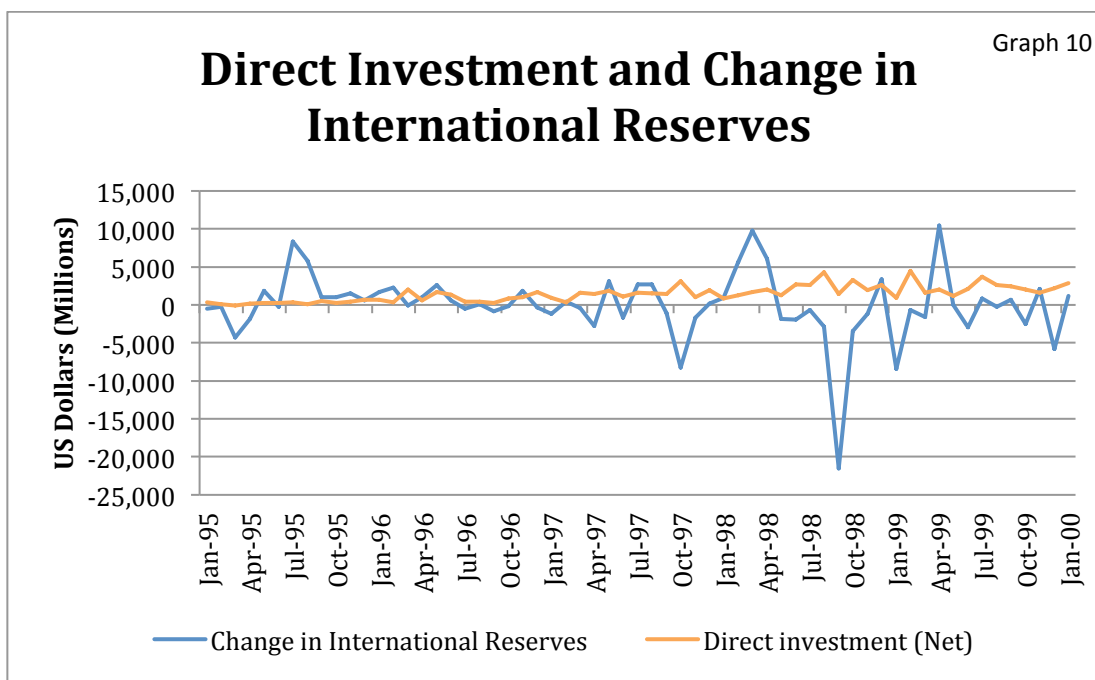


This difference in volatility is especially important considering the effect that changes in the financial account have on international reserves. In Graph 9 below, we can see that almost all of the large changes in international reserves were largely due to changes in portfolio investment. When a regression analysis was run of this data there was a correlation coefficient of 0.69, demonstrating a strong correlation between the changes in reserves and portfolio investment.



The strength of this correlation is especially apparent when compared to foreign direct investment, as seen in Graph 7 below. In this case, foreign direct investment remained consistently positive even during times of large losses in foreign reserves. When a regression analysis was run there was a very small negative correlation of -0.12. This suggests that changes in foreign direct investment

had little effect on the overall composition of foreign reserves. In fact, foreign direct investment remained positive and relatively high during downward spikes in foreign reserves, suggesting that strong foreign direct investment might have been a counter force to the outflows of portfolio investment in maintaining the stock of foreign reserves. Without foreign direct investment, the losses to foreign reserves may have been even worse.



Taking this data analysis together, we get a more complete view of how investors reacted to different crisis periods and the effect on the Brazilian economy. While foreign direct investment grew and remained relatively stable through the period, portfolio investment varied wildly in response to international crises as Brazil became more exposed to the international economy. These swings in

portfolio investment caused large changes in the stock of foreign reserves that resulted in upward and downward pressure on the exchange rate. The changes in portfolio investment also resulted in reactive changes to the interest rate. As portfolio investment declined during the Asian financial crisis, the central bank raised interest rates, resulting in increased interest payments as the maturity of bonds got shorter. This correlated with an increase in public debt relative to GDP, which many investors took as a sign of economic mismanagement, increasing the risk of devaluation or default. With the Russian crisis, portfolio investment left the country causing international reserves to fall and subsequently forcing Brazil to devalue its currency rather than lose its entire stock of reserves. This demonstrates the importance of portfolio investment to the Brazilian devaluation. Because Brazil was so reliant on foreign investment to finance its balance of payments, such large fluctuations proved dangerous and ultimately caused the devaluation first by driving up interest rates which created an unstable macroeconomic environment and second by depleting the stock of foreign reserves.

### **Mundell-Fleming and the *Plano Real***

While Brazil did not have fixed exchange rate but rather a crawling peg, the two systems are similar enough in the short-run that we can analyze Brazil's economic policies through the Mundell-Fleming framework. First, the model predicts that Brazil would only remain stable if it is able to use monetary policy to absorb all changes in the money supply due to capital movements (Sanders 2008). Brazil was fairly successful at sterilizing its foreign exchange operations through most of the *Plano Real* period and even gained \$31 billion in foreign reserves prior

to the crisis wiping out all of these gains. Still, when Brazil was no longer able to absorb the changes in the money supply by selling foreign currency, the country could no longer maintain its fixed exchange rate system.

Second, Mundell-Fleming predicts that increases in government spending relative to GDP should increase interest rates (Sanders 2008). There was no direct correlation found between the increase in government debt and the changes in interest rates, possibly due to a shift away from fixed-rate debt (Independent Evaluation Office 2003). Still, during the devaluation the government was not able to raise interest rates enough to stop capital outflows due to budget constraints. While this is a reversal of traditional Mundell-Fleming logic, it still demonstrates the effect of large government spending on the interest rate by essentially imposing a ceiling. In addition, the drop in maturity preceding the crisis shows that investors were increasingly wary of the high government debt. This drop in maturity reflects the change in demand for money in the same way the increase in interest rate functions in a traditional Mundell-Fleming model.

Third, Mundell-Fleming uses the interest rate differential between domestic and international rates to explain changes in capital flows. According to the model, the balance of payments results due to the difference between the global interest rate and the interest rate as determined by the supply and demand of money within the domestic system (Sanders 2008). According to the theory of interest rate parity, this difference should cause capital to flow into countries with a higher than global interest rate. This is fairly evident in Brazil as investors flooded in during most of the period to take advantage of relatively high interest rates. However the model

does not take into account risk and therefore cannot capture the large shifts of portfolio investment that happened during the emerging markets crisis. As graph 4 above shows, portfolio investment did not change to take advantage of changes in the interest rate spread when the changes were largely due to an increase in risk. Therefore changes in the global macro-economy also have a substantial effect on capital flows.

Finally, Mundell-Fleming does not directly address how a crawling peg system would function. Still, the constant depreciation of the exchange rate should slowly decrease the financial account. While this is not evident in Brazil, it's impossible to know what the effect would have been without this slow depreciation providing downward pressure on the financial account. However, the model predicts that the extreme capital movements seen during the *Plano Real* would have been even greater without the slow depreciation of the exchange rate. Eliana Cardoso (2001) takes the opposite opinion stating that, "With free capital flows, there are two exchange rate regimes that are compatible with a crisis-free environment in a recently stabilized emerging economy: a genuinely floating exchange rate that transfers the exchange rate risk to private portfolios, or a target exchange rate that unquestionably avoids real appreciation. Brazil had neither." She explains that by having a crawling peg system, Brazil did not have the credibility of an entirely fixed-exchange rate regime. This made it more vulnerable to external shocks as investors speculated against the currency in times of crisis.

However, Cardoso's interpretation ignores the far worse devaluations of fixed-exchange rate economies like Mexico in 1994 and Thailand in 1997. Instead it

seems likely that fixed-exchange rate economies are inherently vulnerable to investor speculation, as investors will pull out of a country if they expect to have their investments devalued. If this is true, then downward pressure on the financial account from a slowly depreciating domestic currency should help reduce the chance of a crisis by creating less fear of a large devaluation. It could also help reduce the severity of a crisis after a devaluation by limiting the amount of macroeconomic adjustment necessary to reflect new prices.

### **Conclusion**

The *Plano Real* was a transformational time for the Brazilian economy. After years of high inflation, Brazil was finally able to achieve stable prices for a sustained period of time. Price stability and an artificially high exchange rate led to increased investment in Brazil, tying it closer to the global economy. In many ways, Brazil became a global economic player in the 1990s as it reduced barriers to investment and trade. It privatized many of its major industries and deregulated others, allowing market forces to play a larger role in the national economy. The *Plano Real* eliminated the inflationary pressures that discouraged foreign investment and trade, therefore playing a central role in encouraging liberalization and the opening of the Brazilian economy.

Of course, a more open economy is also more exposed to changes in the global economy. The *Plano Real's* fixed exchange rate regime made the country vulnerable to external shocks by relying on foreign investment to finance its balance of payments. While this helped increase foreign reserves during the boom years, when capital flows reversed themselves Brazil had to sell its foreign reserves *en*

*mass*. When crises hit in back-to-back years in 1997 and 1998, Brazil could not sustain the artificially high exchange rate.

Still, although the devaluation caused economic pain in the short-run, Brazil was able to recover relatively quickly. Although the quick recovery is in large part due to rapid inflation-targeting actions by the central bank and a financial system insulated from currency mismatches, Brazil's attempts to prevent a crisis during the *Plano Real* period helped ensure the crisis was not terrible. It tried to implement capital controls that had some limiting effects on short-term capital inflows. The Brazilian government worked hard to attract foreign domestic investment that improved productive capacity and provided a cushion of foreign capital inflows during crisis periods. The gradual depreciation of the exchange rate probably prevented greater macroeconomic adjustment.

Many economists have speculated at how Brazil could have avoided the devaluation. Although most economists now agree that Brazil should have allowed for a faster pace of devaluation during the time of economic stability between the Mexican crisis and Asian crisis, there was a limited time frame for this devaluation and it would have been impossible to predict the twin crises of 1997 and 1998 (Kregel 1999). It also should have engaged in better fiscal management to prevent the growth in debt, but once again it is far easier to say this in retrospect without having to deal with the institutional and constitutional constraints of Brazil (Independent Evaluation Office 2003). Overall, Brazil managed the economic imbalances that result from a quasi-fixed exchange rate regime relatively well. They

were able to use an exchange rate anchor to bring down perpetually high inflation rates without paying serious consequences.

Now, with Brazil quickly becoming a global economic power and hyperinflation now a thing of the past, it is hard to say that the economic hiccup of devaluation was not worth defeating Brazil's inflationary demons. Although Brazil could have adopted inflation targeting and implemented the necessary fiscal adjustment in 1994, we will never know if the entrenched interests in the Brazilian congress would have allowed this method or even if it would have succeeded at stopping hyperinflation (F Cardoso 2006). In true Brazilian fashion, although the method was unorthodox and there were a few unforeseen problems along the way, the *Plano Real* worked.



### Bibliography

- Alves, Antonio J, Jr. and Luiz FR De Paula. 2000. "External Financial Fragility and the 1998-1999 Brazilian Currency Crisis." *Journal of Post Keynesian Economics*. 22(4):589-617. Available from: <http://www.jstor.org/stable/4538703>
- Amann, Edmund. 2000. "The Illusion of Stability: The Brazilian Economy Under Cardoso." *World Development*. 28(10): 1805-1819. Available from: <http://www.sciencedirect.com/science/article/pii/S0305750X00000589>
- Averburg, Andre. 2002. "The Brazilian Economy in 1994-1999: From the Real Plan to Inflation Targets." *The World Economy*. 25(7):925-944. Available from: [http://www.researchgate.net/publication/4920945\\_The\\_Brazilian\\_Economy\\_in\\_1994-1999\\_From\\_the\\_Real\\_Plan\\_to\\_Inflation\\_Targets](http://www.researchgate.net/publication/4920945_The_Brazilian_Economy_in_1994-1999_From_the_Real_Plan_to_Inflation_Targets)
- Baer, Werner. 2001. *The Brazilian Economy: Growth and Development*. Westport, C.T.: Praeger Publishing.
- Bevilaqua, Alfonso S and Márcio GP Garcia. 2000. "Debt Management in Brazil: Evaluation of the Real Plan and Challenges Ahead." *World Bank*. Available from: <http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-2402>
- Bulmer-Thomas, Victor. 1999. "The Brazilian Devaluation: National Responses and International Consequences." *International Affairs*. 75(4):729-741. Available from: <http://www.chathamhouse.org/sites/default/files/public/International%20Affairs/Blanket%20File%20Import/inta105.pdf>
- Campa, Jose M, PH Kevin Chang, and James F Refalo. 2002. "An Options-Based Analysis of Emerging Market Exchange Rate Expectations: Brazil's Real Plan, 1994-1999." *Journal of Development Economics*. 69(1):227-253.
- Cardoso, Eliana. 2001. "Brazil's Macroeconomic Policies and Capital Flows in the 1990s." In *Short-term Capital Flows and Economic Crises*, edited by Stephany Griffith-Jones, Manuel F Montes and Anwar Nasution, 173-198. New York, NY: Oxford University Press.
- Cardoso, Fernando and Brian Winter. 2006. *The Accidental President of Brazil: A Memoir*. New York, NY: PublicAffairs.
- Central Bank of Brazil. 2014. "Time Series Management System." Available from: <https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries>
- Chinn, Menzie D. 2006. "The (Partial) Rehabilitation of Interest Rate Parity in the Floating Rate Era." *Journal of International Money and Finance*. 25(1):7-21. Available from: <http://www.sciencedirect.com/science/article/pii/>

S0261560605000975

- Da Fonseca, Manuel AR. 1998. "Brazil's Real Plan." *Journal of Latin American Studies*. 30(3):619-639. Available from: [http://keats.kcl.ac.uk/pluginfile.php/731599/mod\\_resource/content/1/Fonseca%20\\_%20Real%20Plan.pdf](http://keats.kcl.ac.uk/pluginfile.php/731599/mod_resource/content/1/Fonseca%20_%20Real%20Plan.pdf)
- De Paula, Luiz F and Fernando Ferrari-Filho. 2003. "The Legacy of the Real Plan and an Alternative Agenda for the Brazilian Economy." *Investigación Económica*. LXII(244):57-92. Available from: <http://www.redalyc.org/articulo.oa?id=60124402>
- ECLAC. 1998. "Foreign Investment in Latin America and the Caribbean." *Economic Commission for Latin America and the Caribbean*. 145-193. Available from: <http://www.eclac.org/publicaciones/xml/2/4262/lcg2042i.pdf>
- Ferrari-Filho, Fernando. 2001. "The Legacy of the Real Plan: A Stabilization without Economic Growth?" *Federal University of Rio Grande do Sul*. Available from: [http://www.ufrgs.br/ppge/pcientifica/2001\\_06.pdf](http://www.ufrgs.br/ppge/pcientifica/2001_06.pdf)
- Fishlow, Albert. 2011. *Starting Over: Brazil Since 1985*. Washington, DC: The Brookings Institution.
- Franco, Gustavo HB. 2000. "The Real Plan and the Exchange Rate". *Essays in International Finance*. No. 217. Princeton, NJ: Princeton University.
- Frieden, Jeffrey and Ernesto Stein. 2001. *The Currency Game: Exchange Rate Politics in Latin America*. Washington, DC: Inter-American Development Bank.
- Garcia, Márcio GP. 1996. "Avoiding Some Costs of Inflation and Crawling Toward Hyperinflation: The Case of the Brazilian Domestic Currency Substitute." *Journal of Development Economics*. 51:139-159. Available from: [http://www.economia.puc-rio.br/mgarcia/Papers/avoiding\\_costs\\_of\\_inflation.pdf](http://www.economia.puc-rio.br/mgarcia/Papers/avoiding_costs_of_inflation.pdf)
- Giavazzi, Francesco, Ilan Goldfajn and Santiago Herrera. 2005. *Inflation Targeting, Debt, and the Brazilian Experience, 1999 to 2003*. Cambridge, MA: MIT Press.
- Goldfajn, Ilan and Eliana Cardoso. 1997. "Capital Flows to Brazil: The Endogeneity of Capital Controls." *Working Paper of the International Monetary Fund*. Available from: <http://www.imf.org/external/pubs/ft/wp/wp97115.pdf>
- Hall, Stephen, Amangeldi Kenjegaliev, PAVB Swamy and George S Tavlas. 2013. "Measuring Currency Pressures: Cases of the Japanese Yen, the Chinese Yuan, and the UK Pound." *University of Leicester Working Paper*. 13(10). Available from: <http://www.le.ac.uk/ec/research/RePEc/lec/leecon/dp13-10.pdf>

- IBGE. 2014. "Multidimensional Statistical Database." *Brazilian Institute of Geography and Statistics*. Available from: <https://www.bme.ibge.gov.br/app/adhoc/index.jsp>
- IMF. 2006. "De Facto Classification of Exchange Rate Regimes and Monetary Policy Framework." Available from: <https://www.imf.org/external/np/mfd/er/2006/eng/0706.htm>
- Independent Evaluation Office of the IMF*. 2003. "The IMF and Recent Capital Account Crises: Indonesia, Korea, Brazil." 120-144. Available from: <http://www.ieo-imf.org/ieo/files/completedevaluations/07282003Bra.pdf>
- Kregel, JA. 1999. "Was There an Alternative to the Brazilian Crisis?" *Brazilian Journal of Political Economy*. 19(3):23-38. Available from: <http://cas.umkc.edu/econ/economics/faculty/kregel/Econ%20512/Winter2004/Readings/Kregel%201999c.pdf>
- Medialda, Bibiana. 2013. "Brazil: an Economy Caught in a Financial Trap (1993-2003)." *Brazilian Journal of Political Economy*. 33(3):427-445. Available from: <http://www.scielo.br/pdf/rep/v33n3/v33n3a04.pdf>
- Ministry of Development, Industry and Foreign Trade*. 2002. "Privatization in Brazil." Available from: [http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes\\_en/Galerias/Download/studies/priv\\_brazil.pdf](http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_en/Galerias/Download/studies/priv_brazil.pdf)
- Petras, James F and Henry Veltmeyer. 2003. *Cardoso's Brazil: A Land for Sale*. Lanham, MD: Rowman and Littlefield.
- Purcell, Susan K and Riordan Roett. 1997. *Brazil Under Cardoso*. Boulder, CO: Lynne Rienner Publishers.
- Sanders, Nick. 2008. "The Mundell-Fleming Model in the Small Open Economy." *UC Davis Graduate Department of Economics*. Available from: [http://njsanders.people.wm.edu/101/Ch12\\_Handout.pdf](http://njsanders.people.wm.edu/101/Ch12_Handout.pdf)
- Ter-Minassian, T, L Perez, T Alleyne, G Justice, R Zandamela, U Fasano and G Sensenbrenner. 1998. "Brazil: Recent Economic Developments." *IMF Staff Country Report*. 98(24). Available from: <http://www.imf.org/external/pubs/ft/scr/1998/cr9824.pdf>
- Valpassos, Marcus VF and Márcio GP Garcia. 2000. "Capital Flows, Capital Controls, and Currency Crisis: The Case of Brazil in the 1990s." In *Capital Flows Capital Controls and Currency Crises: Latin America in the 1990s*, edited by Felipe Larraín, 143-168. Ann Arbor, MI: University of Michigan.

**Appendix A: Formulas**

Exchange Market Pressure Index:

$$(\text{Change in Intern. Reserves})/(\text{Money Supply})-(\text{Change in Log(Exchange Rate)})$$

Real Interest Rate:

$$((1+\text{Nominal Interest Rate})/(1+\text{Inflation Rate}))-1$$

Spread between SELIC and Federal Funds:

$$((1+\text{Real Interest Rate})/(1+\text{Federal Funds Rate}))-1$$

### Appendix B: Data

All data is for end of period. All USD amounts are in millions.

	SELIC Rate	Exchange Rate USD	Money Supply M1 BRL	Current Account USD	Financial Account USD
Jan-94	7065.02	458.66	2,788,455,000	495.1	
Feb-94	13442.03	637.45	4,274,863,000	-193.9	
Mar-94	7784.35	913.345	5,299,764,000	31.1	
Apr-94	15710.86	1,302.28	7,731,705,000	487.5	
May-94	8784.03	1,875.27	11,600,945,000	598.8	
Jun-94	13532.65	2,750.00	20,531,931,750	-96.1	
Jul-94	122	0.94	10,687,238	792.2	
Aug-94	56.46	0.889	12,901,778	918.9	
Sep-94	57.06	0.853	15,844,246	264.7	
Oct-94	56.57	0.846	16,735,495	-1606.8	
Nov-94	65.36	0.845	17,825,475	-1495.6	
Dec-94	53.25	0.846	22,772,664	-2007.1	
Jan-95	46.25	0.842	18,217,441	-1382	834.3
Feb-95	56.54	0.8515	19,885,525	-2029.4	1,308.20
Mar-95	57.98	0.896	17,082,321	-2219.6	-2,077.00
Apr-95	85.47	0.913	17,141,943	-2847.6	388.4
May-95	61.05	0.906	16,077,908	-1422.2	2,822.00
Jun-95	60.84	0.922	17,621,988	-2293.4	2,107.20
Jul-95	60.53	0.936	17,878,924	-1122.2	8,564.90
Aug-95	51.11	0.951	17,775,620	-678.7	6,286.60
Sep-95	51	0.954	19,068,611	-542.8	1,678.80
Oct-95	44.11	0.9619	19,754,622	-1916.9	2,067.70
Nov-95	42.93	0.9666	21,912,091	-786.3	2,648.20
Dec-95	41.22	0.9725	28,492,903	-1142.7	2,114.50
Jan-96	33.83	0.9786	23,481,820	-1248.3	3,272.10
Feb-96	36.11	0.9842	23,095,259	-657.1	3,752.90
Mar-96	30.16	0.988	22,985,492	-1533.1	1,549.10
Apr-96	29.42	0.9925	23,276,407	-1714.7	2,590.90
May-96	25.64	0.9984	22,761,723	-909.6	3,297.10
Jun-96	29.65	1.0044	23,513,221	-1590.1	2,236.20
Jul-96	23.28	1.0112	23,107,137	-2380.7	2,105.30
Aug-96	25.01	1.0169	23,477,144	-1248.2	1,361.20
Sep-96	25.4	1.0215	25,143,255	-2152.9	994.2
Oct-96	23.48	1.0276	23,171,129	-3759.9	4,716.40
Nov-96	25.27	1.0332	24,383,240	-2010.7	4,143.30
Dec-96	23.94	1.0394	29,807,483	-4296.6	3,495.50
Jan-97	21.73	1.0461	33,123,796	-421.5	-354.8
Feb-97	26.14	1.0515	36,236,904	-2028.5	3,467.10

Mar-97	24.11	1.0593	37,448,610	-2205.5	1,918.40
Apr-97	21.84	1.0638	36,298,117	-3755.8	1,488.20
May-97	21.91	1.0717	36,860,743	-1583.2	5,159.30
Jun-97	21.08	1.0769	37,841,978	-2432.2	1,489.90
Jul-97	19.04	1.0834	35,906,316	-3072.5	4,492.70
Aug-97	20.78	1.0916	37,775,700	-1726.1	5,114.00
Sep-97	19.81	1.0964	39,116,753	-2403.6	1,041.10
Oct-97	19.93	1.1031	39,284,420	-3805.1	-4,525.60
Nov-97	45.9	1.1098	40,023,882	-3221.4	2,327.00
Dec-97	39.87	1.1164	47,362,722	-3797	3,790.50
Jan-98	37.19	1.1237	42,619,626	-2174.7	4,676.20
Feb-98	34.32	1.1304	42,820,595	-1508.8	6,322.40
Mar-98	28.32	1.1374	41,922,152	-2424.8	12,413.90
Apr-98	25.16	1.1443	42,274,904	-2837.1	10,195.00
May-98	22.6	1.1505	42,502,086	-2042.8	1,237.30
Jun-98	21.02	1.1569	44,060,070	-2465.3	1,809.70
Jul-98	20.33	1.1634	43,981,738	-2039.7	-585
Aug-98	19.23	1.1769	44,308,331	-1778.3	443.4
Sep-98	34.29	1.1856	43,933,681	-4837.2	-16,656.90
Oct-98	41.58	1.1932	43,031,345	-4959.3	1,872.20
Nov-98	38.73	1.2012	46,117,494	-2685.7	1,616.40
Dec-98	31.24	1.2087	50,707,266	-3662.2	6,036.70
Jan-99	31.19	1.9832	49,957,188	-2425	-5,379.40
Feb-99	38.97	2.0648	47,817,257	-1024.9	413
Mar-99	43.25	1.722	45,497,048	-2037.1	-310.9
Apr-99	36.12	1.6607	44,075,657	-2620.2	13,000.30
May-99	27.11	1.724	44,052,226	-1567.6	1,825.20
Jun-99	22.01	1.7695	45,939,541	-2925.6	751.9
Jul-99	20.74	1.7892	48,011,511	-1568.9	2,890.10
Aug-99	19.51	1.9159	47,508,989	-2001	1,261.60
Sep-99	19.38	1.9223	46,988,943	-1359.6	1,779.50
Oct-99	18.91	1.953	48,580,640	-2487	-252.2
Nov-99	18.95	1.9227	51,580,026	-2319	3,585.40
Dec-99	18.99	1.789	62,744,441	-2998.9	-2,583.20
Jan-00	18.94	1.8024	56,633,254	-913.9	3,525.00

	Direct investment Net USD	Portfolio investment Net USD	International Reserves USD	GDP USD	Net Public Debt USD
Jan-94			35390	40,276	43,150.20
Feb-94			36542	39,200	44,234.84
Mar-94			38282	43,439	44,074.67
Apr-94			38289	41,646	57,440.27
May-94			41408	43,466	56,798.78
Jun-94			42881	44,209	59,869.22
Jul-94			43090	45,263	72,682.38
Aug-94			42981	48,277	75,229.80
Sep-94			43455	48,663	77,408.24
Oct-94			42845	50,480	76,945.79
Nov-94			41937	50,160	77,682.88
Dec-94			38806	48,009	78,004.98
Jan-95	333	-901.5	38278	60,155	77,707.90
Feb-95	95.9	-98.6	37998	58,937	80,409.26
Mar-95	-88.8	-2,636.30	33742	64,850	79,750.13
Apr-95	164.3	-57.5	31887	63,576	78,997.47
May-95	299.9	1,373.90	33731	63,740	78,188.93
Jun-95	252.3	2,134.20	33512	64,547	82,447.91
Jul-95	318	3,431.30	41823	64,725	84,115.92
Aug-95	92.6	3,507.80	47660	65,884	82,675.29
Sep-95	476.8	172.7	48713	65,823	84,874.39
Oct-95	241.3	699	49694	67,435	87,014.90
Nov-95	442.7	717.4	51257	67,634	88,970.21
Dec-95	681.4	874.4	51840	63,043	93,058.47
Jan-96	644.9	1,842.50	53540	63,000	94,257.85
Feb-96	305.4	1,674.50	55794	63,660	95,673.35
Mar-96	2,026.80	740.9	55753	67,657	92,839.70
Apr-96	584.4	1,148.80	56769	67,748	96,546.34
May-96	1,710.50	2,366.90	59394	70,237	104,868.09
Jun-96	1,329.20	1,765.40	59997	68,864	112,006.51
Jul-96	465.9	1,377.10	59521	73,334	114,270.33
Aug-96	433.5	1,262.20	59643	75,073	115,856.34
Sep-96	239.6	1,007.10	58775	73,883	116,720.60
Oct-96	827.5	1,847.00	58600	74,672	118,719.53
Nov-96	1,012.10	3,089.70	60471	73,057	120,990.03
Dec-96	1,680.90	3,496.80	60110	69,083	123,640.75
Jan-97	955.6	1,159.60	58951	67,444	125,618.72
Feb-97	317.6	2,312.90	59405	66,180	126,076.68
Mar-97	1,623.70	917.8	58980	69,723	125,744.24
Apr-97	1,457.70	767	56171	71,448	126,716.81

May-97	1,820.70	3,005.70	59279	73,156	125,548.29
Jun-97	1,096.40	2,055.00	57615	73,196	121,053.72
Jul-97	1,601.70	2,943.80	60331	74,341	122,431.78
Aug-97	1,542.60	2,253.30	63056	75,612	121,243.02
Sep-97	1,420.80	997.2	61931	76,265	130,691.83
Oct-97	3,115.10	-1,129.80	53690	79,232	135,530.07
Nov-97	1,021.70	-1,767.30	52035	75,208	138,795.17
Dec-97	1,903.80	-899.4	52173	69,468	150,360.19
Jan-98	857.5	1,080.40	53103	65,186	154,792.79
Feb-98	1,254.40	2,603.90	58782	63,828	157,037.79
Mar-98	1,668.60	8,798.90	68594	69,300	156,190.11
Apr-98	2,003.80	6,189.60	74656	70,265	159,517.43
May-98	1,298.50	2,387.30	72826	72,452	162,121.46
Jun-98	2,700.80	755.7	70898	71,380	169,362.69
Jul-98	2,598.00	908.7	70210	72,782	171,286.92
Aug-98	4,303.30	-1,744.90	67333	73,340	166,313.84
Sep-98	1,434.30	-6,545.50	45811	72,870	170,078.61
Oct-98	3,289.00	4,397.40	42385	73,717	174,474.94
Nov-98	1,968.90	1,021.30	41189	71,740	188,121.71
Dec-98	2,624.50	-1,727.80	44556	67,125	191,462.65
Jan-99	920.9	-3,528.80	36136	44,830	154,114.76
Feb-99	4,505.80	-4,570.40	35457	44,042	153,984.33
Mar-99	1,599.60	625.3	33848	48,717	168,583.52
Apr-99	2,006.70	3,748.10	44315	48,739	172,996.41
May-99	1,205.10	3,019.50	44310	49,104	172,987.77
Jun-99	2,075.50	-490.6	41346	49,351	170,859.52
Jul-99	3,684.10	-620.9	42156	49,250	171,155.69
Aug-99	2,631.30	6.7	41918	50,667	165,870.96
Sep-99	2,438.90	972.9	42562	50,708	164,297.98
Oct-99	1,989.00	-231.6	40053	51,548	164,754.52
Nov-99	1,602.60	2,036.50	42175	51,011	165,668.86
Dec-99	2,228.60	2,834.80	36342	48,809	176,837.99
Jan-00	2,887.90	628.2	37560	48,380	178,617.81



	Federal Funds Rate	Year on Year Inflation Rate	Interest Payments as Percentage of GDP	Net Public Debt as Percentage of GDP
Jan-94	3.05	2477.15	-0.7	9.38
Feb-94	3.25	2693.84	-0.68	9.45
Mar-94	3.34	3035.71	3.16	9.63
Apr-94	3.56	3417.39	4.37	12.86
May-94	4.01	3828.49	2.09	12.84
Jun-94	4.25	4331.19	0.2	12.8
Jul-94	4.26	4922.46	3.34	14.73
Aug-94	4.47	4005.08	0.77	14.08
Sep-94	4.73	3044.89	0.62	13.66
Oct-94	4.76	2253.15	2.37	13.13
Nov-94	5.29	1703.17	1.18	13.02
Dec-94	5.45	1267.54	2.28	12.91
Jan-95	5.53	916.46	1.65	12.45
Feb-95	5.92	631.52	1.35	12.48
Mar-95	5.98	426.83	1.68	12.23
Apr-95	6.05	274.78	2.36	11.79
May-95	6.01	169.05	1.83	11.2
Jun-95	6.00	91.79	1.39	11.63
Jul-95	5.85	33.03	1.76	11.71
Aug-95	5.74	27.45	3.04	11.56
Sep-95	5.80	26.36	3.53	11.79
Oct-95	5.76	25.69	2.45	11.91
Nov-95	5.80	24.21	1.77	11.89
Dec-95	5.60	22.59	1.76	12.13
Jan-96	5.56	22.28	-5.23	12.07
Feb-96	5.22	21.97	3.46	12.2
Mar-96	5.31	21.99	1.26	11.93
Apr-96	5.22	20.55	3.13	12.33
May-96	5.24	19.17	2.83	13.19
Jun-96	5.27	17.49	1.52	13.88
Jul-96	5.40	16.26	0.3	14.02
Aug-96	5.22	14.84	0.37	14.17
Sep-96	5.30	14.21	1.82	14.26
Oct-96	5.24	13.26	2.76	14.46
Nov-96	5.31	12.02	2.3	14.61
Dec-96	5.29	10.75	2.91	14.65
Jan-97	5.25	9.56	0.92	14.69
Feb-97	5.19	9.39	1.14	14.65

Mar-97	5.39	8.82	1.24	14.61
Apr-97	5.51	8.99	1.69	14.69
May-97	5.50	8.58	1.51	14.53
Jun-97	5.56	7.71	1.47	13.92
Jul-97	5.52	7.02	1.99	14.11
Aug-97	5.54	6.08	1.79	14.01
Sep-97	5.54	5.59	1.21	15.03
Oct-97	5.50	5.5	1.05	15.52
Nov-97	5.52	5.42	1.37	15.9
Dec-97	5.50	5.27	1.17	17.31
Jan-98	5.56	5.22	3.96	17.93
Feb-98	5.51	4.73	4.72	18.27
Mar-98	5.49	4.69	4.6	18.17
Apr-98	5.45	4.52	5.53	18.6
May-98	5.49	3.85	4	18.9
Jun-98	5.56	3.95	5.1	19.86
Jul-98	5.54	3.41	5.06	20.24
Aug-98	5.55	3.06	5.4	19.89
Sep-98	5.51	2.55	6.96	20.51
Oct-98	5.07	2.27	7.32	21.26
Nov-98	4.83	2.05	6.24	23.02
Dec-98	4.68	1.76	4.57	23.34
Jan-99	4.63	1.65	58.66	30.01
Feb-99	4.76	1.65	6.34	30.24
Mar-99	4.81	2.24	-13.78	27.28
Apr-99	4.74	3.02	0.84	27.05
May-99	4.74	3.35	8.82	28.05
Jun-99	4.76	3.14	4.33	28.1
Jul-99	4.99	3.32	4.44	28.16
Aug-99	5.07	4.57	9.33	28.93
Sep-99	5.22	5.69	-2.5	28.43
Oct-99	5.20	6.25	2.02	28.47
Nov-99	5.42	7.5	-5.74	27.75
Dec-99	5.30	8.65	-5.4	27.26
Jan-00	5.45	8.94	1.84	27.66