"Guiding the Invisible Hand": Market Equilibrium and Multiple Exchange Rates in Brazil, 1953-1961

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This paper revisits Brazil's unique experience with Multiple Exchange Rates (MER) between 1953 and 1961, when a centralized system of foreign exchange auctions successfully managed to stabilize the balance of payments and reach macroeconomic equilibrium with decent growth rates, inflation under control and without the emerge of a black market for the exchange rate. This paper questions and expands the existing literature on that period which does not explain the reasons for the effective results during the period between 1953 and 1957, and the the causes for its decline during the later part of the decade between 1957 and 1961. Based on the analysis of a new dataset of the exchange rate market, and performing simple econometric exercises, it argues that the Brazilian MER system was effective because officials were responsive to market demand *despite* using a centralized system for foreign currency distribution. The exercises suggest a realistic response to changes in market fluctuations and a centralized regime which was in practice trying to replicate a market clearing process. The decline and eventual collapse of this effective system is explained by changes in policymaking leading to the dismantling of the original MER framework after 1957. These conclusions also contribute to the general debate about the use of capital and exchange controls during the Breton-Woods period, presenting the mechanics of a unique experiment not found anywhere else in that period.

1 – Introduction

Capital controls have been a constant topic for economic historians since the emergence of the Bretton-Woods (BW) system in 1944. Particularly for the early days of the 1950s, the shortage of dollar liquidity and the lack of currency convertibility made capital controls with the use of parallel or multiple exchange rates (MER) largely common in Europe and Latin America (Bordo, 1993; Reinhardt & Rogoff, 2002). These controls were generally not welcome by the International Monetary Fund, which was only in favor of restrictions to capital account transactions, and have also been largely seen partly as cause for the various balance of payments crisis and large currency devaluations emerging from those experiments (Magud at all, 2011; Konig, 1968;, Edwards, 1999).

This paper participates in this general debate of the instability of the Breton-Woods system[1] questioning whether exchange controls are not the cause but mostly a symptom of the large currency misbalance of that period. It does by focusing on an example of exchange controls in the form of MER which was effective to help markets in balancing the economy, a unique case during that time in Latin America (Konig, 1968). This was the case of MER in Brazil between 1953 and 1961, which imposed a singular experience of currency management where all the country imports were included in a single system of auctions of foreign exchange, allowing a controlled depreciation process with different sectorial exchange rates (Lago, 1982; Vianna, 1987; Sochazewski, 1980)

This Brazilian MER experiment is generally considered by the literature as a very successful case of currency management[2] as it was effective for at least five years to maintain a stable balance of payments, controlled inflation, decent growth rates and preventing the emergence of a black market for the exchange rate. The literature also generally considers the two different phases of that experience, when its institutional framework changed from 1953-1957 to 1957-1961, as parts of the same general experiment, with policies considered to be complementary to each other in the two periods with the objective of stimulating import substitution while maintaining a stable macro environment (Baer, 2009; Figueiredo Filho, 2005)

This paper brings a set of contributions to the existing literature[3] on this case, also shedding light on its importance for the Breton-Woods period, and focuses on the reasons behind this apparent success of the 1950s experiment. This research expands and confronts the existing analysis by both providing evidence and an explanation for why the

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1 Bordo, 1993; Reinhardt & Rogoff, 2002; Magud at all, 2011, Konig, 1968; Ikenberry, 1993; Frieden et all, 2000; Terborgh, 2003; Marston, 1993; Schlesinger, 1952

[2] [3] Kafka, 1956; Huddle, 1964; Baer, 2009; Figueiredo Filho, 2005; Lago, 1982; Vianna, 1987; Sochazewski, 1980; Bergsman, 1980; Abreu, 1990; and Caputo, 2007

system was effective during its first period, and also to explain the reasons behind its decay and collapse after 1957.

This research is based on the collection of a new database of the exchange rate market during that period in Brazil, including the allocation of foreign exchange to the various import categories as well as the resulting exchange rates. This information was collected from the annual reports of Banco do Brasil, the operator of the system, and the monthly bulletins of Sumoc, the regulatory body responsible for the multiple exchange rate experiment. This is the first time this data was collected and comprehensively analyzed.

Three new arguments are made in this paper. The first is that a central reason for the auctions system to have worked well was the concentration of imports going through the MER system rather than outside the auctions via government imports or exemptions conceived to the private sector. It will be shown that only between 1953 and 1957 the system functioned as it was properly designed, concentrating the bulk of imports of the economy and consequentially managing to effectively distribute foreign exchange for the private sector and gradually depreciate the exchanges rates.

Second, it will be shown that while Instruction 113 from Sumoc, which allowed the private sector to import capital goods as FDI, is seen by the literature also as complementary policy to the MER system, it was actually the opposite. While Instruction 113 was undoubtedly a major step to import capital goods and stimulate industrialization, it also opened space for an increase in imports outside the auctions system, since in practice it was just another way to increase imports accounting them with a positive signal in the balance of payments. From a balance of payments perspective, Instruction 113 actually contributed to the collapse of the MER system. The lacks of use of the MER system combined with the introduction of additional exceptions with Instruction 113 are the reasons behind the decay and collapse of the MER system after 1957.

The third argument is the main one of the paper and concentrates on the mechanics of the system during its effective period between 1953 and 1957. By performing simple sets of econometric tests, it can be argued that the system worked during its first phase because officials were being responsive to market demand. The allocation of foreign exchange in different categories was not random, and there are signals officials were following market fluctuations to determine how much funds to distribute to each category. By doing this, they were able to restrict imports and at the same time provide sufficient liquidity to each sector to keep macroeconomic conditions balanced.

This is the most interesting conclusion of this paper: the pure centralization of exchange rate operations was a necessary but not sufficient condition to make the system effective. By being responsive to market demand officials were able to restrict imports while the same times distribute foreign exchange to the economy without leading it to a collapse.
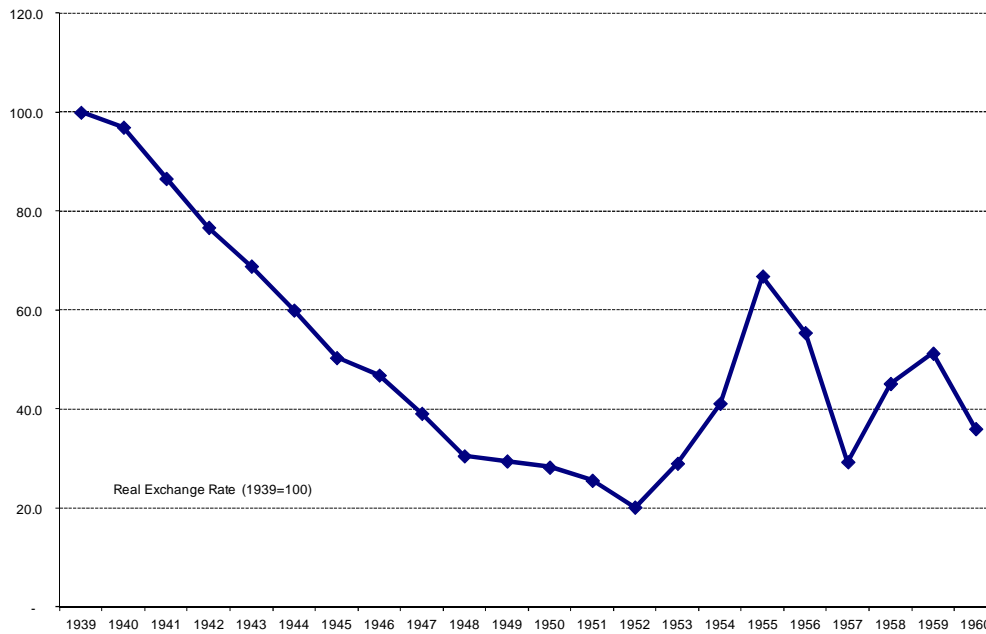
These three arguments combined explain why the early MER mechanism between 1953 and 1957 can be considered an effective system for the purpose of stabilizing the economy and is an example of capital controls being used with success in a specific condition for a short period of time. This contrasts to the second phase when the changes in policymaking, led to the exact opposite results. The paper is divided in five sections. After this introduction, section 2 presents the history of exchange rates policies in Brazil during the 1950s. Section 3 discusses the reasons for the collapse of the MER after 1957. Section 4 presents the econometric exercises that explain the mechanics behind the effective results of the MER system in its first phase. Finally, section 5 presents brief conclusions.

2. Peak and Decline of the MER auctions system

In 1945 the Brazilian currency (Cruzeiro) was fixed at its 1939 pre-war level to keep inflation under control based on the belief commodity exports (mostly coffee at that time) were inelastic to currency depreciation (Huddle, 1964). But this overvaluation and the shortage of global dollar liquidity from the first years of the Breton Woods system originated large problems to stabilize the balance of payment, which remained under pressure for eight years even with some attempts to restrict imports with ineffective quantitative controls (Lago, 1982). In 1952 the current account deficit peaked at U$ 600 million (2.7% of GDP) nearing a balance of payments crisis.

The root of the problem was the official exchange rate, which was kept overvalued since 1939. During the period of 1939 to 1945, the accumulated inflation was around 100%, and by 1947 the currency was fixed at the same nominal level of 1939. In 1953, when the currency finally started to devalue with the new MER system, the accumulated inflation was above 150% (IBGE). Figure 2.1 shows the evolution of the real exchange rate during all this period. It was calculated having the reference year of 1939, and using the weighted average exchange rate for the period of the MER regime between 1953 and 1960.

Figure 2.1 – Real Exchange Rate – Cr\$ per USD (1939=100)

Source: Constructed based on data from IBGE National Statistics, Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Mnistry of Finance, 1951-1957

In 1951 Getulio Vargas became Brazil`s president. As a first attempt to solve this growing balance of payments crisis, Sumoc – the Brazilian monetary authority at that time - did an attempt towards allowing some currency depreciation. As described by the minutes of the Sumoc meeting 266 (10/07/1951), Sumoc members discussed the creation of a free market of exchange rate only for a services, wages and the capital account. The idea was to relax some of the restrictions of the balance of payments by allowing small transactions outside of the trade balance to take place via a free market where supply and demand for foreign exchange could operate freely.

It is important to highlight that during this period there was no direct link between the new free market and the official exchange rate. The availability of foreign exchange for the free market came from inflows outside the trade balance, since those were officially forced to only transact via the official exchange through Banco do Brasil. Naturally this allowed some depreciation of the free market rate, but since the size of transactions outside the trade balance were very small, there was no real relevant impact in the balance of payments. The result was that in 1952 the current account deficit peaked at almost U\$ 600 million, about 2.6% of GDP, forcing Sumoc to cash out all of it international reserves and increase substantially the account of delayed payments (Vianna, 1987).

In October 1953, Sumoc's leadership came up with a new solution to try to permanently solve the balance of payments situation while at the same time impede a one off massive

depreciation. Instead of an arbitrary and non-efficient import licensing system, which was the way Banco do Brasil was trying to contain the rise in imports, the new regime extinguished the import licensing regime putting into place a system of auctions of foreign exchange. The regime centralized in Banco do Brasil the monopoly of all trade exchange rate transactions, and all imported goods were then divided into five categories according to their level of priority. Category 1 included the most essential sectors such as some food, chemistry, agricultural equipment and medicine. Category 2 included some production inputs, like rubber, electrical material and medical equipment. Category 3 included all industrial equipment, capital goods and some consumption goods such as vehicles, textile, and leather. Category 4 all non-essential equipment and some production inputs like steel. Category 5 all other sectors, basically all the remaining consumption goods
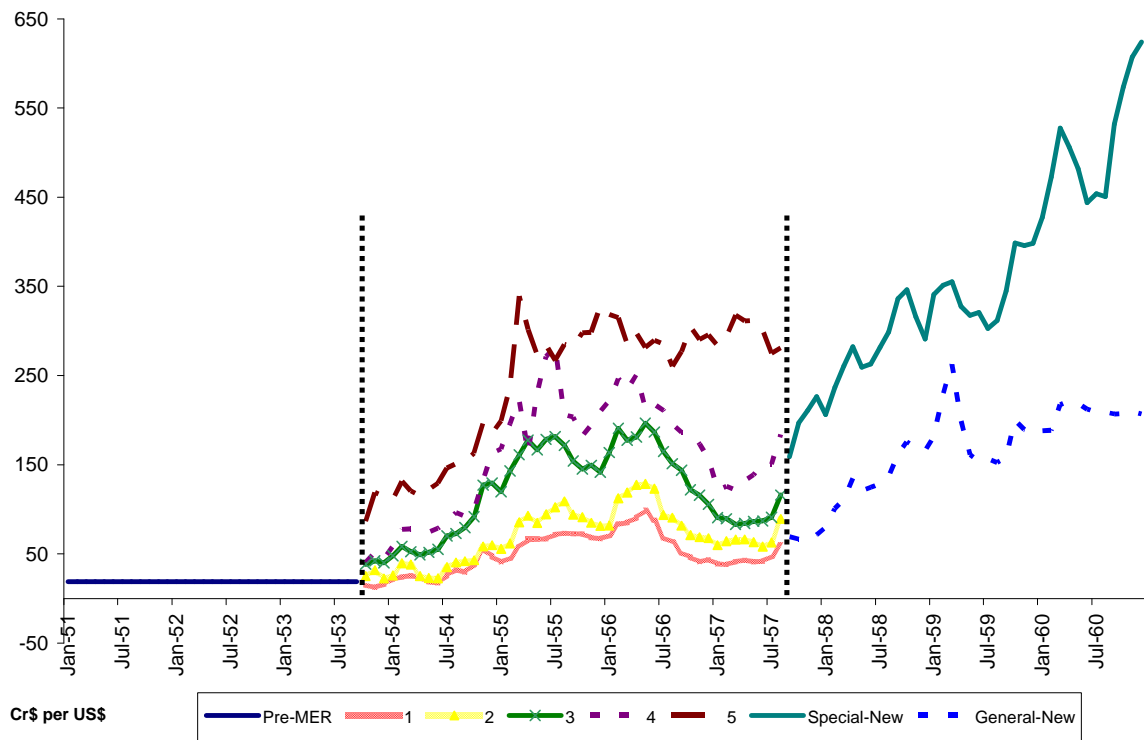
To keep the balance of payments stable and regulate the outflows of dollars, Banco do Brasil defined the quantities of foreign exchange to be auctioned for each category at a weekly basis, which were then auctioned in public exchange houses across the country. In practice, Banco do Brasil was not auctioning the dollars themselves but a license to import products in that category in the exact amount purchased at the auctions. And as Banco do Brasil was the only body authorized to execute the exchange rate operations, it was able to guarantee that the licenses were only used to import products in the correct category. These new licenses were called *Promessas de Venda de Cambio,* or PVC. (Vianna, 1987).

The auctions were held in different exchange houses throughout the country with the distribution of foreign exchange across the cities also arbitrarily allocated by Banco do Brasil. During the whole auctions period, Sao Paulo and Rio de Janeiro, Brazil's biggest cities, received at least 30% of all foreign exchange each, with the remaining 40% distributed to the rest of the country. Twelve auction houses were initially established, but this number increased to twenty over time (Huddle, 1964, pg. 95). Officials believed the system would be more efficient if there were a large number of exchange houses, allowing foreign exchange to reach different parts of the country even if in small quantities (Lago, 1982). Kafka (1956) argues that the various auction houses across the country created the benefit of allowing foreign exchange to reach demand across regions, helping to contain the emergence of a black market, but could also result in different exchange rates as there was no link between auctions at different places and any mechanism to could guarantee the same price equilibrium. To correct for this, minimum bids were introduced for all auction houses based on the previous auctions results, as a way to guarantee certain homogeneity on the auctions results. This, however, caused the counter effect that sometimes not all available foreign exchange was effectively sold in all auctions, with funds then being centralized to be re-distributed in the following week.

The auctions were made in the price of the foreign exchange, which means bidders were auctioning on the higher price for the foreign currency they accepted to import a certain product. Most of the auctions were for the US dollar, but there were also some smaller auctions for other currencies from countries in which Brazil had direct trade relationships and payment agreements. The higher the category, the least essential, smaller was the

amount of foreign exchange being offered by Banco do Brasil, naturally pushing the price of the foreign exchange up and depreciating that currency. Auctions took place once per week in each of the auctions houses, and only registered import companies could participate. Individuals were not allowed as all services and capital transactions were already taking place in the free market exchange rate. The auctions followed a traditional English auction system, were open bids were made with ascending price bids. The minimum PVC was $1000 dollars, and the process was repeated many times to sell all of the available foreign exchange at each location (Kafka, 1956). Figure 2.2 shows the average monthly exchange rates for each category in the period of the multiple exchange rate regime for the US dollar.

Figure 2.2 - Multiple Exchange Rates (Cr$ per U$)

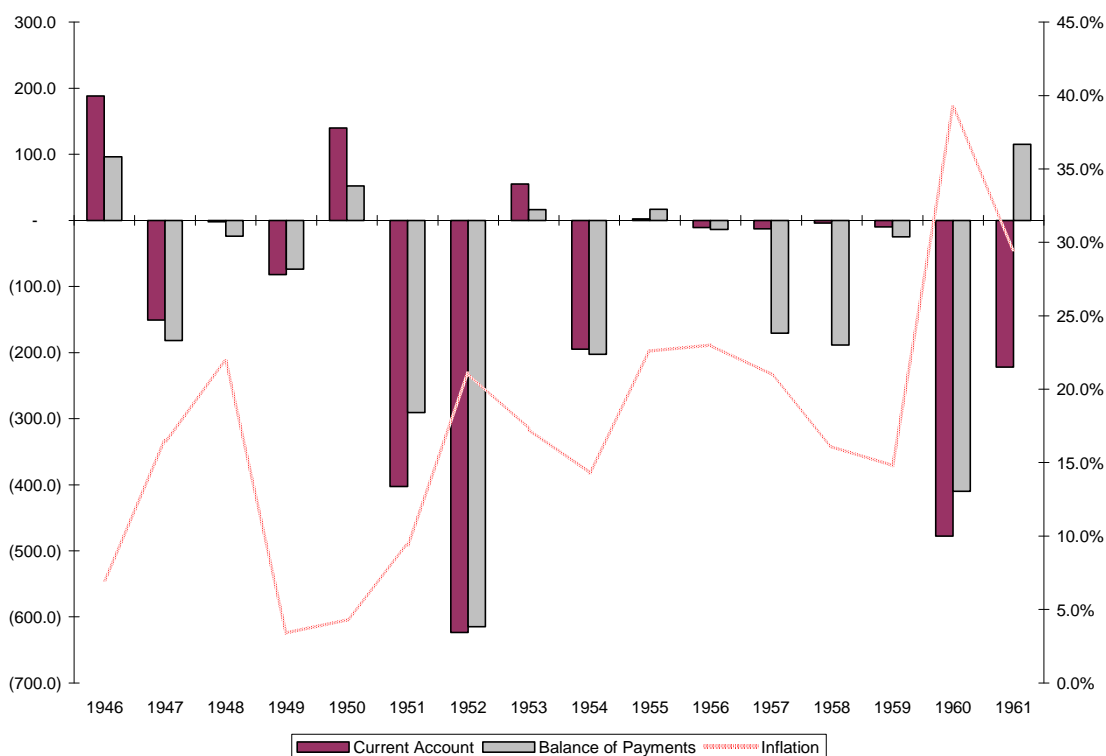

Source: Constructed based on data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Mnistry of Finance, 1951-1957

The immediate result from the system seems to have been quite effective. With all foreign exchange centralized and auctioned, imports felt drastically and the current account and balance of payments quickly stabilized. Figure 2.3 shows how the balance of payments recovered quite rapidly between 1953 and 1955, clearly delivering its primary objective of stabilizing the balance of payments. This was also a period of massive growth of industrial production, with inflation remaining under control (around 20% y/y) but not accelerating despite the size of the devaluations. There was also no black market for foreign exchange rates emerged during this period (Huddle, 1964). That is why the existing literature on the

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subject (Kafka, 1956; Huddle, 1964, Baer, 2009; Figueiredo Filho, 2005; Lago, 1982; Vianna, 1987; Sochzewski, 1980; Caputo, 2007; Bersgman, 1970; Abreu, 1990) affirms that this system allowed the government to re-establish the equilibrium in the balance of payments by controlling the level of imports and depreciating exchange rates.

Figure 2.3 - Balance of Payments (U$ million) and Inflation (%)

Source: Constructed based on data from IBGE National Statistics

The system seems to have worked very well for quite a few years, but after Vargas suicide in 1954 João Fernandes Café-Filho assumed the presidency for a brief period before the next elections. In his small mandate Eugenio Gudin was appointed Minister of Finance and Otavio Bulhoes was appointed Sumoc's Executive Director, economists with a very liberal approach (Bielschowsky, 1988, Skidmore, 1968). The new leadership quickly realized one of the disadvantages of MER system which they kept in place: the negative impact on investments and FDI inflows. With most of the imports of the economy being restricted to the auctions, while the consumer sector became highly protected by depreciated exchange rates, a lot of uncertainty was brought to the imports of capital goods and consequentially to investments into the economy. Brazil was already not one of the main recipients of foreign investment in the post war period, but the uncertainty created for investors to import capital goods made this condition even worse (Sochczewski , 1980).

The solution to this problem came with an important adjustment to the auction system in 1955: Sumoc's Instruction 113. Instead of re-opening the market as a whole, they decided to do it only for capital goods in a direct attempt to solve the problem of uncertainty for investors and FDI flows. The new legislation allowed importers of capital goods to account their products directly as FDI in the balance of payments, in the official exchange rate and without having to go through the auctions. So if an investor was planning to bring money and then import capital goods, he now could directly buy the goods outside the country with its own funds and then import them for their face-value as FDI, without accounting them as imports in the balance of payments. In other words, imports of capital goods where authorized to take place outside the auctions system and instead of a negative value in the current account, they were recorded as positive in the capital account. This modification reduced significantly the risk to invest in the country and bring FDI inflows, as foreign investors could be sure that they would be allowed to bring capital goods at the much cheaper (overvalued) official exchange rate (Minutes 507 of Sumoc, 17/01/1955). The inexplicit idea of Instruction 113 was to start stimulating new sectors for import substitution, particularly the automotive industry (Bulhoes, 1990, pg 110; Malan, 1974),

A new change in policymaking took place in mid-1955 when Kubistcheck was elected. His new economic teams, as well as his own ideas, were highly developmentalist, following the growing Cepal school of though from that time (Bielschowsky, 1988). Between 1956 and 1961, Kubistcheck delivered its famous investment program ("Plano de Metas") to stimulate growth and Instruction 113 was a major channel to allow foreign investment to enter the country (Abreu, 1990). The new administration was mostly concerned on providing a new level of industrial development to Brazil, building both infrastructure and capital goods industries to fully vertically integrate the industrial chain in the country. For this additional expansionary policies were needed as well a new form to protect the chosen sectors, creating greater differentiation to stimulate specific areas of the economy (Sochczewski, 1981; Bergsman, 1970).

To reach this, besides its strong public investment program, another important change took place to the MER system in 1957, with two basic premises: the first was that there was no need to maintain the system as restrictive on imports anymore as foreign exchange inflows had increased significantly between 1955 and 1957 with the surge in FDI after Instruction 113. Officials got comfortable with the idea that the new cycle of foreign investment in Brazil was starting and would last for a long time, and there was no need to further restrict imports to the economy. The second premise was to create even further differentiation between sectors, as the auctions system only provided the exact same protection for a large group of products included in each of the five auctions categories and there were no ad valorem tariffs (Sochczewski, 1981; Figueiredo Filho, 2005).

This led to a reform of the protectionist system, with the reintroduction of ad valorem taxes were actually being discussed since the end of Vargas administration in 1954 (Silva, 2008). But after Vargas suicide and the shift towards more orthodox policies during Cafe-

Filho period, this discussion was kept aside and only returned to the policymaking debate when Kubitschek emerged to power. Colistete (2006) states that the pressure from the organized industrialists in Sao Paulo on the subject was extremely high, since this was a long time demand. Also, from the industrialists perspective, ad valorem tariffs were a superior form of protection compared to the MER, since it only restricted imports of final goods, but not necessary forced them to join the auctions to import inputs for production.

So the reform of the auctions system essentially included two main points. The first was the reduction from five categories to three: a preferential one, which was basically government imports without going through the auctions and at the official rates; followed by a special and a general category, which were the combination of the previous five categories into two. This was targeted to simplify the system, although it did not necessarily mean a reduction in the restriction of the system, as all imports in theory still had to go through the auctions (Sochczewski ,1981

The second change was the reintroduction of ad valorem tariffs for each group of products, ranging from 0% to 150% and targeted to substitute the protection previously being given by the exchange rates. After twenty-three years without ad valorem taxes, they were now back. The governments created a new institutional body called Customs Policy Council (CPA) responsible for determining the level of ad valorem tariffs for each product and collect these new revenues, which rapidly became the new main source of funding for the government in substitution to the auctions tax (Sochczewski, 1981, Malan, 1974). On the top of the new ad valorem taxes, a complex system of exemptions and restrictions was also gradually implemented. These were ad hoc decision made by the new Customs Policy Council (CPA) to grant benefits to some sectors depending on their requests. According to Bergman (1970, p 33), the enforcement of them was very flexible and varied from time to time and also according to the political influence of the demanding sector

While the new system was targeted to simplify and provide further differentiation, in theory it did not change the major concept of the first MER, which was to maintain all imports inside of the auctions system and allow the auctions mechanism to adjust the exchange rates and maintain the balance of payments stable. This is why almost all the literature about these changes sees it as mostly a continuation of the previous policies from Vargas, just trying to at the same time to complement it with further import substitution and the openness to foreign investments via instruction 113. For most authors, the second phase of the MER was just a step further in import substitution (Bergsman, 1970, Baer, 1995; Sochaczweski, 1980; Vianna, 1987; Figueiredo Filho, 2005; Lago, 1982; Malan, 1974).

However, there are many signals that this in practice a dismantling of the original system, as the data below will show. After 1957, there was a rapid increase in out of auctions imports, a consequence of both the increase demand from government imports - due to its large investment plan - and also the increase in subsidies and exemptions given by the

CPA to many sectors. This new system opened a door for the MER system to gradually lose effectiveness, with both the government and many sectors managing to imports outside it.

On top of this, one of the main problems of the period between 1956 and 1961, contributing significantly for the decay of the auctions system after the 1957 reform, was the monetary policy side. The demand for additional imports, both from the government and the private sector, which led to an increase in out of auctions imports, was not purely a natural process, but the result of extremely expansionary money printing. During Vargas money printing peaked at around 20% of growth per year, similar to inflation, but during the Kubistcheck`s year it increased from around 15% y/y on 1955 to an enormous 60% y/y in 1958.

This deterioration of the basic macroeconomic stability on the monetary and fiscal side created huge demand pressures on both imports and inflation, which rose quickly to about 40% y/y until 1961. At the same time, the lighter restrictions on foreign trade with the increase in out of auctions did not contain this major import rise. The result of this process was the fast deterioration of the balance of payments despite the large amounts of FDI inflows and greater currency availability of that period. The balance of payments deteriorated to a deficit of almost $500 million dollars by 1960, forcing Sumoc to cash out all the available reserves which were built during the good years of 1953-1957. Because of these policy changes, including the consequences of the 1957 reform and the lack of control on the monetary policy side, Brazil was back to the same condition of 1952 and the pre-auctions system.

Kubistcheck left power in 1960 and Janio Quadros assumed promising to restore macroeconomic equilibrium and fight inflation. The multiple exchange rate system was abolished in 1961 under Instruction 204 of Sumoc, ending with nine years of the MER experience and allowing a 100% depreciation of the official rate. At the same time, the new Brazilian government went to the IMF to re-open negotiation and ask for funds to reduce the balance of payments difficulties (Lago, 1982). By mid-1961, a new deal of $650 million dollars was reached conditional to the country fulfilling all of the fund's conditionalities, which included the end of the MER system.
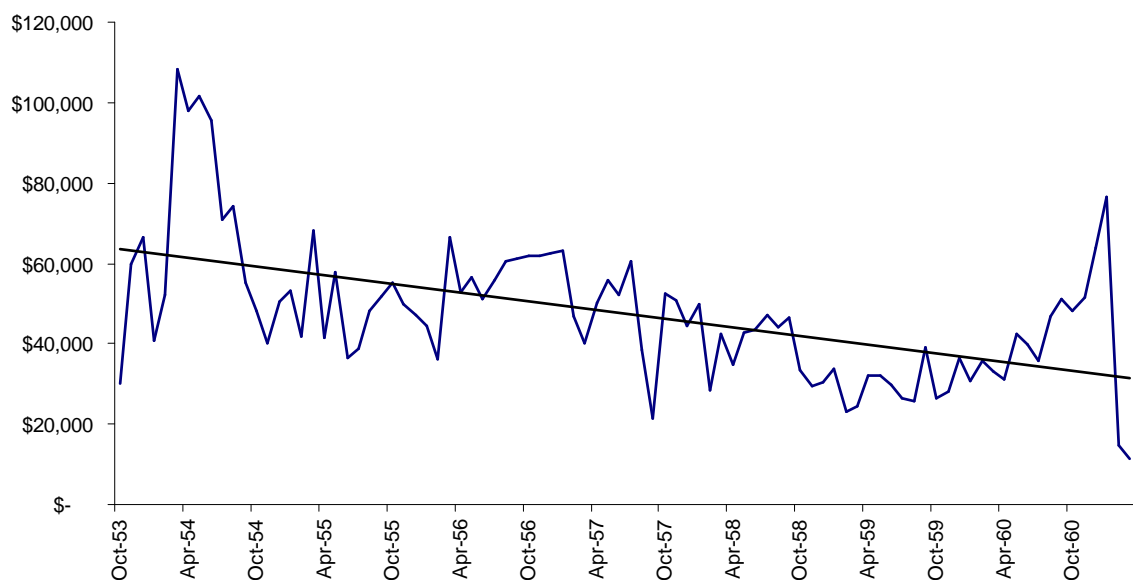
3 – Out of the Auctions System

The first evidence that the system was different during its first and second phases is simply the commitment from authorities in using the MER auctions platform. There were two different ways in which the private sector and the government could import outside the auctions system. The first and most simple was the government prerogative to use part of the foreign exchange availability for its own imports, in the official exchange rate and without going through the auctions. The second were the exemptions authorized to the private sector (Sochzewsky, 1980, 91). These exemptions started to appear in Sumoc minutes between 1953 and 1954, and were created by Instruction 70 (article XVI, which can be found in appendix 2) which gave Sumoc the privilege to discretionarily authorize

imports outside of the auctions for capital or essential goods. The new evidence below shows (Figure 3.2) these exemptions were very small in 1953 and 1954, and on average only 5% of the foreign exchange, as overall 60-65% of foreign exchange was allocated to the auctions and 30% to the government. Caputo (2007, 40) argues that these exemptions were in practice an anticipation of Instruction 113 from 1955, which made the imports of capital goods outside the system a more formal procedure, allowing them to also be accounted as FDI rather than imports. But after 1957, the level of exemptions increased significantly not only because of Instruction 113 but mostly as a consequence of the 1957 tariffs reform, which opened the door for discretionary exemptions authorized by the Conselho de Política Alfandegária (CPA) (Sochzewsky, 1980, 92).

While these exemptions existed in theory already in 1953, they were in practice only largely used after 1956 and with the formal procedure to authorize exemptions by the CPA. Before 1955, Sumoc was quite committed on forcing most of the private imports to go through the auctions system. For the MER system to function properly most of the country's imports had to go through the system, allowing the exchange rates to adjust correctly for each category. The centralization of foreign exchange distribution allowed officials to have a strict control of the level of imports so to guarantee balance of payments stability. But after 1956 this was completely changed with the rise in the different forms of out of the auctions imports.

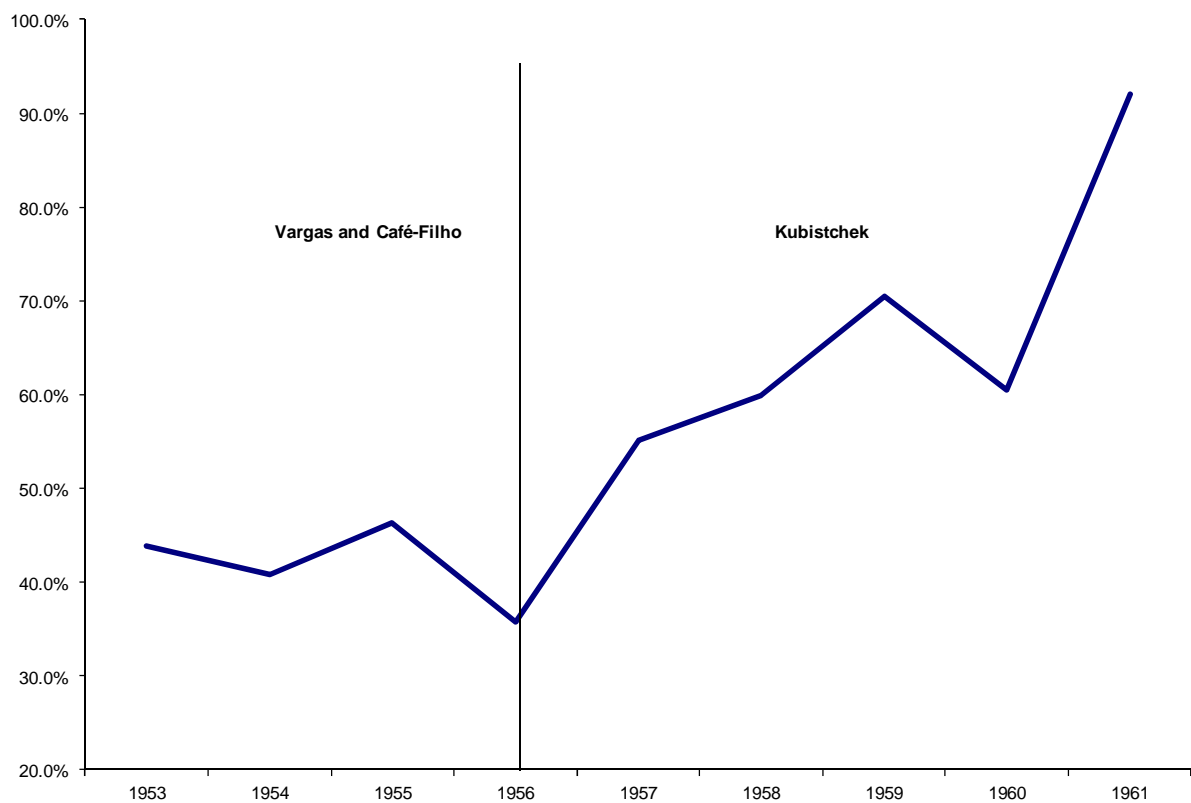### Figure 3.1 - Auctioned Foreign Exchange (US dollars million)

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. See appendix 4 for methodology.

Figure 3.1 shows the amount of auctioned foreign exchange at the MER system between 1953 and 1961. The data shows the level of auctioned currency declining over time, and having its biggest level in the first phase of the auctions system. At first, this could be seen

as paradoxical, since it was in the first phase after the 1952 balance of payments crisis that the government was more under pressure to contain imports. This was the period when Sumoc worked to rebuild the country's international reserves and had its major foreign exchange constrains. After 1956, as previously showed in Figure 2.3 of the evolution of the balance of payments, the government's foreign accounts improved significantly with the large amount of FDI coming via Instructions 113, on average about $150 million per year between 1955 and 1960. The case of instruction 113 will be further detailed in the next section, but the simple explanation of why the government reduced the amount of currency being offered in the MER system does not have to do with the availability of foreign exchange, but with the willingness to use the system as the channel for balance of payments equilibrium.

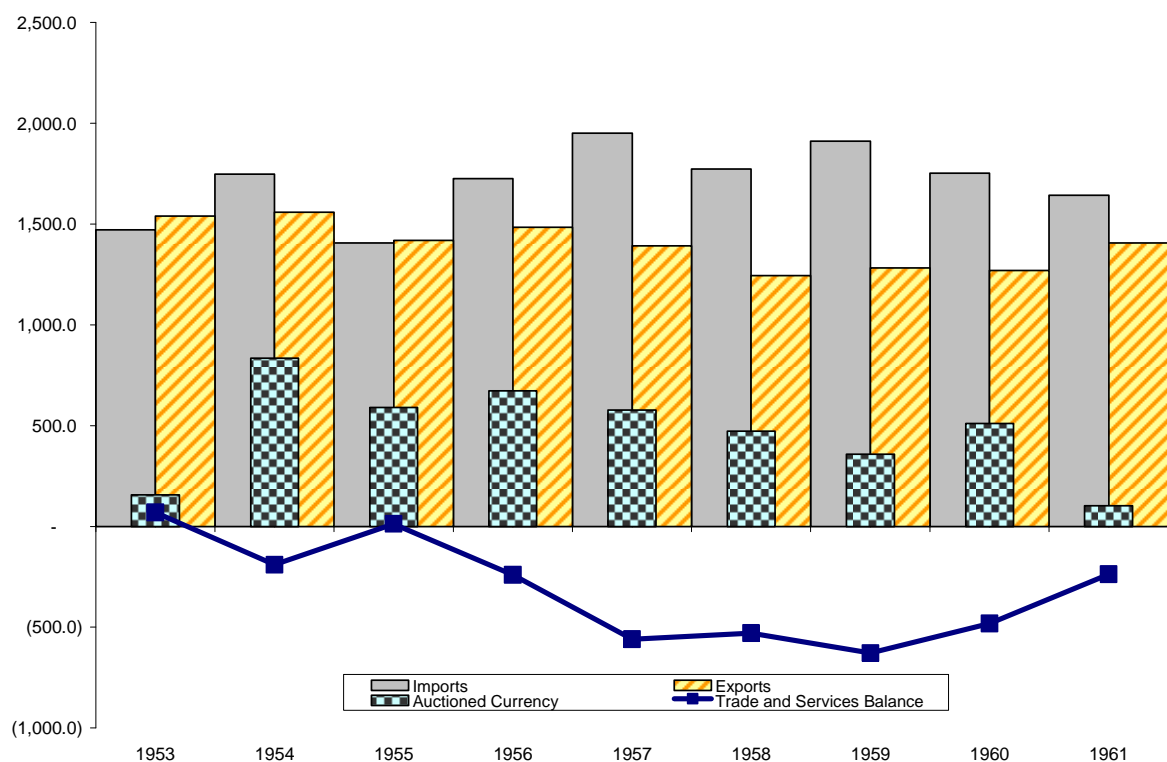**Figure 3.2 - Percentage of Imports Outside the Auctions System**

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. Import data was compiled by IBGE – Estatistica Historicas do Seculo XX. See appendix 4 for methodology.

Figure 3.2 shows the percentage of imports that were made outside the auction system. The difference between the quantities presented and 100% is the percentage which was in practice being imported via auctions. The quantities of imports outside the auctions system includes both the government and the exemptions conceived to the private sector. Unfortunately, there is no data to separate these two components individually, but the

overall group of outside de auctions imports was constructed with a simple deduction from the amount of foreign exchange auctioned in the MER system.

Figure 3.2 shows that, until 1956, the amount of imports outside the system remained at levels around 30-40%, which Sochazweski (1980, 91) describes as the standard level for the government own imports and is confirmed by this data. But after 1956 the situation completely changed, with a significant increase in out of auctions imports. Out of auctions imports increased from 30-40% in the first phase to 60-70% in the second phase. Gradually the MER system started to receive less foreign exchange and by the end of the 1960s the instruments was almost non-operational anymore. When the system was finally shut-down in 1961 it was basically not-functional anymore, with 90% of the foreign exchange being allocated outside of the auctions system.

Figure 3.3 - Auctioned Currency and Trade Balance

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil; and Trade Balance data Compiled by IBGE – Estatísticas Históricas do Seculo XX- Original data from Sumoc. See appendix 4 for methodology.

Figure 3.3 compares the auctioned foreign exchange with the evolution of the trade balance, and complements the above argument by showing that it was really a matter of willingness to use the auctions system. There was a decline in exports receipts between 1955 and 1961 of about $150 million on average (IBGE, 1955-1961) with the fall of coffee

prices in the second part of the 1950s. But this decline is not enough to explain the major rise seen in imports - on average of $300 million - in the same years (IBGE, 1955-1961), and most importantly, it does not explain the even faster reduction of foreign exchange auctioned at the MER system. The auctioned foreign exchange declined by $264 million on average between 1955 and 1961 (Figure 3.3). Sumoc was removing more foreign exchange from the system than the reduction in exports receipts, while at the same time allowing imports to rise. This resulted in a deterioration of the trade balance and the balance of payments. While it is not possible to know what would have happened with the balance of payments if the same commitment to the system was maintained during the second phase, the simple math of flows suggest that if imports of goods have remained at the same average of the first phase of $1.1 million, with a large share of them allocated to the MER system even with the decline in exports receipts, on average exports of $1.25 million would have been enough to pay for the imports (IBGE, 1953-1960). This would have been enough to stabilize the trade balance and the balance of payments during the second phase. The MER system stopped working because authorities stopped using the system, allowing a massive surge in imports while removing foreign exchange from the auctions. This evidence of the allocation of foreign exchange to the MER system suggest that the later part of the auction system was in practice not very different from the previous import licensing system in place between 1947 and 1953, in which the discretionary power of Banco do Brasil to authorize imports result in no real control of the process.
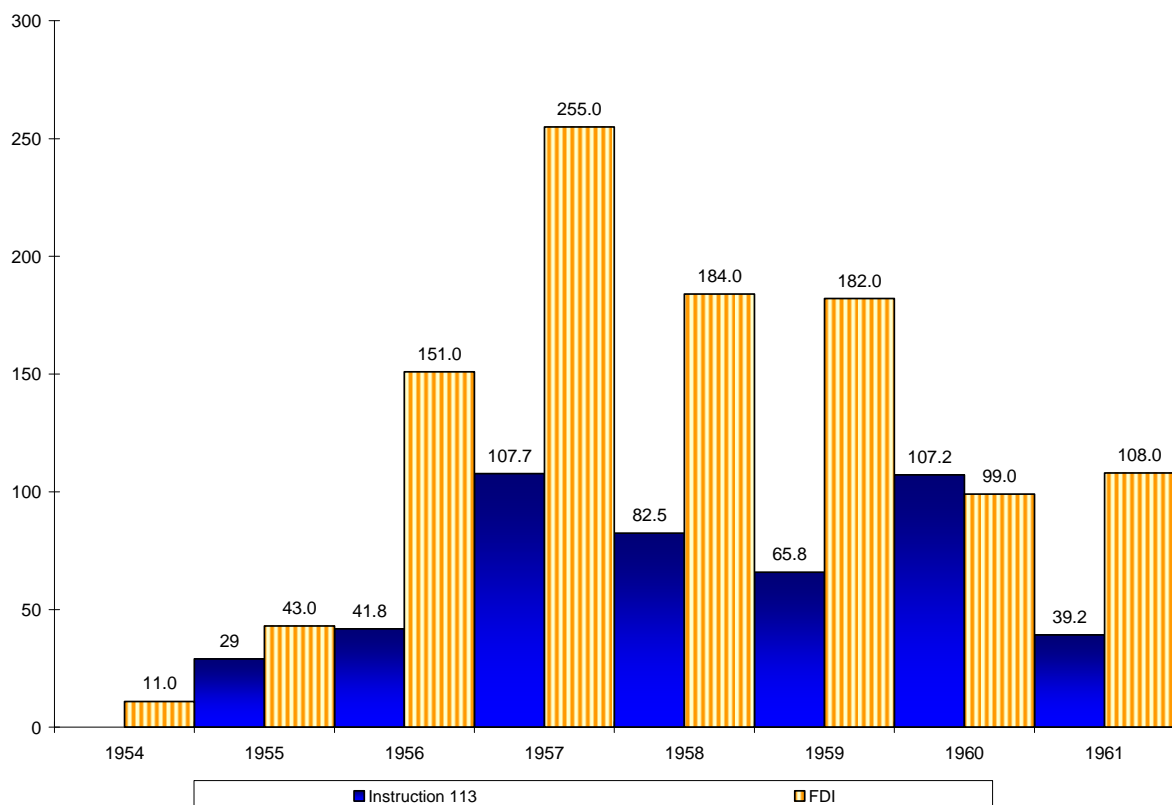
4 – Import Substituting FDI

The deterioration of the balance of payments in the second MER system did not happen only because of the rise in private sector exemptions authorized by the CPA. Instruction 113 was an additional loophole to increase imports without going through the auctions. Instruction 113 was published in 1955 during the term of Bulhões in Sumoc and Gudin at the Ministry of Finance under Cafe-Filho's presidency (Malan, 1974, 5). The instruction was targeted to solve the problem from the MER system in its first phase of disincentivizing FDI investments. Foreigners who brought FDI flows had to also import capital goods through the auctions, which meant uncertainty on the price of the imported capital goods. Instead of re-opening the exchange rate market as a whole, as the MER was functioning well, the decision was to open it only for imports of capital goods with the provision that allowed industrialists to account their products directly as FDI at the official exchange rate (Minutes 507 of Sumoc, 17/01/1955). In practical terms, foreign investors had to request an authorization to Sumoc to import via Instruction 113. With this authorization they could then purchase the capital goods abroad and bring them to any Brazilian port to be registered as FDI (Sochawesky, 1980, 90). Between 1955 and 1960, 1545 authorizations were issued under Instruction 113, representing $497 million, about half of FDI of the period (Caputo, 2007, 5; IBGE, 1955-1960).

The strategy is largely seen by the literature as an important stimulus to the imports of capital goods and the promotion of industrialization of advanced industries in the second half of the 1950s (Figueiredo Filho, 2005, 163; Caputo, 2007, 105). In fact, the inexplicit idea

of Instruction 113 was exactly to stimulate new sectors for industrialization, particularly the automotive industry (Bulhoes, 1990, 110; Malan, 1974, 5). 38% do the total FDI during the years of 1955-1963 (US$189 million) came to the automotive sector, but other important industries such as chemical (13%) and machinery (16%) also received a very important share of the inflows (Caputo 2007, 46). Under the "Target plan", the Kubistcheck administration created a group composed of government officials and private sector executives to plan, study and approve benefits to develop the automotive sector called GEIA (Grupo Executivo da Industria Automobilística) (Kertenetzky, 2016, 5).

From a macroeconomic perspective, however, Instruction 113 contributed to the decline of the auction system as a mechanism to stabilize the balance of payments. By accounting imports - even if only capital goods - as positive FDI inflows in the balance of payments, in practice the government was "cheating" the amount of foreign exchange available at the economy. In the restricted capital account system of that decade, large sums of FDI could have been the solution to allow imports to rise in the MER system without misbalancing foreign accounts. But since a major part of this "FDI" were imports via instructions 113, they were illiquid in reality, and could not be used as foreign exchange to be distributed in the MER system.
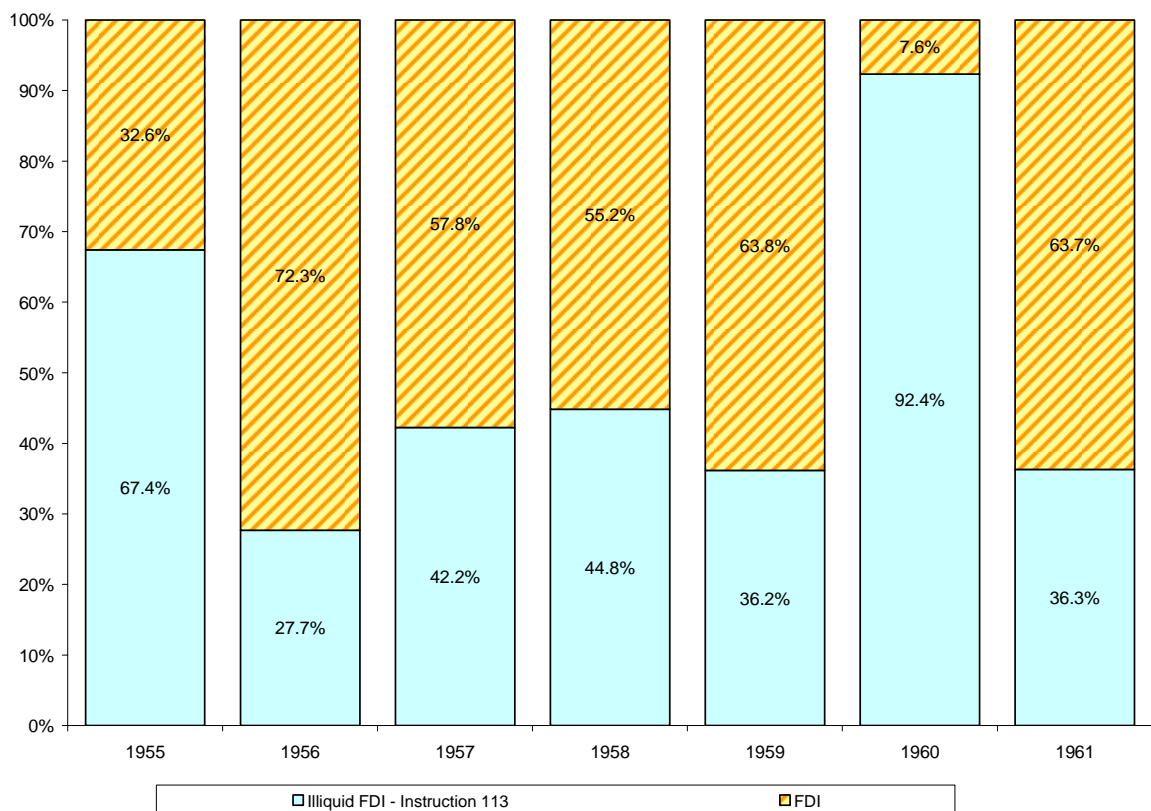
Figure 4.1 - FDI and Instruction 113 (US Million)

Source: FDI data compiled by IBGE – Estatísticas Históricas do Seculo XX - Original data from Sumoc; Instruction 113 data from Caputo (2007), p. 54

Figure 4.4 shows the evolution of both FDI and Instruction 113 flows after 1955. It shows how both FDI and Instruction 113 flows have surged after 1955. FDI was practically zero in the first half of the 1950s, was a disappointment for Sumoc officials in the Dutra administration and forced officials to start adjusting the balance of payments through restricting imports. With the major incentives from Instruction 113, FDI picked up from 1955 onwards peaking at $250 million dollars in 1957. FDI flows, on average, represented 20% of the level of imports of that period, which averaged $1.2 billion dollars. So in theory the inflows of FDI could have financed one-fifth of imports, reducing the constrain on imports and supporting the MER system.

Figure 4.2 - Liquid and "Illiquid" FDI (US Million)

Source: Own Construction. FDI data compiled by IBGE – Estatísticas Históricas do Seculo XX - Original data from Sumoc; Instruction 113 data from Caputo (2007), p. 54. See appendix 4 for methodology.

But Figure 4.2 shows this was a mirage, and presents the distribution of liquid versus "illiquid" FDI (Instruction 113) between 1955 and 1961. During that period, the percentage of FDI with authorizations from Instruction 113 averaged 49.6%, half of the FDI flows. These imports did not compete with the rest of the economy for the use of the restricted foreign exchange availability of the country, as foreign companies used external funding to buy capital goods and then import them. This was an interesting financing procedure

for a country which did not have access to foreign debt markets in that period (Caputo, 2007, 12). Still, it meant only half of the FDI in the period was liquid to support the financing of other imports via the MER system.

On average FDI was $150 million per year, from which only half, $75 million, could be used to fund additional imports. When these figures are compared to the numbers discussed in the section 2 of the paper, it becomes clearer how FDI was not enough to finance the surge of imports outside the system. Imports rose by almost $300 million per year between 1955 and 1961, and the additional $75 million of liquid FDI was not enough to pay for that (IBGE, 1955-1961). If the $75 million of illiquid "FDI" is accounted as imports, the surge in imports reached almost $400 million on average against a decline of only $80 million on exports receipts on average in the same period (IBGE, 1955-1961). There is no balance of payments which can remain stable under these conditions. It is also worth flagging the increase in amortizations which resulted from this FDI flows in later part of the 1950s. They represented on average $280 million between 1956 and 1960 (IBGE, 1956-1960). This means Instruction 113 produced a system where foreign companies brought imports instead of foreign exchange, and then took away foreign exchange to repay debts and profit. The illiquid FDI were not only an opportunity cost on the foreign exchange which could have been use to finance the MER system, but eventually had a significant balance of payments cost via the outflows.

The conclusion of the last two sections is that the sum of increase in government's own imports outside the auctions, the exemptions created by the 1957 tariffs reform, and the additional imports in the form of illiquid "FDI" under Instruction 113, resulted in the reduction of foreign exchange available to the original MER system. This explains the lost of its macroeconomic effectiveness and the eventual collapse of the MER in 1961.

5 – Responsive Allocation of Foreign Exchange

While the first two sections help to understand the decline of the MER system, extending the new interpretation, it still not sufficient to comprehend the reasons behind the effectiveness of the system during its first phase. As shown the system only worked when officials concentrated foreign exchange in the auctions. When out of the auctions imports were let to increase, the system gradually declined in macroeconomic effectiveness. But while allocating foreign exchange to the system was a necessary condition for it to perform well, it is not sufficient to explain how policymakers were able to reach market equilibrium under a centralized system of exchange rate auctions. The macroeconomic results suggest it was a well balanced economy, but this is the maximum scholars have reached so far. The aim of this part of the paper is to explore the mechanics behind the first MER regime.

The key was the capacity of Brazilian policymakers at Banco do Brasil and Sumoc to efficiently distribute foreign exchange through the auctions for the different sectors. The most impressive singularity of the system was how the allocation in the categories across exchange houses resulted in a balanced economy, inflation under control, and a stable the

balance of payments, impeding the emergence of a black market for foreign exchange. This was only possible if the distribution of foreign exchange to categories was done in an effective way to at the same time guarantee availability of foreign exchange to all sectors while maintaining the purpose of the system to restrict foreign exchange to the economy as a whole and stabilize the balance of payments.

This suggests that the allocation of foreign exchange to categories was not random. Authorities had to be realistic on the distribution of foreign exchange to sectors, and able to follow the fluctuations in market demand for each category to provide enough liquidity for that market to reach an equilibrium. This rational suggest macroeconomic equilibrium for the economy as a whole was only possible because authorities were, in a way, replicating a market clearing process during the first phase, with the weighted average exchange rates of the five categories probably being not far from the free market exchange rate. This aspect will be explored in section 5.3.3. This suggest the hypothesis to explain the effectiveness of the first phase is that authorities were responding to market demand in the process of distributing foreign exchange, which allowed the system to be effective.
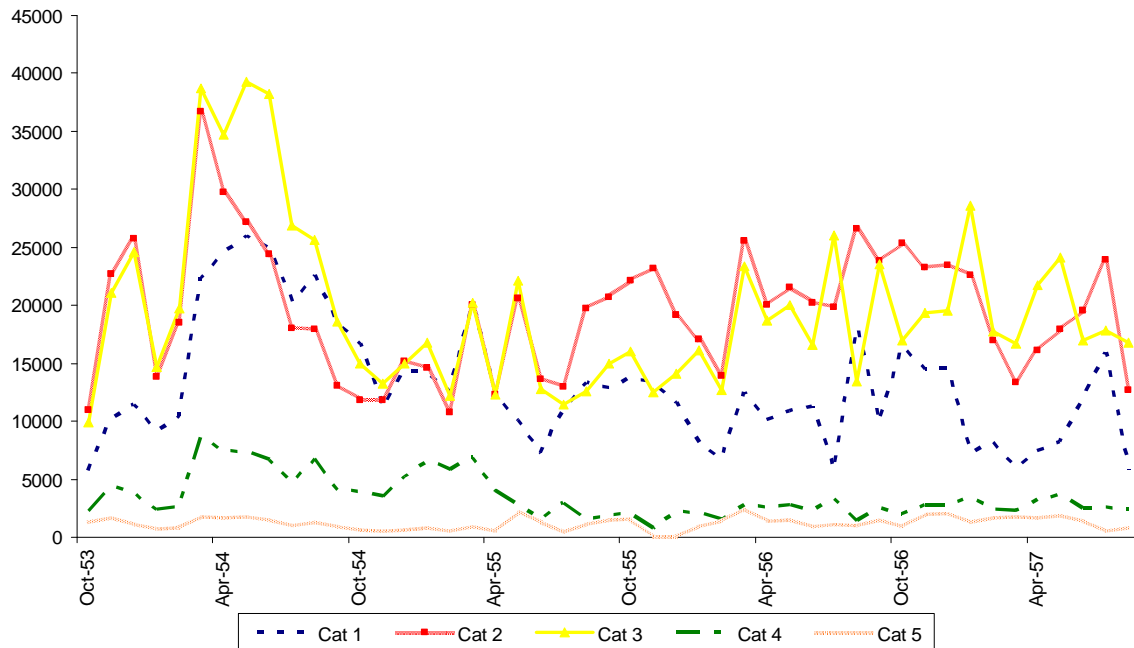
Unfortunately qualitative sources (both primary and secondary) do not have records of how authorities were distributing foreign exchange in the five categories. The minutes of the Sumoc meeting which launched Instruction 70 does not have a proper explanation for the distribution of sectors in the five categories (Minutes 408 of Sumoc, 9/10/1953). Banco do Brasil does not hold records explaining the distribution of foreign exchange at a monthly basis, only the records of the amount of foreign exchange distributed. But this new quantitative data can shed light on the behavior of the distribution across sectors and auctions houses. To test the above hypothesis, the next sub-sections analyze the pattern of three different parts of the new dataset: (1) the distribution of foreign exchange to the five categories during the first MER period; (2) the difference between the amounts of foreign exchange offered and auctioned at the MER system; and finally (3) the comparison between the auctions weighted exchange rate with the free market exchange rate. A series of econometric tests with these series reveals if the effective results obtained by the first phase of the system were random or if officials were in fact following a responsive market approach. The next three sub-sections will present the statistical exercises.

5.1 – No Random Distribution

The first exercise tests if the distribution of foreign exchange followed a exogenous pattern or was just random, and its done simply by applying a random walk test on the quantities of foreign exchange allocated to each category. If the allocation of foreign exchange in the system followed a random walk it means there was no exogenous distribution by policymakers, a clear indication that the resulting macroeconomic equilibrium were just pure luck. On the other hand, if the allocation was not random walk it suggests officials were making choices on how much foreign exchange to auction in each category. The random walk equation is a mathematical formalization of a path that consists of a succession of random steps (Enders, 2004, p. 156), and while this test does shows the response to market demand, it can reveal if the allocation was exogenous. This is

performed with the series of effectively auctioned foreign exchange in each of the five categories between 1953 and 1957. The data is presented below in Figures 5.1.
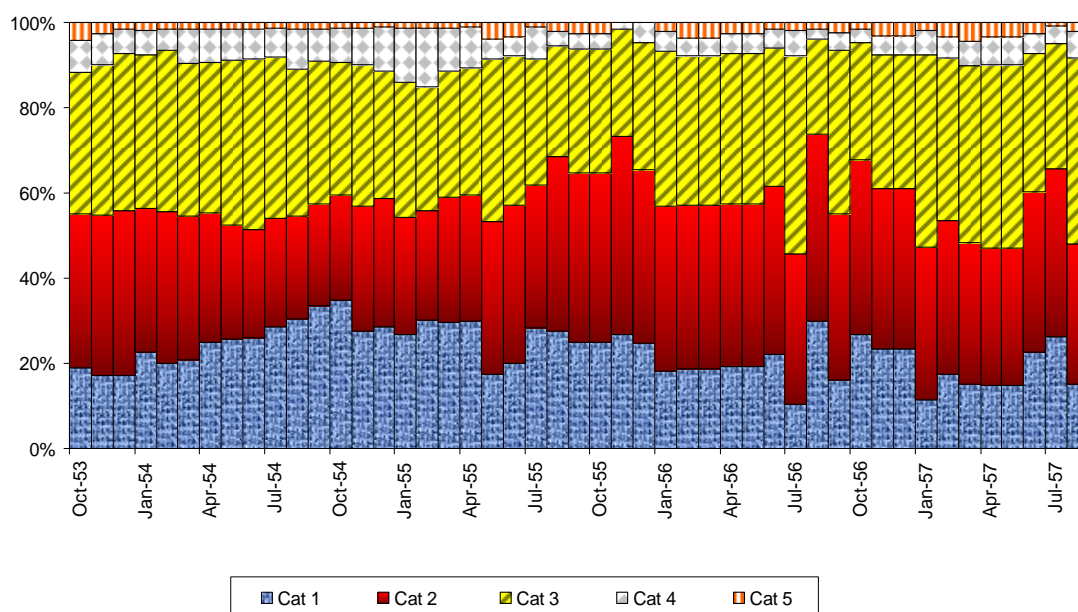
Figure 5.1 - Auctioned Foreign Exchange Per Category - 1953-1957 (U$ million)

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. See appendix 4 for methodology.

Figure 5.1 shows the amount of foreign exchange auctioned in each category between 1953 and 1957. It reveals that while there was a pattern on the distribution with categories 1-3 receiving a larger share of the foreign exchange than categories 4-5, it also reveals a lot of variations between the quantities auctioned in the three main categories. Category 1 included the most essential sectors such as food, chemical, agricultural equipment and medicine. Category 2 included some production inputs, like rubber, electrical material and medical equipment. Category 3 included all industrial equipment, capital goods and some consumption goods such as vehicles. Category 4 all non-essential equipment and some production inputs like steel. Category 5 all other sectors, basically all the remaining consumption goods (Minutes 408 of Sumoc, 9/10/1953). It is possible to notice that category 5, which included consumption goods, received a significant low amount of foreign exchange. But between categories 1-3 there was a lot of fluctuations with authorities sometimes allocating more foreign exchange to category 1, with essential goods not produced in Brazil, while in other moments to categories 2 and 3, which included equipment and capital goods. It is clear that the distribution was not fixed and fluctuated in time depending on how much officials wanted to distribute to each category. If this variation can be considered not random, then it is an indication that this distribution could be responding to market demand.

Figure 5.2 - Auctioned Foreign Exchange - 1953-1957 (Percentage of Total)

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. See appendix 4 for methodology.

Figure 5.2 shows the percentages distributed to each category and complements the analyses of Figure 5.1. Clearly, a pattern seems to exist throughout the first phase. Categories 1-3 received the largest share of foreign exchange, and represented the bulk of essential imports combining almost 90% of total; while 4-5 received only around 10%. But as discussed following Figure 5.1 there was a lot of variation within categories 1-3 with percentages ranging between 15% and 30% for each of them during the whole period. One possible explanation for this variation is that essential products such as medicine or food, which were not produced in Brazil, had peaks of demand which forced officials to increase foreign exchange to category 1. In other moments these funds could be allocated to equipment and capital goods in categories 2 and 3. Clearly the variation between them shows the existence of a trade-off on the distribution of funds to the different sectors, and a choice for officials behind the distribution.

The random walk test[4] helps to statistically show if this variation can be seen as an exogenous decision from policymakers or if, in reality, is just a statistical fluctuation. Table

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[4] The simple random walk equation links a series to its previous value and an error: $Y_t = Y_{t-1} + E_t$. And the standard test to check whether a series follows a random walk pattern is the ADF (Augmented Dickey-Fuller), which is also commonly use to test for unit roots (Enders, 2004. p. 744).

5.1 show the results of an ADF test with a random walk function including intercept, and with only lag which represents a simple random walk equation.

Table 5.1 - Random Walk Test - ADF

	T-Statistic	P-value	Rejects Random Walk?
Caterory 1	-3.24	0.0238**	Yes
Caterory 2	-4.3	0.0013***	Yes
Caterory 3	-3.698	0.0073***	Yes
Caterory 4	-2.852	0.059*	Yes
Caterory 5	-4.571	0.0006***	Yes

Source: Own Construction; Statistical significance: *** for 1% level; ** for 5%   level; * for 10% level

The table presents the T-Statistics and P-values for the ADF test for each of the five categories, and shows that the null hypothesis of existence of a random walk pattern is rejected in all of them. This is consistent with the overview of the data, and suggests the changes in distribution were not random. Officials were probably making an exogenous decision to distribute foreign exchange to the sectors. And while this evidence still does not definitively shows that officials were responding to market demand, it confirms the distribution of funds was not random with an exogenous choice behind it.

5..2 – Responding to Market Demand

If it was not random, then the second test explores if the distribution was a response to market demand. This can be tested comparing the series of offered foreign exchange and the effectively auctioned foreign exchange. One of the interesting features of the new data is exactly the separation between the quantities of foreign exchange offered at the MER system and the amounts effectively purchased by importers. Auctions took place once per week in each of the auctions houses, and only registered import companies could participate. The auctions followed a traditional English system, with open bids made with ascending prices and the minimum amount being $1000 dollars. The process was repeated many times to sell all of the available foreign exchange at each location and category (Minutes 408 of Sumoc, 9/10/1953; Vianna, 1987, 103).

While the auctions were open and repeated in order to sell all foreign exchange, a gap between the offered and auctioned currency emerged because of the minimum prices imposed by Sumoc authorities. During the structuring of the system, officials believed it would be more efficient if there were a large number of exchange houses, allowing foreign exchange to reach different parts of the country even if in small quantities since São Paulo and Rio de Janeiro received around 80% of the total foreign exchange. Initially twelve auctions houses were open, but they were increased to twenty in time to allow minor quantities of foreign exchange to reach different parts of the country (Huddle, 1964, p. 95; Lago, 1982, p. 95)

This created the benefit of allowing foreign exchange to reach demand across regions, helping to contain the emergence of a black market. But also resulted in a disequilibrium

since different exchange rates could emerge in the same categories across different exchange houses. There was no formal link between auctions at different places and no mechanism to could guarantee the same price equilibrium. Minimum prices were introduced to correct for this problem for all auction houses and based on the auctions results of the previous week. With this system, the minimum prices guaranteed that auctions in different parts of the country would result in similar levels of exchange rates for each category. While this mechanism could force homogeneity, it also caused the counter-effect that sometimes not all available foreign exchange offered at a specific auction house and category was effectively sold. These amounts were brought back to the central office of Banco do Brasil to be again distributed in next the round of auctions on the following week to new locations or categories (Vianna, 1987, p.104; Kafka, 1956)

The difference between the quantities offered and those effectively auctioned is a good indicator of the size of the mismatch between supply and demand for each category at a certain period of time, since it represents how much currency was not purchased given the minimum price. A huge gap means there was an over allocation from authorities or not enough demand to purchase the foreign exchange at that price: an allocation mismatch. A very small gap shows officials were distributing adequately or signal demand was much stronger than supply and additional foreign exchange was needed in that specific category or location.

This suggest a very interesting system were authorities were at the same time imposing minimum prices to force some out some buyers of the system, restricting the scarce foreign exchange which was a major objective to reduce imports; but also making sure to not allow sectors or areas to remain without sufficient liquidity, which could result in the emergence of a black market. So when the gap was too small they had to respond providing additional foreign exchange.

One way to test if officials were improving their distribution of foreign exchange over time would be to test if the number of auctions rounds at each location was falling on a weekly basis. This would be a signal officials were adequately sending the correct amounts of foreign exchange to a category or location, reducing the number of auctions rounds needed to sell foreign exchange. Unfortunately, there is no available data on the rounds of auctions or at the location level.

But another way is to track the quantities offered and auctioned. If the results of previous monthly auctions – via the effectively auctioned currency – predict the gap between offered and auctioned foreign exchange in the following month, it suggest officials were responding to the past results to re-allocate funds better. If officials were being responsive, then they were looking at the auctions results at a specific moment - the quantities effectively purchased - to determine how much to offer to each market in the following period so to minimize the gap between offered and auctioned foreign exchange. This would suggests a learning process taking place at the central level where Sumoc was in practical terms trying to make sure all categories and locations got enough foreign exchange to be in equilibrium while at the same time not offer excessively liquidity for the

different areas or categories, given the overall lack of supply of foreign exchange for the balance of payments.

There are different ways to statistically test the lagged effect from one variable in another. If the series are stationary, this can be done using a Granger causality test or a vector auto regression (VAR). If the series are not stationary in level but are in first difference, then a cointegration test combined with a vector error correction (VEC) is the most adequate econometric methodology (Greene, 2008, p. 739). In this case, both a granger causality and a VAR are performed below since the series of auctioned, offered currency, and the gap are all stationary in level, shown in table 5.2.

Table 5.2 – Unit Root Test 1 – Stationary

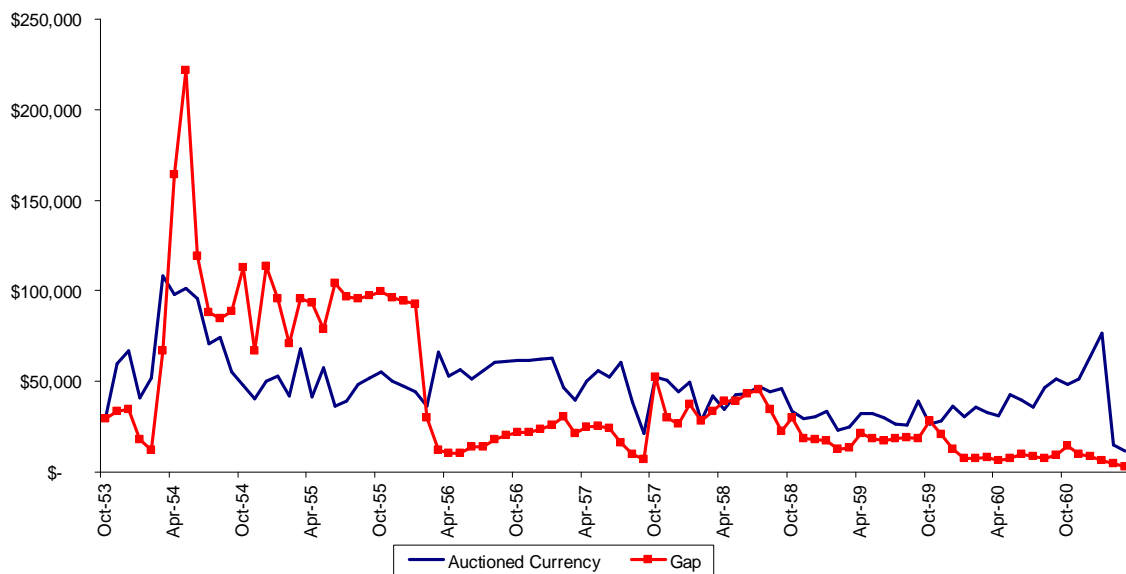|	T-Statistic	P-value	Unit Root?
Level			
GAP	-2.894	0.05**	No
Auctioned Currency	-3.99	0.0023***	No
Offered Currency	-4.453	0.003***	No

Source: Own Construction; Statistical significance: *** for 1% level; ** for 5% level; * for 10% level

The first test, granger causality, follows the concept that a time series is said to granger-cause another if it can be shown, with the use of an F-test on lagged values of the first series, that those values provide statistically significant information about future values of the other series (Greene, 2008, 699). In simple words, it means one series is statistically helpful to predict another. The second test, the VAR, is an econometric model used to capture the linear interdependencies among multiple time series. In this exercise, each variable has an equation explaining its evolution based on its own lags and the lags of the other model variables, allowing us to test if the lag information of a specific time series helps to predict the other series overtime. In practical terms, both tests have the same statistical objective, but will be performed to give robustness to the overall exercise (Greene, 2008, 703).

The ideal experiment would be to test whether the results from the previous auctions predict the gap of quantities offered and effectively purchased in each of the categories, or even in each category and each auctions exchange house. This level of details would certainly allow a very comprehensive understanding of how officials were distributing foreign exchange. Unfortunately, there is no available data on auctioned and offered foreign exchange at the category level, but only at the aggregated level for the whole MER system. And there are no data on the distribution across the auctions houses. The collected data includes only the quantities auctioned at the category level, which was just used for the random walk tests for the previous exercise. The monthly bulletins from Sumoc, as well as the statistical books from Banco do Brasil, only provide general data for the system aggregated from the different auctions houses.

Despite the limitation the test at the aggregate level can be revealing about the officials' approach to foreign currency distribution. If the amount of auctioned currency can help to predict the gap in the following period at the aggregate level, it means that officials were, from a centralized perspective, looking at the full market results at a specific moment to determine how much to offer in the next auctions, and thus trying to reduce the gap between the auctioned and offered currency. Figures 5.3 and 5.4 describe the data which is used in this test.
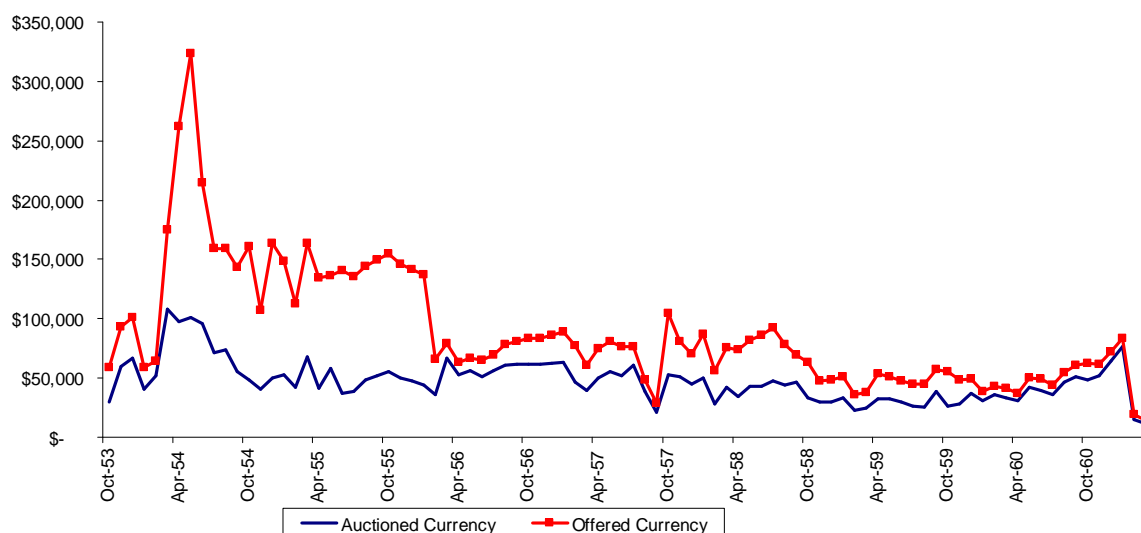
Figure 5.3 - Auctioned Foreign Exchange and Gap (U$ million) - 1953-1961

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. See appendix 4 for methodology.

Figure 5.3 shows the evolution of the quantities auctioned and the Gap between offered and auctioned foreign exchange. Figure 5.3 seems to suggest changes in the pattern of the auctioned foreign exchange and the gap. In the beginning of the series, the gap was much bigger than the quantities effectively auctioned, an indication that officials were allocating foreign exchange inefficiently to markets, as a lot was not being sold in some auctions. In time, this pattern changes and the gap falls. If the test below reveals that officials were responding to the previous auction results, this process would suggest a learning process from officials to reduce the gap over time. The reduction of the gap happens more clearly around 1955, after very high volatility in the first few years of the system. Another interesting aspect is how less volatile is the series of auctioned foreign exchange in comparison to the gap. It suggest the level of auctioned currency was more stable in the aggregate level, and officials improved the distribution to match the amounts offered and auctioned at the MER system.

Figure 5.4 - Auctioned Foreign Exchange and Offered Foreign Exchange - 1953-1961

Source: Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. See appendix 4 for methodology.

Figure 5.4 shows the evolution of the quantities auctioned and offered. It also points to a reduction of the gap with a clear convergence of the offered foreign exchange to the auctioned foreign exchange, reinforcing the conclusion from Figure 5.4 that the offered currency adjusted and converged to the more stable level of auctioned foreign exchange. The figure does not reveal any clear relationship of one series predicting another, only this general convergence. That is why using the gap as an indicator for the allocation mismatch seems to provide more information on whether officials were changing improving their allocation or not.

Table 5.3 - Granger Causality Test

Direction of Causality			F-Statistic	P-value	Granger Cause?
GAP		Auctioned Currency	0.7	0.4	No
Auctioned Currency	*granger cause*	GAP	3.4	0.0681*	Yes
Offered Currency		Auctioned Currency	0.7	0.4	No
Auctioned Currency		Offered Currency	0.1	0.749	No

Source: Own Construction; Statistical significance: *** for 1% level; ** for 5% level; * for 10% level

The results confirm the above expectations. In the case of the granger causality test in Table 5.3, from the four tests performed, the granger causality is only statically significant

when the auctioned currency is tested to granger cause the gap. In this case, there is an indication that the amount of currency effectively auctioned at month predicts the gap in the following month. It suggests officials were looking at the auctions result to accurately distribute foreign exchange in the following period, trying to reduce the gap, a signal of mismatch between supply and demand for foreign exchange. For robustness, the granger causality test was also performed between the offered and auctioned foreign exchange, as well as inverting the causality between the gap and the auctioned currency (also at Table 5.3). They were all statistically not significant which reinforces the validity of the result obtained between the auctioned foreign exchange and the gap.

Table 5.4 – VAR Model

	VAR Results		
	Auctioned	**GAP**	
Auctioned Currency (-1)	0.63	0.27	**Coef**
	0.095	0.15	**SE**
	0***	0.034***	**P-value**
GAP (-1)	0.34	0.74	**Coef**
	0.04	0.06	**SE**
	0.46	0***	**P-value**
C	15998	-5140	**Coef**
	4229	6708	**SE**
	0***	0.22	**P-value**
R2	0.439	0.73	
Adj. R2	0.426	0.72	n=89

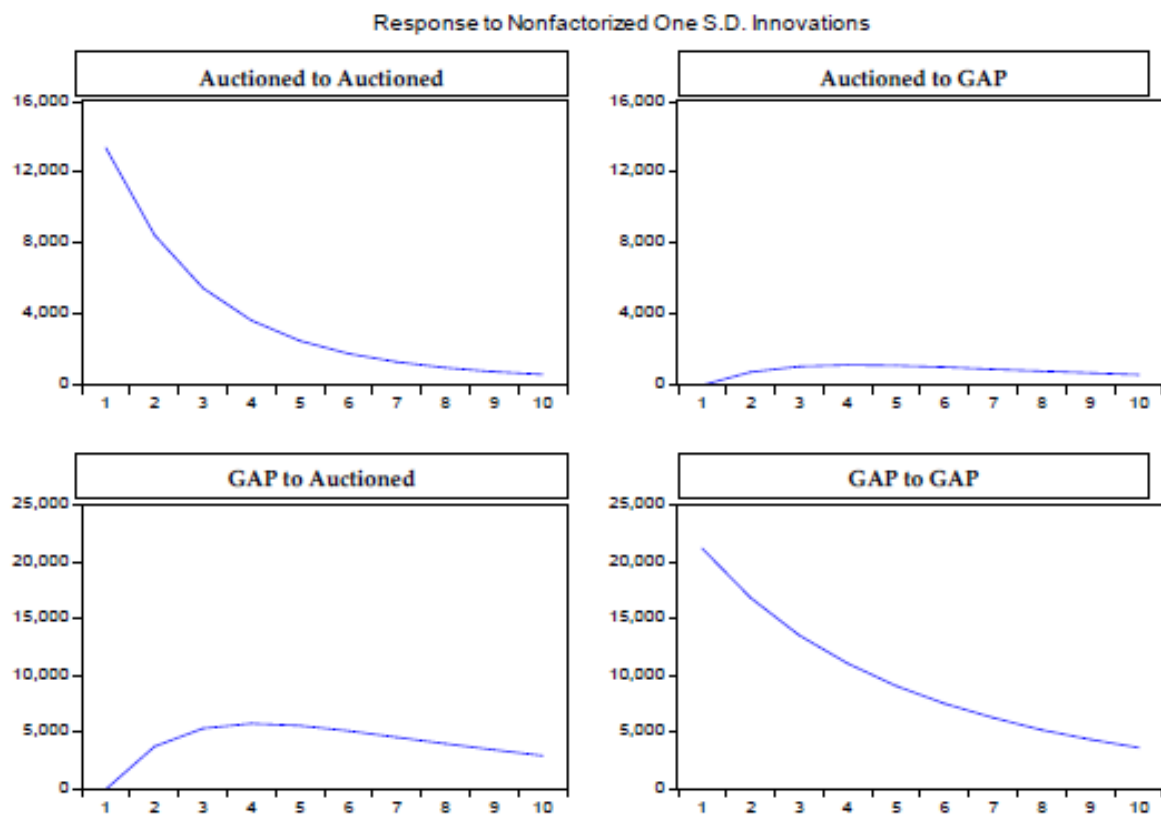Source: Own Construction; Statistical significance: *** for 1% level; ** for 5% level; * for 10% level

More results with the same conclusions are obtained with the VAR estimates. Table 5.4 shows the effects of the variable lags on each other. The direct elasticities of each variable (both gap and auctioned currency) on their future values are very strong, not only in coefficients but also in statistical significance. This is not a surprise as one would expect the amount of currency distributed in a month to have a strong connection to amount offered in the following month. But the cross coefficients are the most interesting results and, similarly to the granger causality test, the only statistical significant relationship is found in the elasticity of lagged effect of the auctioned currency on the gap. These results reinforces the hypothesis that officials were looking at previous auctions results in an effort to distribute future foreign exchange and reduce the mismatch of allocation in the system.

Finally, two aspects of the tests are worth highlighting. First, these relationships are essentially short-term. VAR coefficients (without cointegration) and granger causality tests should be interpreted only short-term causality relationships. This is not a problem for this experiment, since no long-term relationship between the two variables is expected, but the results should not be interpreted as a long-term endogenous adjustment from the auctions to the gap. In fact, the results confirm only the short term responsiveness from

one variable to the other, which resulted from an exogenous reaction from authorities. Second, the autocorrelation LM test for residuals shows no signals of any serial autocorrelation in the VAR model, indicating robustness of its results.

The VAR exercise is usually combined with the use of impulse response functions, which show the dynamic of the VAR variables considering a shock of one standard deviation in the lag of one another variable of the model. The impulse response functions can be used to assess how the GAP responds overtime to a shock in the amount of auctioned currency. Figure 5.5 shows the impulse response functions graphs for each of the lagged relationships tested in the VAR model.

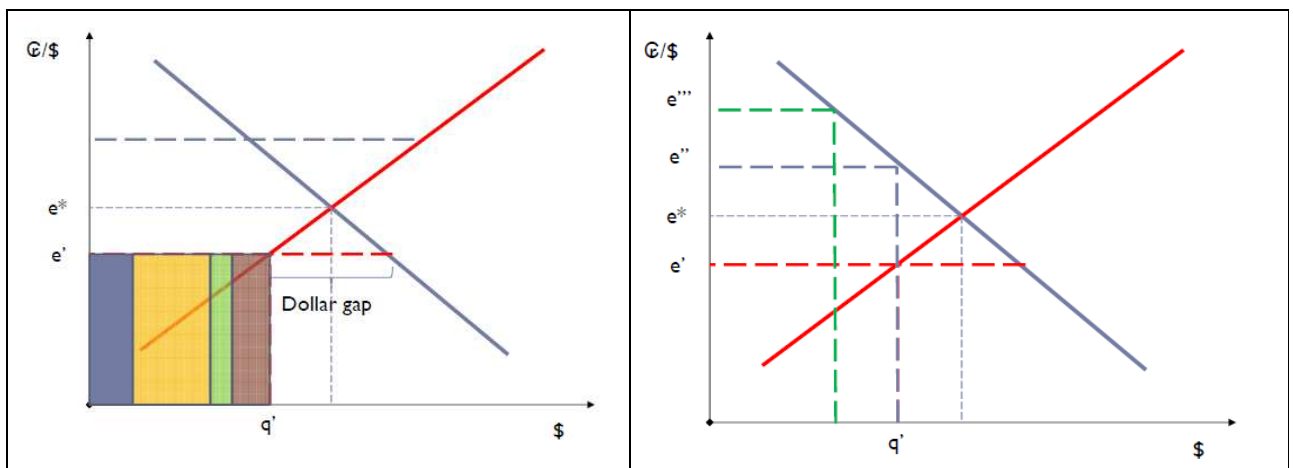## Figure 5.5 – Impulse Response Functions

Source: Own Construction. Build on the VAR results from Table 5.4

The graphs show an interesting dynamics of the auctioned currency and the GAP. First, its shows declining quantities of auctioned currency and gap in case of a shock of one standard deviation from themselves in the initial month. This only confirms that the amount of auctioned currency and the size of the gap falls overtime. Second, it shows almost no effect from a shock of one standard deviation of the GAP in the auctioned currency, exactly as the model suggested. Third, and most importantly, it shows a very interesting dynamic when the GAP responds to a shock of one standard deviation in the auctioned currency. The shocks initially results in an increase in the gap for the first few

months of the system, as officials are being pressured to provide additional liquidity to the auctions as are observing a larger demand of auctioned currency in the previous period, but then this effect declines over time with the gap gradually closing with officials improving the distribution and closing the gap. This is the further confirmation of the learning process of Sumoc officials, which by looking at previous results are able to adjust and gradually reduce the gap over time.

From a simple microeconomic perspective, what these results suggest is that Sumoc was trying to separate each category as single market for foreign exchange, and then allocate enough funds allowing exchange rates to adjust endogenously. The trick was, of course, to use the price information from the previous month of auctions results to centrally improve the distribution of foreign exchange in the following month and reach market equilibrium for each category. Figure 5.6 helps to explain this process.

Figure 5.6 – Microeconomic Interpretation of Brazil's MER System

Source: Own Construction

The two chart shows a simply supply and demand dynamic. The horizontal axis shows the quantities (q) available of foreign exchange ($\$$), while the vertical axis shows the prices of the exchange rates (e) in cruzeiros per dollars ($\mathbb{C}/\$$) . The left graph shows a MER system where supply and demand of foreign exchange are not in equilibrium because officials have fixed the exchange rate. This causes a disequilibrium in demand and supply and the appearance of a dollar gap – which is the cause for the emergence of a black market for foreign exchange. The right chart shows what Sumoc officials were doing for each category of the MER system. Since they could not provide enough foreign exchange supply for the whole demand for imports, by fixing the quantities in each category, they forced the market to adjust through the demand curve. This forced the exchange rate price to depreciate finding its own equilibrium for each individual category. The responsiveness to previous demand fluctuations was a way to guide markets to follow this rule, not allowing exchange rates prices to surge in a specific category, while at the same time containing the emergence of a dollar gap. Sumoc is helping markets to function properly.

This allowed a controlled depreciation process of the various exchange rates and the overall auction weighted exchange rates, as shown by Figure 2.1 in section 2.
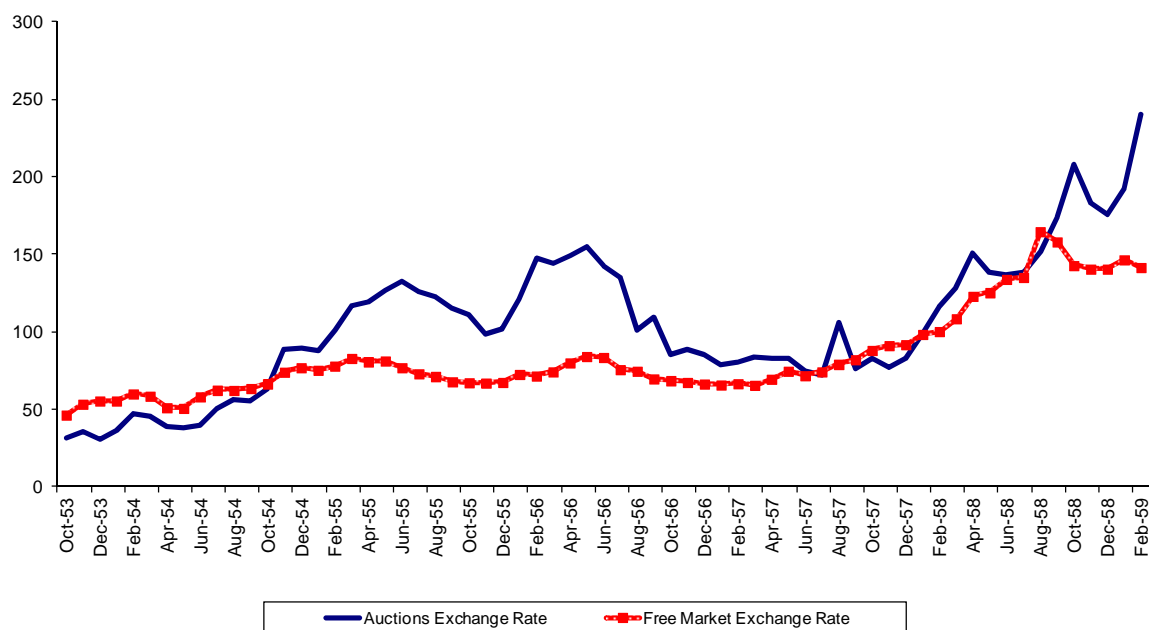
5.3 – Chasing the Free Market

The third exercise uses a different set of information from the dataset. Instead of looking at the quantities, it uses exchange rates prices. Based on the quantities allocated to each MER category and the exchange rates series, it is possible to construct the weighted average auctions exchange rate. At the same time, while all trade operations went through the auctions system, there was a floating free market exchange rate for services and capital operations, which represented about 10% of the foreign exchange market (calculated based on IBGE, 1951-1961). This exchange rate was created in 1952 before the auctions and it was in theory and practice a separate market for these transactions (Sumoc Minutes 266 of 10/07/1951). The free market was the first experiment of Sumoc of allowing some exchange rate depreciation fluctuation, but since it was concentrated on only a small part of the market, it did not have any meaningful impact to stabilize the balance of payments (Figure 2.3).

As discussed, officials imposed minimum prices for the exchange rates in the auctions for each category. These prices were increased overtime according to the results of the previous round of auctions and were used to homogenize the system forcing the auctions to have similar exchange rates across the country in the same categories. Interestingly, however, was the fact that in practical terms these minimum prices were set discretionarily and did not follow any specific rules. One can interpret the increase in these exchange rate minimum prices as not only as a way to maintain a certain level of homogeneity between the auctions houses, but also as an effort to force exchange rate prices to depreciate. As just discussed in the previous tests, it was not in the interest from authorities in setting prices too high that would force too many buyers out and increase the gap between offered and auctioned foreign exchange. It was their objective to produce some depreciation as this was the mechanism to restrict imports and stabilize the balance of payments. So the gradual increase in the minimum can be interpreted also a mechanism to force exchange rates categories to depreciate. The question that emerges is if this increase in the exchange rate minimum prices has any connection to the free market exchange rate, which could be used by authorities as a benchmark of the expected size of the depreciation and help setting the new minimum prices If the weighted auction exchange rate is predicted by the lagged market exchange rate, this is an indication that officials were looking at the free market as a benchmark to determine the minimum prices for the auctions. In other words, they would be forcing the auctions to converge to the free market overtime using the minimum prices mechanism and the quantities distributed to each category.

There was no overlap between the free market and the auctions. Exporters were forced to sell all their foreign exchange inflows to Banco do Brasil and this was the only source of foreign exchange for the auctions. The transactions of the free market rate had their own

supply of foreign exchange from inflows for wages, capital or services. The free market, although in smaller size (about 10% of the foreign exchange market), remained functioning during the role period of the auctions period and can be tested as a benchmark for auctions exchanges rates. The weighted auctions exchange rate was constructed with the data of the quantities of foreign exchange distributed to each sector between 1953 and 1957 (Figure 5.4) and the exchange rates of each category presented at section 2 (Figure 2.2). Figure 5.7 presents the series.

Figure 5.7 - Free Market Rate and Weighted Auctions Rate - 1953-1957 (Cr/$)

Own Construction. Built based on MER primary sourced data from Sumoc Annual Bulletins and Reports, 1953-1961 and Monthly Statistical Books – Ministry of Finance, 1951-1957, containing data from Banco do Brasil. See appendix 4 for methodology.

A first look at the two series seems to suggest they do correlate. But while the free market exchange rate depreciate in a more stable pace, the auctions rate follows a more volatile path. This is probably the result of the volatility of the quantities auctioned for the different categories. A first look does not, however, indicate which series could be following the other in a causal relationship. Based on the description above, the expectation would be that the market rates predicts the auctions exchange, confirming that authorities were responding to markets and using the free market as a benchmark. The opposite result, with the free market being predicted by the auctions, would be counter-intuitive.

Table 5.5 – Unit Root Test 2 – Stationary

	T-Statistic	P-value	Unit Root?
Level			
Market	-0.074	0.947	Yes
Auctions	0.0307	0.957	Yes
1st Difference			
Market	-6.862	0***	No
Auctions	-6.741	0***	No

Source: Own Construction; Statistical significance: *** for 1% level; ** for 5% level; * for 10% level

For this exercise, a different econometric methodology is required compared to the previous exercises. Table 5.5 shows that the two series (market and auctions) are not stationary in level, which impedes performing a granger causality test or a VAR. But since the variable are stationary in first difference, a cointegration test combined with a Vector Error Correction (VEC) – in case they do cointegrate – is the correct approach to the test whether the market exchange rates predicts the auctions exchange rate.

The cointegration test checks if the two variables have a linear long-run relationship, and in case they do, the VEC shows which variable predicts the other in the short-term - a similar concept to VAR performed above but for non-stationary variables (Greene, 2008, p. 756). For the purpose of this exercise a cointegration test is very appropriate as now the objective is to find a long-term relationship between the two series, which was not the case in the previous tests. Only if the two series are cointegrated and with a long-term relationship, then the VEC model would show if the auctions exchange rate is predicted by the market, confirm the short-term adjustment dynamic. Table 5.6 presents the results of the cointegration test.

Table 5.6 – Cointegration Test

Johansen Cointegration Test (No Trend)		
Market and Auctions		
	Trace	Max-Eigen
None	0.53	0.53
At Most 1	0.06*	0.048**

Source: Own Construction; Statistical significance: *** for 1% level; ** for 5% level; * for 10% level

Table 5.6 shows one cointegrating equation between the two variables in the long-term (pointed by both the trace and max-Eigen indicators of the Johansen Test). This means the two series have a long-term statistical relationship, and allows the performance of the VEC model to test the short term responsiveness of one variable to the other. The VEC results are presented in table 5.7

Table 5.7 – Cointegration and VEC Results

	Market	Auctions	
Vector Error Correction Model			
	Market	**Auctions**	
Coint Equation	0.053	0.194	**Coef**
	0.034	0.072	**SE**
	0.06*	0.004***	**P-value**
Market (-1)	0.163	0.637	**Coef**
	0.146	0.312	**SE**
	0.1*	**0.023****	**P-value**
Market (-2)	-0.150	-0.125	**Coef**
	0.145	0.310	**SE**
	0.150	0.480	**P-value**
Auctions (-1)	0.037	-0.101	**Coef**
	0.062	0.133	**SE**
	0.270	0.220	**P-value**
Auctions (-2)	-0.026	-0.034	**Coef**
	0.060	0.129	**SE**
	0.480	0.390	**P-value**
C	0.015	0.029	**Coef**
	0.008	0.017	**SE**
	0.03**	0.047**	**P-value**
			N=62

Source: Own Construction; Statistical significance: *** for 1% level; ** for 5% level; * for 10% level

The VEC results shows that the market exchange rate explains the auctions exchange rate with 5% statistical significance, while the opposite effect does not exist. This means that the markets exchange rate statistically predicts the auctions exchange rate. The test also shows that this short-term response happens only with one month lag, which suggest officials were exactly chasing the immediately previous market exchange rate. The results of the VEC suggest the existence of a relationship between the two completely separate markets, which could only be linked by the MER mechanism of setting minimum prices and the distributing foreign exchange in the auctions in an effort to depreciate exchange rates following the free market. It suggests the free market exchange rate as an important benchmark for the auctions system and Sumoc

6 – Conclusions

This paper has expanded the analysis on the peak and decline of the Brazilian MER system between 1953 and 1961. It has provided new evidence and arguments that explain why the system has worked in its first phase (1953-1957) and how it has decayed over time. The two main conclusion are: (1) The decline of the system is related to the increase in imports outside the auctions system because of the increase in government purchases, the exemptions to the private sectors and the hidden imports of Instruction 113, which removed foreign exchange from the system and made the original system lose its functionality; (2) The effective results obtained in the first phase are related not only to the centralization of foreign exchange in the system but mostly to the responsiveness from officials to market demand. The allocation of funds over time was not random and the econometric exercises suggest officials were looking at the results of the previous auctions and the free market exchange rate to determine how much to provide to each category and to set minimum prices for the following month. This allowed an interesting intermediary system which helped to gradually depreciate the exchange rate after a long period of overvaluation (Figure 2.1), with Sumoc "guiding the invisible hand" of the market.

These conclusions provide contributions to different areas of literature related to this subject. To the literature about the Brazilian MER system and Brazil`s exchange rate policies (Kafka, 1956; Huddle, 1964; Baer, 2009; Figueiredo Filho, 2005; Lago, 1982; Vianna, 1987; Sochazewski, 1980; Bergsman, 1980; Abreu, 1990; and Caputo, 2007) it gives details on the mechanics of the system, something inexistent so far, and also confronts the well established concept that Instruction 113 and the tariffs reform of 1957 were an important set of complementary policies to the auctions system targeting to stimulate industrialization and provide additional differentiation of sectors. While they could have reached the objective of industrialization, from a balance of payments point of view in practice they were playing against the original MER system, opening the door for out of

auctions imports and making the system less effective, eventually collapsing in the end of the 1950s.

And for the more general literature of capital controls and Bretton Woods discussed in (Bordo, 1993; Reinhardt & Rogoff, 2002; Magud at all, 2011, Konig, 1968; Ikenberry, 1993; Frieden et all, 2000; Terborgh, 2003; Marston, 1993; Schlesinger, 1952) it gives indication of a system which while worked only for a short period of time, had an interesting use of capital controls and a mechanics which was interestingly effective for that period. Naturally this does not prove that capital controls can be used at any moment and circumstance, but in moments of shortage of liquidity such as the post-war Breton Woods, this proves a unique example of a system that was quite functional while it followed its original design.

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