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MONEY AND CREDIT POLICIES IN SMALL OPEN LESS-DEVELOPED ECONOMIES

Indiana University

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MONEY AND CREDIT POLICIES IN SMALL OPEN
LESS-DEVELOPED ECONOMIES

Wassim N. Shahin

Submitted to the faculty of the Graduate School
in partial fulfillment of the requirements
of the degree
Doctor of Philosophy
in the Department of Economics
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Accepted by the Graduate Faculty, Indiana University, in partial fulfillment of the requirements of the degree of Doctor of Philosophy.

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Date of Oral Examination:
July 25, 1986
Dedicated to

Badr, Naim, Khawla, Bushra, and Salim
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Finally, the support I received from my family in the Lebanon is beyond any description. My problems were always theirs despite the dislodgement, falling shells, and booby-trapped cars they were facing. Without this support, I would have never been able to complete my doctorate.
Abstract

Dissertation: Money and Credit Policies in Small Open Less-Developed Economies.

The thesis addresses the issues of money and credit policies in small open less-developed economies. We examine the effects of varying monetary policy instruments on money and credit aggregates under a fixed exchange rate regime and a flexible regime when the nonborrowed base is the instrument of policy. We also analyze the effect of financing budget deficits through captive buyers of government securities on money and credit aggregates under both regimes. The thesis also deals with measures aimed at promoting and diversifying regulated markets for government securities.

Studies dealing with the functioning of monetary policy in the presence of target aggregates and different monetary regimes have generally encompassed the characteristics of developed closed economies. In the last decade, several small open economies experienced major developments in their financial markets as a result of policies aimed at financial liberalization. These changes have rendered the financial environment in these countries suitable for using money and credit as instruments of stabilization. At the same time, the financial sector of these economies is still characterized by some major features salient to a less developed setting. These features include the presence of unregulated loan markets, the lack of ownership motives for holding government securities, the presence of captive buyers of these securities, and fixed deposit, loan and other major interest rates. Using a portfolio balance model that encompasses these characteristics, we reached the
results that under both policy regimes, monetary authorities can vary a policy instrument and predict the direction of the move in unregulated loans. The effect of varying policy instruments on regulated loans, money supply, and the monetary base depended on the instrument itself and the regime. The same results held in the case of increasing budget deficits and changing policy instruments to promote a market for government securities. Some of our results were not in line with the analysis in the existing literature because of the differentiating characteristics of the financial markets in the study.
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INTRODUCTION

Studies dealing with the functioning of monetary policy in the presence of target aggregates and different monetary regimes [B. Friedman 1975, Benavie and Froyen 1982, Bryant 1982, Meyer 1983, Lindsey et al. 1984], have generally encompassed the characteristics of developed closed economies.

In the last decade, several small open less developed economies experienced major developments in their financial markets as a result of policies aimed at financial liberalization. These changes have rendered the financial environment suitable for using money and credit as instruments of stabilization. At the same time, these economies are still characterized by some major features salient to a small less developed setting. The differentiating characteristics take several forms such as the presence of unregulated loan markets, the lack of ownership motives for holding government securities, the existence of captive buyers of these securities, and fixed deposit, loan and other major interest rates.

Therefore, we thought that it would be inappropriate to generalize the results in the literature concerning money and credit policies to the case of small open less developed economies. A study that takes into account the financial characteristics of these countries is more fitted for this task.

The purpose of the dissertation is to address the issues of money and credit policies in small open less developed economies using a model that includes the major features of the financial sectors in these countries. We examine the effects of varying monetary policy instruments...
on money and credit aggregates under a fixed exchange rate regime, and a flexible exchange rate regime when the nonborrowed base is the instrument of policy. We also analyze the effects of financing budget deficits through captive buyers of government securities on money and credit aggregates under both regimes. The thesis also deals with measures aimed at promoting and diversifying regulated markets for government securities.

The thesis is organized in seven chapters. Chapter I begins by setting out the objective and rationale for targeting monetary aggregates in more developed economies. The primary objective of monetary targeting is to achieve greater price stability. Four different reasons are given for controlling monetary aggregates in order to achieve this purpose: the relation between money stock and total output; the floating exchange rate regimes followed after 1973; the disenchantment with previous policies based on controlling interest rates, exchange rates, and other money market conditions; and the expectational effects of announced targets. Then, the experience with monetary targeting is analyzed. This is followed by a discussion on whether the objective and rationale for monetary targeting can be generalized to the case of small less developed economies. The discussion concludes with suggestions favoring using money and credit aggregates as intermediate targets of policy in these economies.

Chapter II discusses the most important characteristics of the loan, money, and government securities markets in small open less developed countries: the existence of captive buyers of government securities, mainly financial intermediaries, who are required to hold a quota of government bonds after every new issue; the lack of ownership motives for
holding these securities due to fixed bonds prices and rates of return;
the presence of unregulated loan markets defined to include indigenous
bankers, traders, landlords, and money lenders, who are not subject to the
direct regulations of the monetary authorities; and interest rate policies
based on fixing deposit, loan and other major interest rates. The second
part of Chapter II relates the characteristics of the financial markets
in small open less developed economies to the existing studies on monetary
targeting. The conclusion is that these studies did not encompass the
differentiating features of the types of economies we consider and,
therefore, a model that takes these characteristics into account needs to
be developed.

Chapter III introduces a portfolio balance model with micro
foundations, including the major characteristics of the financial markets
in small open less developed economies just discussed. The model allows
us to use two policy regimes, one in which the policy-makers peg the
exchange rate (a fixed rate regime) and allow both their holdings of
foreign assets and the nonborrowed base to adjust; the other in which the
nonborrowed base is policy determined, and the exchange rate and the
foreign assets held by the central bank are endogenous (a flexible rate
regime). The model has also several actual instruments (instruments that
the central bank does control precisely) such as the discount rate, the
reserve requirement ratio, the deposit rate, and the loan rate.

In Chapter IV, we use comparative statics techniques to discuss the
effects of varying actual instruments on the unregulated loan market and
regulated loans under different policy regimes. Studying the effects of
changing actual instruments on the regulated loan market is of importance if the monetary authorities use a policy instrument such as a fixed exchange rate regime or a nonborrowed base regime in order to use the regulated loans as the intermediate target of policy. Similarly, in the system we are considering, a large part of the loan activities take place through unregulated channels. Therefore, we examine the instruments that can affect the behavior of borrowers and lenders in the unregulated loan market.

Chapter V deals with some monetary policy implications in the presence of the financial characteristics salient to small open less developed economies. We first examine the effects of varying actual instruments on the money supply and the monetary base under different policy regimes. Our aim is to draw some conclusions concerning the ability of the monetary authorities to affect the two aggregates when they are used as intermediate targets of policy. Then, the effects of financing budget deficits through captive buyers of government securities are discussed. Our purpose in raising this issue is to analyze whether monetary authorities can use a money aggregate as an intermediate target while financing part of the budget deficits through captive buyers.

Chapter VI moves to the topic of the functioning of a regulated market for government securities. We first review the status and functions of a regulated market for government securities using the experience of Taiwan. We then review the literature on measures to promote and diversify markets for government securities. The recommendations in the literature did not result from any specific model and were descriptive in nature. Therefore, the model developed in Chapter
III is used to recommend such measures under different policy regimes.

The concluding Chapter describes the approach we have taken in the study, summarizes our findings, and interprets their significance. Some of the results we reach concerning the effects of varying actual instruments on regulated loans, the money supply, and the monetary base are not in line with the conventional wisdom because of the differentiating characteristics of the study. This holds too in the case of the effects of financing budget deficits through captive buyers of government securities on monetary aggregates. Our results also imply that monetary authorities can affect the activity in the unregulated loan market under both policy regimes and with several actual instruments. The results reached to recommend measures to promote and diversify a market for government securities suggest that under a fixed exchange rate regime, reducing the regulated loan rate might be counterproductive when it comes to diversifying a market for government securities. In the case of a flexible exchange rate regime, it was shown that reducing the loan and the deposit rate helps promote and diversify this market.
CHAPTER I

OBJECTIVE AND EXPERIENCE WITH MONETARY TARGETING

The purpose of the this chapter is threefold. First, we will state and discuss the objectives and rationale for monetary targeting. Second, we will briefly analyze and evaluate the experience with targeting. In the third part, we will examine whether the underlying reasons for targeting can be extended to the case of small open economies sharing some less-developed countries (LDCs) characteristics discussed in Chapter II.

I. Objective and Underlying Reasons for Monetary Targeting

Setting rules for the conduct of monetary policy as a way to stabilize economic activity was suggested long before industrialized countries adopted monetary targeting. Henry Simons [1936, p. 3] stated that "definite, stable, legislative rules of the game as to money are of paramount importance to the survival of a system based on freedom of enterprise." Therefore, in order to stabilize the price index, he "preached" what he called a new "religion of money" based on putting demand deposit banking on a 100 percent reserve ratio and fixing the total quantity of currency and demand deposits. Friedman [1960] advocated more flexible rules to stabilize economic activity by recommending a constant and announced money supply growth. Such a policy in his opinion prevents monetary arrangements from becoming a major source of instability. "What we need is not a skilled monetary driver of the economic vehicle continuously turning the steering wheel to adjust to the unexpected irregularities of the route, but some means of keeping the monetary
passenger who is in the back seat as ballast from occasionally leaning over and giving the steering wheel a jerk that threatens to send the car off the road’’ [Friedman, 1960, p. 23].

Until the early 1970s, monetary authorities, in general, relied upon interest rates, exchange rates, and total credit in the economy as intermediate targets. In the mid 1960s, for example, the dominant operating targets for the United States’ open market policy were money market conditions. In the meeting of the Open Market Committee on November 22, 1966, “supporting staff documents indicated that the directive language quoted would be consistent with net reserves fluctuating around zero, a 3-month treasury bill rate around 5 percent, and bank credit expansion in a 2 to 4 percent annual rate range.” [Wallich and Keir, 1978, p. 41]. In most other countries, the main emphasis was on fixing the exchange rate, in line with the Bretton Woods system followed before 1973. Rather than emphasizing a monetary target, central banks were required to intervene in the foreign exchange market to keep exchange rates fixed, and their domestic money stock was determined as a consequence.

In 1970, however, the United States changed its emphasis and began using monetary aggregates as policy objectives. Average growth ranges were specified for both the bank credit proxy and the money supply. “During the succeeding 2-2-1/2 years, operating directives usually stressed bank credit and money as primary targets with money market conditions subordinated to a proviso role” [Wallich and Keir, 1978, p. 41]. But it was not until December 1974 that monetary targeting, which implies adopting announced quantitative targets for the rate of growth of
the money supply, came into effect. West Germany was the first country to announce a formal target for its money stock for a period as long as a year. The United States, Switzerland and Canada followed the West German example in 1975 and the United Kingdom, France and Italy started targeting in 1976.

The primary objective of monetary targeting was to achieve greater price stability. In the 1970s, industrialized countries experienced higher degrees of inflation than in the previous two decades. If we examine the inflation rate of the industrial countries as a group, we see that over the five year period from 1971 to 1975, prices increased by 41 percent compared to 35 percent in the ten year period from 1961 to 1970 and 19 percent in the ten year period from 1951 to 1960. [Table I]. This worldwide inflation led monetary authorities in the aforementioned countries to seek a new policy fit to cope with the emerging problem and its consequences. The remainder of this section is an examination of the economic rationale behind substituting monetary targeting for the previous policies based on controlling interest rates, exchange rates and credit conditions.

1. Relation Between Money Stock and Total Output

Controlling the growth of the money stock to stabilize economic activity presumes predictable links between the money supply and the real sector. In his essay "of Money" in 1752, David Hume illustrated this relationship by stating that "in every kingdom into which money begins to flow in greater abundance than formerly, everything takes a new face: labour and industry gain life, the merchant becomes more enterprising, the
### TABLE I-1

**Inflation Rates in More Developed Countries That Have Targeted a Quantity Aggregate**

<table>
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</thead>
<tbody>
<tr>
<td>Canada</td>
<td>3</td>
<td>4.6</td>
<td>7.6</td>
<td>10.8</td>
<td>10.7*</td>
<td>7.6</td>
<td>9.0</td>
<td>9.0</td>
<td>10.2</td>
<td>10.2</td>
<td>12.4</td>
<td>10.8</td>
</tr>
<tr>
<td>France</td>
<td>5.5</td>
<td>6.1</td>
<td>7.1</td>
<td>13.7</td>
<td>11.7</td>
<td>9.6*</td>
<td>9.2</td>
<td>9.1</td>
<td>10.6</td>
<td>13.3</td>
<td>13.3</td>
<td>12.1</td>
</tr>
<tr>
<td>Italy</td>
<td>5.1</td>
<td>5.5</td>
<td>10.8</td>
<td>18.9</td>
<td>16.9</td>
<td>16.8*</td>
<td>16.9</td>
<td>12.1</td>
<td>14.7</td>
<td>21.2</td>
<td>17.8</td>
<td>16.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>6.4</td>
<td>6.7</td>
<td>8.7</td>
<td>9.7</td>
<td>6.8*</td>
<td>1.6</td>
<td>1.5</td>
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<td>3.5</td>
<td>4.0</td>
<td>6.5</td>
<td>5.6</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>9.3</td>
<td>7.2</td>
<td>9.2</td>
<td>15.7</td>
<td>24.3</td>
<td>16.6*</td>
<td>15.7</td>
<td>8.2</td>
<td>13.5</td>
<td>17.9</td>
<td>11.9</td>
<td>8.5</td>
</tr>
<tr>
<td>United States</td>
<td>4.2</td>
<td>3.4</td>
<td>6.1</td>
<td>10.9</td>
<td>9.1*</td>
<td>5.8</td>
<td>6.5</td>
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<td>11.2</td>
<td>13.5</td>
<td>10.4</td>
<td>6.0</td>
</tr>
<tr>
<td>West Germany</td>
<td>5.0</td>
<td>5.6</td>
<td>6.9</td>
<td>7.0*</td>
<td>5.9</td>
<td>4.2</td>
<td>3.6</td>
<td>2.7</td>
<td>4.1</td>
<td>5.4</td>
<td>5.9</td>
<td>5.2</td>
</tr>
</tbody>
</table>

**Industrialized Countries: Increase in Consumer Prices**

1951-60: 19 percent; 1961-70: 35 percent; 1971-75: 41 percent

* = year targeting started

Data Sources: *International Financial Statistics*
manufacturer more diligent and skillful, and even the farmer follows his plough with greater alacrity and attention." [Hume, 1970, p. 37]. Since then, a large body of theoretical and empirical work was developed to describe the link between the monetary and real sectors of the economy. Historically, the impetus of current work began with Fisher and Wicksell around the turn of the century and continued, among others, with Pigou, Keynes, Hansen, Hicks, Metzler, Modigliani, Patinkin, Bruner and Meltzer, Friedman, and Tobin. Even though separate theories coincided on some points and differed on others, it is safe to state that, except under some rational expectations and market clearing hypothesis assumptions, there is a unanimity in the literature that the effects of changes in the quantity of money can be transmitted to the real economy through three channels. The first is the substitution or the cost of capital effect that takes place when prices of financial and real assets change. The second is the wealth effect resulting from changes in real cash balances and equity values, and the third involves credit policies. This last channel means that monetary authorities adjust credit conditions in the economy in order to expand or contract real sector activity.

Early empirical studies of the late 1930s concentrated on testing the validity of the money-interest rate-investment-output channel. Even though the results of these studies showed that interest rate had little or no effect on investment decisions, studies done in 1967 and 1970 by Jorgenson and associates showed that investment responds to interest rate variation, albeit, with a time lag. Other empirical studies of the 1960s and 1970s dealt with the relationship between money and money income. It
was shown that there is a positive and statistically strong relationship between the quantity of money and Gross National Product. Having determined a theoretical and empirical relationship between monetary and real sectors, the relationship between price movements and the stock of money in the economy becomes clear. In fact, acting as a historian, Friedman [1960, p. 9] attributes the increase in prices during the War of 1812, the American Civil War, World Wars I and II to governmental action in financing its expenditures. The inflationary effects of the increase in money supply were even more obvious during the Revolutionary War. In 1752, Hume wrote: "This is not easily to be accounted for, [increase in money stock], if we consider only the influence which a greater abundance of coin has in the kingdom itself, by heightening the price of commodities, and obliging everyone to pay a greater number of these little yellow or white pieces for everything he purchases" [Hume 1970, p. 37].

2. Floating Exchange Rates

The Bretton Woods fixed exchange rate system collapsed in 1973, more than one year before any country officially adopted monetary targeting. A system of floating exchange rate replaced the abandoned one. From 1974 to 1976, as we have seen in the previous section, seven industrialized countries announced quantitative monetary targets. Based on that evidence, there appears to be a strong relationship between monetary policy and the nature of the exchange rate regime. With the exchange rate left to float freely, monetary authorities can concentrate on targeting a monetary aggregate rather than adjusting these aggregates to keep the exchange rate fixed.
3. Disenchantment with Previous Policies

One reason given, especially by monetarists, for adopting monetary targeting is the growing disenchantment among policymakers with previous policies aimed at stabilizing the economy, mainly, those based on using interest rate as a policy objective. Interest rates are not always a good indicator of the state of monetary policy. It was not always clear whether the rise in interest rates was the result of tight monetary policy, or an increase in the demand for money. Added to this problem is the effect of inflationary expectations on nominal and real interest rates. With the presence of inflationary expectations, nominal and real interest rates diverge. Nominal interest rates may then give a false signal of what is happening in the economy. Thus, in the United Kingdom, while the minimum lending rate rose from 5 percent in June 1972 to 13 percent in September 1973, real interest rates fell as inflationary expectations increased more than nominal interest rates [Foot 1981, p. 16]. Based on the nominal interest rate figure, monetary policy seemed tight, but based on the real interest rate figure, it seemed easy. This shows that nominal interest rates can be a poor guide of the state of monetary policy.

Friedman advocates targeting a growth rate of the money stock not only because nominal interest rates give false signals but because monetary authorities cannot peg interest rates for more than very limited periods. According to Friedman [1968, pp. 6-7], an open market purchase aimed at increasing the money supply reduces interest rates. But this is only the beginning of the process not the end. A rapid increase in
monetary growth stimulates spending and thus raises income, causing an increase in the demand for money. In turn, the rise in money demand will, within a year or two, produce a rise in interest rates toward their natural level. More than that, if the public expects prices to continue to rise as a result of the monetary growth, the demand for loans keeps on increasing, a fact that raises interest rates above their pre-open market operations level. Therefore, Friedman continues, high and rising nominal interest rates have been associated with rapid growth in the quantity of money as in Brazil, Chile or the United States in the 1960s, and low and falling interest rates have been associated with slow growth in the quantity of money as in Switzerland in the 1960s and the United States from 1929 to 1933. Since monetary policy cannot affect interest rates for a long period, interest rates should not be used as a policy objective. Instead, the target should be expressed in terms of a monetary aggregate.

4. **Expectational Effects of Announced Targets**

Another argument used to explain monetary targeting is that announcing targets can have expectational effects in financial as well as real sectors. Business firms and trade unions are given a signal that inflationary expectations should be based not on present but on predetermined and announced future rates of money growth. By targeting the growth of the money stock, monetary authorities send a message to the public that they are serious in stepping up and implementing their counter-inflationary measures.
II. Target Aggregates and the Experience with Targeting

Countries have adopted a variety of different target variables for purposes of targeting monetary aggregates. Target aggregates have included the monetary base, the narrow definition of the money stock M₁, broader measures of the money stock M₂ and M₃, general credit expansion, and in some countries, a combination of more than one aggregate. At the same time, the experience of various countries with monetary targeting has differed. Our purpose is not to discuss in detail the experience with targeting on a country by country basis. It suffices to mention that even though the countries that have targeted did not meet their targets on all occasions, targeting is still used in all these countries, where the experience with the new policy has been generally successful in stabilizing price movements especially in Germany, Switzerland, and the United States [Table I].

Regarding the inability to meet the pre-announced growth rates of the money stock in all periods, various justifications are given to minimize the severity of this major criticism against targeting. Plausible explanations of this phenomenon can be broadly classified into two groups: First, there have been times where monetary authorities have deliberately accepted a deviation from target growth rates rather than pay the price necessary to meet these targets. In 1977–78, for example, Switzerland and West Germany had accepted an overshooting of monetary growth in order to offset the appreciation of their domestic currencies. In another instance, in 1980–81, the United Kingdom allowed M₃ to overshoot its target level, partly because development in the real economy suggested
that this aggregate was giving a misleading impression of the tightness of policy [Atkinson and Chouraqui, 1984, p. 9].

A second explanation for failures to meet targets can be attributed to the experimental nature of targeting, especially in the early stages of the mid-1970s. Because of the fact that target aggregates were new phenomena, countries were experimenting with the definition of the growth rate of the money stock, the target aggregates, and the instruments of control.

Before 1979, for example, countries like West Germany announced a single figure target measured by an average increase in the money stock during a given year. This left the monetary authorities with little room for maneuver in the case of any outside disturbance. Therefore, we now find countries using a target range with upper and lower growth rate, which makes it easier to stay within the announced boundaries.

More fundamentally, in some cases, the choice of the target aggregate rather than the ability of the monetary authorities to control it might have contributed to the deviations under consideration. Switzerland, for example, fixed a target for $M_1$ in 1975, only to discover in 1979 that the monetary base might have been more controllable. Other countries have experienced distortions in their $M_1$ too, mainly, the United States and Canada where some believed that shifts in $M_1$ were caused by financial innovations.

The choice of an instrument to control the growth of the monetary aggregate was found not to be appropriate in several cases too. Nothing was more dramatic than the experience of the United States. After using the federal funds rate as an instrument to control the growth of the money
stock for four years, monetary authorities in the United States decided to shift to an unborrowed reserves regime, believing that the new policy could achieve better results.

In what follows, we will examine whether the objective and rationale for targeting can be generalized to the case of less-developed economies.

III. Monetary Targeting and Small Open Less-Developed Economies

The literature on monetary targeting shows no evidence of any adoption of targeting in LDCs, except for Brazil where the monetary authorities set targets for both the monetary base and $M_1$. This fact does not mean that LDCs have not relied on monetary policy to stabilize economic activity. Various control measures have been used throughout the LDCs such as accepting ceilings on domestic credit expansion as part of the conditions for an International Monetary Fund loan, and other common anti-inflation policies. South Korea, for example, established in 1979 some rules governing the growth rate of the money supply which were enforced by capital controls and direct credit limits [Kuznets, 1982, p. 79]. But based on the existing evidence, if targeting had been attempted, the countries that have maintained monetary targets have not let the fact be generally known. On the other hand, in the cases where projections for the money stock are made such as in Australia, it is uncertain whether the policy is subsequently adjusted to try to validate these projections [Foot, 1981, p. 15].

Therefore, our purpose in this part of the paper is to discuss whether the underlying reasons for targeting discussed in part one hold in
the case of small open LDCs. The benefits and the opportunity cost of controlling the money stock or total credit are discussed and some suggestions concerning the decision to target a quantity aggregate in LDCs are considered.

1. The Objective of and Rationale for Targeting in Less Developed Countries

The purpose of monetary targeting as discussed in Part One was price stability. In the case of Italy, credit targeting was aimed at controlling both inflation and serious balance of payments difficulties [OECD, 1979, p. 52].

In general, LDCs are characterized by higher inflationary figures than more developed countries (MDCs). For the period 1971-80, consumer price figures show an increase in prices of 540.1 percent in non-oil developing countries compared to 118 percent in industrialized countries [Table II]. The data in Table II also show the movement in prices from 1975 to 1982 in a selected group of LDCs. Compared to Table I, Table II shows higher rates of inflation in most cases.

Regarding the rationale for monetary targeting, four issues were emphasized in Part One. Three of the issues: the relation between money stock and total output, the disenchantment with previous policies, and the psychological effect of announced targets are mainly theoretical and can apply to any level of development, albeit, in various degrees. There is strong evidence that the transmission process from the money stock to total output takes place in LDCs through the three channels discussed earlier: the substitution effect, the wealth effect, and credit policies which are likely to be the most powerful source of transmission of
monetary changes to the real economy in LDCs [Park, 1973, p. 394].

Disenchantment with previous policies is a debatable issue that is not usually discussed within the context of the degree of development in specific countries. It would be enough to mention that previous policies failed to stabilize the economy, based on the price movement figures [Table II]. The psychological effect of announced targets is expected to hold in LDCs as well.

We are left with the issue of exchange rate regime. As we have seen in Part One, after the collapse of the Bretton Woods system, countries were no longer required to maintain a fixed exchange rate. This means that domestic monetary policies would not have to be directed at fixing the exchange rate as in the past. Based on this point, a case for controlling the money stock rather than the exchange rate can be made, even though most LDCs intervene in foreign exchange markets attempting to affect their currencies. Intervention in the exchange rate market should not be a major obstacle for targeting if we take into consideration that three of the MDCs that have adopted monetary targeting (France, Italy, West Germany), follow some cooperative arrangements maintained under the European monetary system in conducting their exchange rate policies. In fact, 35 less developed countries have more flexible exchange rate arrangements than France, Italy and West Germany [International Financial Statistics].

2. Benefits and Opportunity Cost of Monetary Targeting

In general, the benefits of monetary targeting occur in the price sector and in the balance of payments, where credit policies involving
### TABLE II

**INFLATION RATES IN A SELECTED GROUP OF LESS DEVELOPED COUNTRIES**

<table>
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</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>187.5</td>
<td>447.8</td>
<td>176.5</td>
<td>175.3</td>
<td>159.5</td>
<td>100.7</td>
<td>104.4</td>
<td>164.8</td>
</tr>
<tr>
<td>Bolivia</td>
<td>7.1</td>
<td>8.0</td>
<td>8.2</td>
<td>10.3</td>
<td>19.7</td>
<td>47.2</td>
<td>32.1</td>
<td>123.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>29.0</td>
<td>42.0</td>
<td>43.6</td>
<td>38.7</td>
<td>52.6</td>
<td>82.7</td>
<td>105.5</td>
<td>97.9</td>
</tr>
<tr>
<td>Chile</td>
<td>375.5</td>
<td>212.1</td>
<td>91.9</td>
<td>40.0</td>
<td>33.3</td>
<td>35.1</td>
<td>19.6</td>
<td>9.9</td>
</tr>
<tr>
<td>Colombia</td>
<td>22.9</td>
<td>20.2</td>
<td>33.0</td>
<td>17.7</td>
<td>24.7</td>
<td>26.5</td>
<td>27.4</td>
<td>24.5</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>17.3</td>
<td>3.5</td>
<td>4.1</td>
<td>6.0</td>
<td>9.2</td>
<td>18.0</td>
<td>37.1</td>
<td>90.0</td>
</tr>
<tr>
<td>Ecuador</td>
<td>14.4</td>
<td>11.5</td>
<td>13.1</td>
<td>14.0</td>
<td>10.3</td>
<td>13.8</td>
<td>12.0</td>
<td>16.3</td>
</tr>
<tr>
<td>Egypt</td>
<td>9.6</td>
<td>10.2</td>
<td>12.7</td>
<td>11.0</td>
<td>9.9</td>
<td>20.6</td>
<td>10.4</td>
<td>14.8</td>
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<tr>
<td>Greece</td>
<td>13.4</td>
<td>13.1</td>
<td>12.1</td>
<td>12.5</td>
<td>19.0</td>
<td>24.8</td>
<td>24.5</td>
<td>20.9</td>
</tr>
<tr>
<td>Korea</td>
<td>25.2</td>
<td>15.2</td>
<td>10.1</td>
<td>14.4</td>
<td>18.2</td>
<td>28.7</td>
<td>21.3</td>
<td>7.2</td>
</tr>
<tr>
<td>Peru</td>
<td>23.5</td>
<td>33.5</td>
<td>38.0</td>
<td>57.8</td>
<td>66.6</td>
<td>59.2</td>
<td>75.3</td>
<td>64.4</td>
</tr>
<tr>
<td>Phillipines</td>
<td>8.0</td>
<td>6.2</td>
<td>7.9</td>
<td>7.5</td>
<td>18.9</td>
<td>17.7</td>
<td>13.3</td>
<td>10.9</td>
</tr>
<tr>
<td>Taiwan</td>
<td>5.2</td>
<td>2.4</td>
<td>7.0</td>
<td>5.7</td>
<td>9.7</td>
<td>19.0</td>
<td>16.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Turkey</td>
<td>21.2</td>
<td>17.4</td>
<td>25.9</td>
<td>62.9</td>
<td>63.5</td>
<td>94.2</td>
<td>35.6</td>
<td>34.6</td>
</tr>
</tbody>
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**Increase in Consumer Prices**

- Non-Oil Less Developed Countries: 1961-70: 168.5 percent; 1971-80: 540.1 Percent
- Industrialized Countries: 1961-70: 35.6 percent; 1971-80: 118.0

**Data Sources:** International Financial Statistics
limiting credit imports and import oriented industries reduce balance of payments deficits. In the case of Brazil, the gains in terms of lower inflation rates were modest in 1980 and 1981, but the upward trend in inflation was broken and reversed. Inflation fell from 132.1 percent in the 6 months ending March 1981 to 81 percent in the 6 months ending December of the same year, showing thus a drop of 41.1 percentage points [Langoni and Haddad, 1981, p. 91]. A moderate downward movement in prices carried over to 1982 where inflation fell to 97.9 percent from a 105.5 percent in 1981 [Table II].

Monetary targeting also coincided with improvement in the Brazilian balance of payments. From a 12 month deficit of U.S. $4.2 billion in July 1980, the trade account improved to a surplus of U.S. $1.2 billion in 1981 [Langoni and Haddad, 1982, p. 92].

The opportunity cost of monetary targeting is usually the sacrifice of output and employment resulting from the reduction in monetary expansion. This, in fact, happened in Brazil where industrial output fell by 9.6 percent and overall gross domestic product by 3.5 percent in 1981 [Langoni and Haddad, 1982, p. 92]. What usually takes place in some LDCs is the financing of public expenditures by money creation in order to achieve some projected growth rates.

The notion of money creation to finance government projects has been so frequent that according to Keynes it has been a principal cause of inflation's being continuous ever since money was first devised in the sixth century B.C. [Goode, 1984, p. 214]. Therefore, money creation has been associated with inflationary finance, and "the rule of responsible government finance did not prevent inflation any more than moral precepts
prevented sin' [Goode 1984, p. 214]. The issue of inflationary finance has been criticized on various counts, even though there is still no unanimity in LDCs on refusing inflationary financing. The opponents of inflationary finance [Bailey 1956, Mundell 1965, Friedman 1971, and Marty 1967, 1973] among others, have generally argued that the maximum rate of growth from inflationary finance is small, whereas the loss of welfare generated from this policy is relatively large. On the other hand, the proponents of such policies [Aghevli, 1977] among others, have argued that even small increases in the rate of growth of output could be quite significant when the corresponding increase in the level of discounted consumption over time is considered.

Even though the literature on inflationary finance does not offer any conclusive evidence on whether this process speeds or retards economic growth, the negative effects of inflation are many. Since our purpose is not to enumerate the dangers of inflation, it suffices to mention its effects on economic calculations and planning, and ultimately, real growth itself. In the international development strategy of the second United Nations development decade, a target of an annual 6 percent real growth was set forth for LDCs. Because of the world inflation of 1972-75, the estimates of their capital needs to attain that growth rate changed from approximately $2 billion to $6 billion in 1975 prices [Cline, 1981, p. 22].

3. **Should Less Developed Small Open Economies Consider Monetary Targeting?**

Based on the previous discussion in this chapter, the following can
be deduced:

1) There is evidence of a transmission mechanism between the financial and real sectors in LDCs. Besides, targeting a quantity aggregate was successful in reducing inflation in most of the countries adopting this policy and, in the best cases, monetary targeting led to price stability. At the same time, Brazil, the only LDC that has targeted, was very successful in reducing balance of payments deficits. On the basis of the experience with inflation and external equilibrium, targeting has potential benefits.

2) Monetary targeting, as we have seen, may involve an opportunity cost in terms of a possible loss in output and employment. This cost would be reduced if we consider the effects of inflation on real growth and the doubt surrounding the success of inflationary finance. On this point, a case for stabilization through targeting would not be as weak as it might look.

3) It can be argued that LDCs as a group are small open economies vulnerable to external disturbances, who need to fix their exchange rate rather than a commitment to specific targets. The experience of Switzerland, and to a lesser extent Brazil, shows that even for a small open economy, a money stock target may be an appropriate approach. According to a Swiss Central banker, Schiltknecht [1981, p. 224]: "a policy aimed at price stability is made more difficult if the rest of the world does not pursue a similar policy .... The conclusions, therefore, would be not to abandon a money stock target, but to recommend countries with high inflation rates to adopt a similar target and to opt for an efficient control procedure."
4) Keeping ideological preferences favoring monetary targeting aside, one reason that can make this policy appealing is what Friedman [1977, p. 470] calls "brute experience." As Goodman [1984, p. 228] states: "It is possible that the disappointing experience will prepare the way for more realistic policies." Based on their actual inflation rates and balance of payments problems, LDCs were not generally very successful in their stabilization policies. Therefore, a policy aimed at targeting money or credit aggregates might be worth considering.
1. An excellent survey of these theories can be found in Spencer [1974].

2. A detailed explanation can be found in Spencer [1974, pp. 87-88].

3. A discussion of these studies and their criticism is found in Laidler [1978, pp. 157-160].


5. Discussions of the experience of countries that have targeted a monetary aggregate can be found in: Griffiths and Wood [1981], Meek [1982], Atkinson and Chouraqui [1984]. For specific countries, see, along with Foot [1981] and Atkinson and Chouraqui [1984]. For Canada, Freeman [1981], for France, Raymond [1982], for Italy, OECD [1979], for Switzerland, Foot [1981], Davis and Meek [1982], Shiltknesht [1982], Meyer [1983], for the United Kingdom, Meyer [1983], Friedman B. [1984], Friedman, M. [1984], for West Germany, Schlesinger [1982]. Also, see the reports of the various central banks of these countries.
In this chapter, we discuss the most important characteristics of the loan, money and government securities markets in small open LDCs. Then, we examine some of the existing studies on monetary targeting to show that they do not encompass the characteristics of LDCs and, therefore, their results cannot be generalized to the functioning of monetary policy in these countries. We conclude that models incorporating the characteristics discussed are more appropriate for studying targeting in a small open economy environment.

I. Some Characteristics of the Financial Markets in Small Open Less Developed Countries

Small open LDCs have several economic features that are not shared with more developed countries (MDCs). In the present study, our concern centers only on some characteristics of the financial markets since our objective is to examine issues pertaining to money and credit policies. Therefore, in this section, we emphasize four major features that, as will be shown in the remaining chapters, are essential in determining the functioning of money and credit policies in the types of economies examined herein.

1. Existence of Captive Buyers of Government Securities

The market for government securities in LDCs differs from that of
MDCs in at least two respects. First, government securities are taken up largely by captive buyers, mainly financial intermediaries, who are required to hold a quota of government bonds after every new issue.\textsuperscript{1} This government debt is issued to finance budget deficits, a policy that is pursued in most LDCs. Thus, the reserves of financial intermediaries become the captives of budget deficits. Second, there is a lack of ownership motives for holding government securities resulting largely from government policies. In several LDCs, for example, prices of government securities are either fixed by the government or permitted to vary within a very small range. This emanates from policies designed to control the rate of interest on bonds to minimize the debt burden. Since there is no capital gain involved in holding bonds with fixed prices, and with relatively low rates of return, the spectrum of owners of government securities becomes narrow.\textsuperscript{2}

2. Presence of Unregulated Loan Markets

We can distinguish between two different kinds of loan markets. We have on one hand, the "regulated" credit market consisting of loans made by deposit money banks and other financial intermediaries, and, on the other hand, the "unregulated" credit market including the non-financial intermediary public; that is, indigenous bankers, traders, landlords and money lenders.\textsuperscript{3} What we term as "regulated" and "unregulated" is usually referred to as "organized" and "unorganized." We elect to use "regulated" and "unregulated" because we are dealing with monetary policy issues and, therefore, we separate the two credit markets based on their relationship to the monetary authorities. "Regulated" and
"unregulated" serve our purpose better especially since we define the regulated loan markets as loan markets subject to the regulations of the central bank and the unregulated credit markets as the ones that are not under the direct control of the monetary authorities.

Both credit markets coexist within the modern sector of the economy and are fully monetized. What is of interest to us is not the dualism between a monetized and a non-monetized sector but credit dualism which means that the loan activities in LDCs are under a dual system. The unregulated credit market exists mainly in urban areas. A survey done by Sogang University of Seoul in 1969 found that 79 percent of unorganized market lending was in the urban business sector, 7 percent was made to urban consumers and the remaining 14 percent to rural households. The same survey revealed that 75 percent of all firms responding had some debts outstanding at the unorganized market, while 10 percent had more than 50 percent of their debts in the unregulated market. What is more interesting is that 93 percent of the firms with unregulated market debts gave as the reason for borrowing from this market the unavailability of sufficient amounts of regulated credit [Van Wijnbergen, 1982].

The literature on unregulated credit markets reveals that the unavailability of regulated credit is one reason for the flourishing of unregulated loans [Tun Wai 1957, McKinnon 1973, Park 1973, Shaw 1973]. Monetary authorities, in general, limit regulated credit through some credit policies discussed in the next section. This creates a quantity constraint on the credit supplied by the regulated sector. Due to the excess demand for credit, some borrowers rely on other sources of finance to satisfy their needs. They can either use the unregulated credit market
or rely on foreign sources of finance. But since borrowers are composed largely of small firms and businesses, and, to a lesser extent, rural households, foreign sources of finance might be beyond their reach, and unregulated markets become a last resort.

This argument rests on the assumption that most borrowers prefer the regulated market (assuming they can meet credit standards) and their resort to the unregulated loan market results mainly from the constraints on obtaining regulated credit. The argument can be explained on the grounds that unregulated loan market interest rates are higher than those in regulated markets. The evidence in the literature overwhelmingly support the higher loan rates issue. \(^4\) Higher rates reflect, among other things, the risk of default since some borrowers are driven to the unregulated markets because they lack suitable collateral, the costs of search and bargain for loan renewals, and the risks associated with evasion of usury laws and regulations.

3. **Credit Policies Followed in Less Developed Countries**

Most LDCs control regulated credit through policies that can take various forms and can be broadly classified under price credit policies, quantity credit policies, and reserve requirement ratios.\(^5\)

Interest rate ceilings are one type of price policies. Maximum rates chargeable on loans are determined by the monetary authorities. Another price policy is tied to the discount mechanism. Central banks can alter the discount rate charged to commercial banks on the funds they borrow for relending to the private sector. Reducing the discount rate, for example, provides commercial banks with incentives to increase lending to the
private sector.

The most widely used quantity policy is the portfolio ceiling device involving quotas on the quantity of loans that can be made by financial intermediaries. One form of quota or ceiling is to limit the ratio of loans to total liabilities. A commercial bank, for example, can lend only a specified percentage of its total liabilities.

Reserve requirement ratios can take the form of required reserves against bank deposits. A change in this ratio affects the amount that financial intermediaries hold in the form of assets including loans. There are other forms of reserve ratios too. Financial intermediaries might be required to hold reserves not only against deposits but against all bank liabilities including all forms of bank borrowing. At the same time, a legal reserve requirement can be applied against loans as well. This ratio may be raised to whatever level necessary to reduce the attractiveness to financial intermediaries of making loans.

It is very unlikely to find a country that uses all these policies simultaneously. Still, it is very common for a less developed country to fix the loan rate and at the same time use a portfolio ceiling device to expand or contract regulated credit activity.

4. Interest Rate Policies Followed in Less Developed Countries

Interest rates in most LDCs, unlike most developed countries, are not market determined. Rates on deposits, loans, and government securities are fixed by the monetary authorities and varied depending on the prevailing economic conditions. Several reasons are usually given for adopting such policies. One important motive is the presence of other
controls over, for example, prices, production, availability of credit, investment, and the foreign sector. Controlling interest rates gives the monetary authorities an additional instrument of policy. Another cited reason is the presence of some institutional features such as market imperfections that might prevent interest rates from being determined efficiently if left to the market place [IMF Occasional Paper 22, 1983]. These imperfections can take, for example, the form of one or few banks exercising monopolistic or oligopolistic control over interest rates. Therefore, regulation over these rates becomes necessary.

Controlling interest rates does not always mean keeping levels close to market determined rates. In some LDCs, interest rates are kept below market determined levels for some reasons. One reason is the argument that low interest rates contribute to economic development and growth. Another is the desire to minimize interest payments on government debt. Other reasons center on the beliefs that a rise in interest rates may be inflationary, that high interest rates damage disadvantaged sectors, and that savings are insensitive to changes in interest rates.

II. Relationship Between Existing Studies on Monetary Targeting and the Characteristics of Less Developed Countries

In this part, we will relate the LDC characteristics discussed in Part One to the literature on monetary targeting. We will examine each characteristic, within the context of some of the existing studies that are referred to later.

The shortcomings arising from omitting open economy monetary policy would be exacerbated in the case of LDCs since these countries are more vulnerable to what happens in international markets than are most MDCs. Furthermore, studying monetary policy in LDCs using a closed economy model might become inadvisable for at least two reasons other than the openness of the economy issue. First, as will be elaborated in the next paragraph, there is an absence of open market operations with domestic assets. Monetary authorities may then use foreign assets for that purpose. Financial intermediaries and the non-bank public in several small open economies hold a large amount of foreign assets, especially foreign exchange, for reasons of political and economic instability. Because there is no lack of ownership motive in holding foreign assets, open market operations in foreign exchange might be easier to administer than with domestic securities. Second, with most prices of financial instruments or interest rates fixed, monetary authorities can gain, in the exchange rate, a flexible instrument that can adjust to achieve a predetermined quantity target in a floating exchange rate regime.

2. Existing studies on monetary targeting in MDCs assume the presence of a market for government securities. Open market operations
are then used to keep the target price (generally a federal funds rate) or a target aggregate (monetary base or total reserves) at a predetermined level. In these studies the notion of captive buyers of government securities is not an issue and, therefore, the reserves of financial intermediaries are not the captives of budget deficits. At the same time, there exists ownership motives for holding these securities. This results from the fact that interest rates on government bonds are market determined and play a major role in asset substitution and portfolio allocation of both commercial banks and the non-bank public. In the presence of ownership motives, monetary authorities can attempt to use the open market operations tool to stabilize economic activity. In financial environment characterized by capital gains from holding government securities, market participants would have more incentives for holding these securities.

While the presence of a wider bond market in MDCs allows central banks the flexibility of using open market operations, the characteristics of markets for government securities in LDCs prevent monetary authorities from using a major tool of stabilization policy. Therefore, it is hard to generalize the results of the studies on monetary targeting to the case of LDCs, especially those results which depend on the viability of open market operations. This fact appears clearly when the federal funds rate is the policy instrument and monetary authorities use non-borrowed reserves to keep the rate at its predetermined level.

3. Monetary targeting with unregulated loan markets has been ignored. The presence of this market affects, as will be seen in the next
chapters, the ability of the monetary authorities to influence total credit and other target aggregates in the economy, with the direction of the effect being different under different monetary policy regimes. Therefore, it would be misleading to study the efficacy of credit targeting in LDCs relying solely on the experience of those MDCs that have targeted credit such as Italy, and on the models that were built to analyze this issue. As our results will show in the succeeding chapters, incorporating the unregulated loan market is essential for studying the significance of both money and credit in LDCs.

Horngren [1985] analyzed regulatory monetary policy in the presence of what he calls uncontrolled financial intermediaries, which meant some form of non-bank intermediaries whose "activities are not regulated by the central bank" [p. 208]. These uncontrolled intermediaries are separated from the public in his model and assume all the functions of commercial banks except for the fact that they are not subject to the credit policies of the monetary authorities. In the context of unregulated markets, Horngren's work differs from ours (Chapter III), in at least three respects: First, the uncontrolled financial intermediaries included in his study are totally different from the unregulated loan market we consider in ours. Our work deals with regulated and unregulated loan markets, whereas in his study, regulation concerns the amount of reserves and government securities commercial banks have to hold. With a model of three assets (reserves, bonds and loans), having to hold a percentage of the liabilities in the form of reserves and bonds affects the amount of loans commercial banks can make. Uncontrolled intermediaries do not have to hold what Horngren calls a "liquidity
ratio" and, therefore, the loans they make are not subject to regulatory actions.

Also in his study, the public does not make any unregulated loans. The only function of the public as far as lending activities are concerned is to borrow from both regulated and unregulated intermediaries. In our model, as will be seen in Chapter III, there exists an unregulated credit market that functions separately from the lending activities of financial intermediaries. Members of the public act as borrowers and/or lenders in this market.

Second, in Horngren's study, uncontrolled financial intermediaries charge the same market determined loan rate that is charged by regulated commercial banks. This implies two possible market situations. The first is that the uncontrolled financial intermediaries operate in the same credit market as the controlled ones which implies the existence of one credit market composed of two heterogeneous lenders charging an interest rate determined by the demand and supply for their loans. The second possibility is that uncontrolled financial intermediaries operate in a separate loan market but act as loan rate takers by charging the interest rate determined in the controlled loan market.

In our model, there are two clearly separate credit markets with two different loan rates. The regulated credit market with a loan rate fixed by the monetary authorities and the unregulated one with a loan rate determined endogenously by the demand and supply for unregulated loans.

The third and major difference between Horngren's work and ours concern the fact that his study does not deal with monetary targeting and
instrument regimes. What he does is to define the required liquidity ratio and then to examine the effect of changing this ratio on some aggregates such as the money supply and total credit and on the interest rates in the economy. In our work, we examine the effect of changing four instruments of policy on the unregulated loan activity itself under different policy regimes when money supply, monetary base, and regulated loans are the intermediate targets of monetary policy.

4. Some of the studies on monetary targeting did not include a loan market and mainly considered an economy with reserves, currency and deposits, an interest rate and a discount rate, the monetary base and the money supply, and in some cases income [B. Friedman 1975, Bryant 1982, Meyer 1983, Lindsey, et al., 1984]. Benavie and Froyen [1982], considered a model with a loan market. This market was not subject to regulation except for a reserve requirement ratio that affected the loans of financial intermediaries. The loan rate was market determined and moved endogenously to equilibrate demand and supply for loans.

As we have seen earlier, credit markets in LDCs do not take the form considered by Benavie and Froyen. First, there exist ceilings on the loan rate. Second, there are portfolio ceiling devices that limit the quantity of credit loaned out to the private sector. With this in mind, the results reached by Benavie and Froyen concerning the effects of varying policy instruments on the credit market activity and the loan rate cannot be generalized to the case of LDCs where the loan rate is fixed and the credit activity is regulated. The techniques used by Benavie and Froyen are more appropriate for studying the effect of varying policy instruments on the unregulated loan market activity under various policy regimes,
which will be discussed in Chapter IV.

5. Existing studies on monetary targeting dealt mostly with the case of market determined interest rates. Monetary authorities tried to maintain the federal funds rate at a certain level only when they were using it as their instrument of policy. Benavie and Froyen [1982] studied monetary policy implications, first when the deposit rate is flexible and then when it is fixed. The results they reached differed in some cases depending on the nature of the deposit rate. For example, when the deposit rate was flexible, the effect of increasing the reserve requirement ratio on the loan rate was ambiguous under a federal funds rate regime and an unborrowed reserves plus currency regime. When the deposit rate was fixed, the results changed. The effect was negative under a federal funds regime and positive under an unborrowed reserves plus currency regime.

This simple example suggests that if all interest rates considered were administered by the monetary authorities as in LDCs, several monetary policy results and implications might differ. Also, the potential tools of monetary policy would be affected. In a regulated environment with fixed deposit and loan rates, interest rates can be varied along with the more "conventional" tools such as the discount rate and the reserve requirement ratio.

III. Conclusion

The previous analysis shows that existing studies that dealt with monetary targeting did not encompass the characteristics of less developed
small open economies and, therefore, it would be inappropriate to
genralize their results to the case of these countries. Models that take
into account these characteristics would be more suited for analyzing
money and credit policies implications in LDCs. Subsequently, it will be
seen that policy instruments will differ when the economy is regulated;
the policy regime itself will change when the economy is opened; and the
ability of the central bank to affect total credit and other intermediate
targets will be affected in the presence of unregulated loan markets and
captive buyers of government securities.
FOOTNOTES

1. Because of this fact, government securities held by deposit money banks represent a larger portion of the total amount outstanding of securities in LDCs than in MDCs. In recent years, deposit money banks in Taiwan held as much as 74 percent of the amount of government security outstanding, compared to 49 percent in South Korea and 20 percent in the United States [Federal Reserve Bulletin (U.S.), Central Bank of China: Taiwan Financial Statistics Monthly, Bank of Korea: Monthly Economic Statistics.]

2. For a discussion of the effects of government policies on the market for government securities in LDCs and methods to develop this market see Porter [1965], Tun Wai and Patrick [1973], Drake [1977].

3. A good description of the "unregulated" ("unorganized" or "curb") market is found in one of the earliest studies on this subject by Tun Wai [1957]. For a more recent analysis, see McKinnon [1973], Park [1973], and Shaw [1973]. A general description of "curb" markets was introduced by Shaw [p. 136], who stated: "They engage in covert activities it is said; they frustrate official policy; they finance weddings, funerals and capital flight abroad. They exact usurious rates of interest; they compete with organized finance and retard its growth."

4. See Tun Wai [1957], McKinnon [1973], Shaw [1973], and Van Wijnbergen [1982, 1983]. To take an example, data for Taiwan show that in March 1983, the maximum rate on regulated short-term loans was 10.25 percent per annum. The rate on loans for exports was 8 percent per annum. In the unregulated loan market, the average rate on unsecured loans in
1983 was around 33 percent per year, for the same period. [Central Bank of China, Financial Statistics Monthly].

5. A detailed discussion of these policies is found in Hodgman [1972], Silber [1973], and Johnson [1974].

CHAPTER III

A FINANCIAL MODEL OF A SMALL OPEN ECONOMY WITH FIXED DEPOSIT AND LOAN RATES IN THE PRESENCE OF UNREGULATED LOAN MARKETS AND CAPTIVE BUYERS OF GOVERNMENT SECURITIES

This chapter deals with a model of the financial markets in small open economies with regulated financial systems. We have tried to incorporate the most important characteristics of these markets discussed in Chapter II such as, the presence of an unregulated loan market, the existence of "capitive buyers" of government securities issued to finance budget deficits, the credit policies followed in these small open economies, and the constraints placed on loan and deposit rates.

The model we use is a portfolio balance model in line with the work of Brainard and Tobin [1968], Bryant [1980, 1982], Benavie and Froyen [1982]. There are three broad groups in the economy, each of which is discussed in a separate section: the financial intermediaries, the non-financial intermediary public, and the monetary authorities. There are also two other smaller groups performing two functions: a government that issues government securities and a foreign supplier of foreign assets.

I. Financial Intermediaries

We consider a single class of financial intermediary that performs the functions of commercial banks. These intermediaries face major constraints in the credit market, the market for government securities and the demand deposit market. The assets and liabilities of financial intermediaries are represented in Balance Sheet I:
On the asset side, we have excess reserves ER, required reserves RR = αD where α is the reserve requirement ratio and D the demand deposits, foreign assets held by financial intermediaries FA, government securities held by financial intermediaries GS, and loans in the regulated credit market LR. By regulated credit market, we mean the market that is subject to the credit policies of the monetary authorities, as opposed to the unregulated credit market discussed in detail in Chapter II. On the liability side, we have D and borrowed reserves from the monetary authorities BR.

In the present model, financial intermediaries have to optimize under three constraints beside the balance sheet constraint. First, they are "captive buyers" of government securities. In Chapter II, we discussed how in the types of economies we are concerned with in this paper, financial intermediaries are required to hold a quota of government bonds after every new issue. We also saw that there is a lack of ownership motives for holding government securities resulting largely from government policies aimed at fixing security prices and interest rates on bonds. Because of these two points, most studies on monetary policy in
these economies assume the absence of markets for government securities and model the economy accordingly. Neglecting government securities as a policy variable reflects a general attitude that the government bond market plays a minor role in stabilizing economic activity. But since our work deals with monetary control issues, disregarding a market characterized largely by "captive buyers" might omit essential facts on the effects of budget deficits on monetary aggregates. Therefore, we specifically include $G_S^F$ in the balance sheet but, because of the lack of ownership motive characteristic discussed earlier, we assume that financial intermediaries hold government securities only because they are captive buyers, and that the amount held is equal to the quota allotted to them by the central government. This means that any increase in $G_S^F$ is synonymous with an increase in budget deficits.

The second constraint concerns the credit market. We saw in Chapter II that policies aimed at controlling credit take various forms. In our model, we use an interest rate ceiling, that is, the rate chargeable on loans made by commercial banks is determined by the monetary authorities. In general, loan rates are fixed below market determined levels, which implies that these markets become demand determined, since financial intermediaries demand loans in portfolio type models and hold them as assets.

The third constraint on the behavior of banks concerns the fixed deposit rate. Since deposit rates are fixed by the monetary authorities, financial intermediaries accept any amount of deposits the public wishes to hold at a given interest rate. This means that banks have no direct control on their supply of deposits, that is, they cannot affect it
through deposit rate manipulations.

Assuming no constraints on borrowing from the monetary authorities, with the demand for borrowed reserves being regulated, among other things, by the discount rate, we write the commercial banks’ balance sheet identity to get:

\[ NW + BR + (1 - \alpha)D - ER - FA^F - GS^F - L_r - 0. \]

We assume that the financial intermediaries are profit maximizers whose total revenue function is defined as:

\[ X = H(ER) + rsGS^F + roL_r + (r^* + (\hat{e} - e))FA^F \]

where:

- \( X \) = total revenue
- \( H(ER) \) = implicit revenue function for excess reserves, used in Benavie and Froyen (1982).
  - We assume that \( H'(ER) > 0 \), and \( H''(ER) < 0 \).
- \( rs \) = interest rate paid on government securities
- \( ro \) = interest rate charged on regulated loans
- \( r^* \) = foreign interest rate
- \( e \) = exchange rate defined as the value of foreign currency in terms of domestic currency, so that an increase in \( e \) is synonymous with a depreciation in the home currency unit.
- \( \hat{e} \) = expected exchange rate
- \( (\hat{e} - e) \) = the expected change in the exchange rate. This means that the return on foreign assets is equal to \( r^* \) plus or minus the rate of depreciation or appreciation in the domestic currency. This type of return was used in Girton and Henderson [1977], Isard [1978], and Bryant [1980]. Our model does not attempt to explain how expectations are formed. \( \hat{e} \) is treated as exogenous.
The total cost function of the financial intermediaries include both explicit and implicit elements:

\[ W = r_d D + d_0 R + L(ER, FA^F, GS^F, L_x, D, BR) \]

where:

\( W \) = total cost  
\( r_d \) = interest rate paid on deposits  
\( d \) = discount rate  
\( L \) = implicit cost function borrowed from Benavie and Froyen 1982. It includes the cost of maintaining assets and liabilities, the cost of borrowing, and the cost of making loans and providing services to the depositors. We assume

\[ \frac{\partial L}{\partial y} > 0, \quad \frac{\partial^2 L}{\partial y^2} > 0, \quad \frac{\partial^2 L}{\partial yz} = 0; \quad y \neq z \text{ and} \]

where \( y, z = ER, FA^F, GS^F, D, BR, L_x \).

Having defined \( X, W \) and the balance sheet constraint, the Lagrange function \( B \), can be written as:

\[ B = H(ER) + r_s GS^F + (r^* + (\gamma - e))FA^F + r_0 L_x - d_0 R - r_d D \]

\[- L(ER, FA^F, GS^F, L_x, D, BR) + \lambda (NW + (1 - \alpha)D \]

\[ + BR - ER - FA^F - GS^F - L_x \). \]

Solution to this profit maximizing problem is found in Appendix A. The demand functions we derive are:

\[ FA^{dF} = FA^{dF}(r^*, d, e, \gamma, GS^F, r_0, D, \alpha) \quad (1) \]
Let us also define total reserves TR as the sum of ER and required reserves RR. TR would then be written as:

\[ TR_d = TR^d(r^*, d, e, â, GS_F, rc, D, a) \] (3')

We assume no change in NW in our model and, therefore, we drop NW as an argument in the behavioral demand equations. The following observations can be made on the results derived in Appendix A: the constrained profit maximizing solution allowed us to enter D and GS_F as arguments into the asset and liability demand functions of the financial intermediaries. An increase in Deposits D increases the liabilities of banks which allows them to demand more assets such as FA_F, L_T, and TR. It also reduces their demand for borrowed reserves. An increase in the amount of government securities held by "captive buyers" forces commercial banks to readjust their portfolios to accommodate their quota of securities. This implies reducing their demand for other assets FA^d, L^d, TR, and increasing their demand for borrowed reserves.

Increasing r* increases the demand for foreign assets and BR, and reduces the demand for the other assets L^d and TR^d. The same result holds for e and the opposite one for e since from the way we defined the return on foreign assets, an increase in â and e, increases and
reduces the return on $FA^R$ respectively.

Increasing $d$ reduces the demand for BR and other assets. Increasing $\alpha$ increases the demand for BR and reduces the demand for all other assets. Increasing $rc$ increases the demand for loans $L^d_T$, and $BR^d$ but reduces the demand for other assets $FA^dR$ and $TR^d$.

II. Non-Financial Intermediary Public

This category consists of households and firms which are aggregated as a single group in the economy. The balance sheet of this groups is as follows:

<table>
<thead>
<tr>
<th>BALANCE SHEET II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>$FA^N$</td>
</tr>
<tr>
<td>$NL_u$</td>
</tr>
</tbody>
</table>

The non-financial intermediary public holds financial assets in four different forms: Currency $C$, Deposits $D$, Foreign Assets $FA^N$, and Unregulated Credit. $NL_u$ is the net quantity of unregulated loans, a market discussed in detail in Chapter II. The public supplies loans in this market at an interest rate $ru$. We use the word unregulated as opposed to regulated based on the relationship of the market to the monetary authorities. Unregulated markets are those who are not subject directly to the credit policies of the monetary authorities. On the
liability side, we have regulated credit $L_r$, and the financial wealth of
the public $W^{N}$.

Even though a market for government securities exists, we assume that
the public does not hold any government bonds because of the lack of
ownership motive discussed earlier. The balance sheet identity of the
public is written as:

$$W^{N} - D - NL_u - FA^N - C + L_r = 0.$$ 

The revenue on the portfolio of assets is:

$$X' = rdD + ru NL_u + (r * + (e - e))FA^N + E(C).$$

where:

- $ru =$ rate of return on unregulated loans.
- $E(C) =$ implicit revenue function for currency. In the type of
economies discussed in this paper, the public holds a large
amount of currency in its portfolio of assets. Several
economic and political reasons justify this fact. We
assume an implicit revenue to be derived from holding
currency with $E'(C) > 0$ and $E''(C) < 0$.

The total cost of managing the portfolio includes the interest paid on
regulated loans $rc$ plus an implicit cost function $K$, similar to the one of
the financial intermediaries.

$$W' = rc L_r + K (D, NL_u, FA^N, L_r, C).$$

We assume $\frac{\partial K}{\partial y'} > 0$, $\frac{\partial^2 K}{\partial y'2} > 0$ and $\frac{\partial^2 K}{\partial y'z'} = 0$, $y' \neq z'$

where $y', z' = D, NL_u, FA^N, L_r, C$.

Non-financial intermediary public maximize the net return on their
portfolio subject to the balance sheet constraint.

The Lagrangian $\beta'$ is written as:

$$\beta' = r_d D + r_u N_{L_u} + (r^* + (\hat{e} - e))F_{A}^N + E(C)$$

$$- r_c L_c - K(D, N_{L_u}, F_{A}^N, L_c, C)$$

$$+ \lambda'(W_F^N - D - N_{L_u} - F_{A}^N - C + L_c).$$

Solution to this constrained maximization problem is found in Appendix A.

The demand and net supply functions we derive are:

$$D^d = D^d(r_d, r_u, r^*, L^S_c, \hat{e}, \hat{e})$$  

$$N_{L_u} = N_{L_u}(r_d, r_u, r^*, L^S_c, \hat{e}, \hat{e})$$  

$$C^d = C^d(r_d, r_u, r^*, L^S_c, \hat{e}, \hat{e})$$  

$$F_{A}^N = F_{A}^N(r_d, r_u, r^*, L^S_c, \hat{e}, \hat{e})$$

where $L^S_c$ is the supply of loans in the regulated loan market. Two observations are in order here. First, we assume no wealth effect in the model. $W_F^N$ does not change in the short-run and, therefore, we drop it from our behavioral equations for simplicity. Second, we assume that the public is rationed in the regulated loan market. Since the loan rate $r_c$ is fixed by the monetary authorities below market determined levels, the public accepts all the regulated loans that are available at a given interest rate. This behavior is similar to the one of financial
intermediaries in the deposit market. In that case, commercial banks accommodated all deposit demand. Here, the nonbank public accommodates the demand for loans by financial intermediaries. For that reason, $L^S_r$ enters as an argument in the demand and net supply functions of the members of the nonbank group, in the same manner $D$ entered the demand and supply functions of commercial banks. Therefore, the interest rate charged on regulated loans $rc$ does not appear explicitly as an argument in equations (5-8). It affects these equations through its effect on $L^S_r$.

$D^d$, $N^S_L$ and $FA^{dN}$ are directly related to their rates of return and indirectly to the rate of return on the substitute assets. Also, an increase in $e$ is expected to reduce $FA^{dN}$ and increase the demand for other assets. The opposite results hold for $\hat{e}$.

III. Monetary Authorities

Using a simplified version of the balance sheet of the monetary authorities, we define the monetary base $MB$ from the asset side, to be the sum of the foreign assets $FA^{dc}$ and government securities $GS^{dc}$ held by the central bank, and borrowed reserves $BR$. From the liability side, $MB$ is equal to currency $C$ and total reserves $TR$

$$C + TR - BR - FA^{dc} - GS^{dc} = 0 \quad (9)$$

IV. Government and Suppliers of Foreign Assets

The supply of foreign assets $FA^s$ to the financial intermediaries, the public, and the central bank is assumed to be exogenous. The government issues government securities $GS^s$ to the financial intermediaries (captive
buyers) and to the central bank. The present model assumes that home assets are not traded internationally and, therefore, the government does not issue government securities to foreigners.3

V. Equilibrium Conditions

The model developed can be reduced to the following equations and equilibrium conditions:

\[
NL^{S} \left( r^{d}, r^{u}, r^{s}, L^{S}_{L}, e, \hat{e} \right) = 0 \quad (10)
\]

\[
L^{d} \left( r^{s}, d, e, \hat{e}, G^{S}, rc, D, a \right) - L^{S} = 0 \quad (11)
\]

\[
D^{d} \left( r^{d}, r^{u}, r^{s}, L^{S}_{L}, e, \hat{e} \right) - D = 0 \quad (12)
\]

\[
FA^{dN} \left( r^{d}, r^{u}, r^{s}, L^{S}_{L}, e, \hat{e} \right) + FA^{dF} \left( r^{s}, d, e, \hat{e}, G^{S}, rc, D, a \right) + FA^{dC} - FA^{S} = 0 \quad (13)
\]

\[
G^{SdF} + G^{Sdc} - GS = 0 \quad (14)
\]

\[
FA^{dc} + G^{Sdc} - NBB = 0 \quad (15)
\]

\[
NBB - C^{d} \left( r^{d}, r^{u}, r^{s}, L^{S}_{L}, e, \hat{e} \right) - TR^{d} \left( r^{s}, d, e, \hat{e}, \right) = 0 \quad (16)
\]

Equation (10) represents the equilibrium condition in the unregulated loan
market. The regulated loan market is represented by equation (11). The demand for regulated loans $L^d$ minus $L^s$ equals zero. Equation (12) is the equilibrium condition in the deposit market. (13) is the equilibrium condition in the foreign security market and (14) is the one for domestic securities. Equation (15) defines the non borrowed monetary base (NBB) and (16) represents equilibrium in the market for bank reserves. The balance sheet constraints of the three sectors imply a version of Walras Law which means that one of equations (10) - (16) is redundant. We choose to drop equation (16), the market for reserves.\(^4\) Equation (16) is considered to be a market for reserves if monetary authorities treat currency and reserves as perfect substitutes in their portfolio.

The present model thus has six equations (10 - 15) determining six endogenous variables from among $ru$, $L^d$, $D$, $e$, $GS^{dc}$, $FA^{dc}$, and NBB.

$e$, $FA^{dc}$ and NBB are each "potential" instruments of policy. Following Bryant [1982], potential instruments are ones that the monetary authorities could control precisely. We will consider two policy "regimes," one in which the policy-makers peg the exchange rate (a fixed rate regime) and allow both their holdings of foreign assets and the nonborrowed base to adjust; the other in which the nonborrowed base is policy determined, and the exchange rate and the foreign assets held by the central bank are endogenous (a flexible rate regime). Under the fixed rate regime, the monetary authorities must allow their holdings of foreign assets to change in order to keep the exchange rate fixed. When the nonborrowed base is the instrument of policy, the exchange rate $e$ must be permitted to fluctuate.
The model has also actual instruments \((d, a, rd, rc)\) defined, following Bryant [1982], as instruments that the central bank does control precisely.
FOOTNOTES

1. The real sector of the economy is assumed to be exogenously determined. This assumption is traditional in portfolio analysis. See, for example, Branson [1968], Tobin [1969], Kouri and Porter [1974], Dornbusch [1975], Herring and Marston [1977], Benavie and Froyen [1982], Bryant [1982].

2. As far as we know, the first study to specify unorganized (unregulated in this paper) loan was the one by Van Wijnbergen [1982]. In his study, firms and public are two different groups and the public make unorganized loans to firms. In the present study, the non-financial intermediary public has an aggregative nature. It includes firms and the public, and unregulated loans are expressed in the form of net supply. Our specification is in line with the way some models specify the federal funds market in the balance sheet of financial intermediaries. The demand for federal funds is expressed as net demand.

3. Our assumption follows Branson [1974] who assumed the existence of non-traded equities. He reached the conclusion that non-traded assets give the monetary authorities better control over the money supply.

4. To demonstrate that Walras' law allows us to drop equation (16), let us check the balance sheet restrictions. Rewriting the balance sheet constraints after dropping the net worth of financial intermediaries and the wealth effects of the non-financial intermediary public, we obtain:

$$TR_d + FA_d^F + GS_d^F + L_d^d = D + BR_d^d \ (\text{financial intermediaries})$$
\[ C^d + D^d + FA^{dN} + NL^u_T = L^T_T \text{ (public)} \]

\[ C + TR = BR + FA^d + GS^{d}\text{ (monetary authorities)} \]

where \( NBB = C + TR - BR = FA^d + GS^d \)

Adding these constraints plus \( FA^S \) and \( GS^S \) yields the aggregate budget constraint:

\[ (N^L^S_T) + (L^S_T - L^d_T) + (D^d - D) + (FA^{dN} + FA^{dF} + FA^d - FA^S) \]

\[ + (GS^{dF} + GS^{d\text{c}} - GS^S) + (TR^d + C^d + BR^d - NBB) \]

where \( NBB = FA^d + GS^d \).

The expressions in parentheses correspond to the 6 market equilibrium conditions given by equations (10) - (14) and (16). The aggregate constraint implies that if five of these are in equilibrium, then the sixth must be as well and is consequently redundant. We choose to drop equation (16). This preserves the three balance sheet identities.
The purpose of this chapter is to use the model developed earlier to study the effects of changing monetary policy instruments, under different regimes, on the unregulated and regulated loan markets. Our purpose in doing so is threefold. First, without any a priori commitment to whether the unregulated loan market ought to be controlled or not, we examine the instruments that can affect the behavior of borrowers and lenders in this market. In the system we are considering, a large part of the loan activities take effect through unregulated channels. Therefore, if the monetary authorities use regulated loans as their intermediate target of policy, for example, it might be misleading to believe that this can give the correct signals about what is happening to total loans in the economy. In this case, additional measures might be needed to reduce the role of unregulated lending in order to limit the movements in the loan market.

Second, studying the effect of changing actual instruments on the regulated loan market allows us to examine what happens to the regulated loan activity in the economy when the discount rate, the reserve requirement ratio, the deposit rate, and the regulated loan rate are varied under different policy regimes. This is of importance if the monetary authorities use a policy instrument such as a fixed exchange rate regime or a nonborrowed base regime in order to use a quantity aggregate like, for instance, regulated loans as the intermediate policy target.
Because of the differentiating characteristic of the regulated loan market in our model, changing an actual instrument might not, as will be seen later, convey the expected signal to regulated loans. A contractionary move by the monetary authorities aimed at reducing the quantity of regulated loans can sometimes have expansionary effects in the form of increasing this quantity, and vice versa.

Third, we will compare the effects of varying actual instruments on the two loan markets. Our purpose in doing so is to draw some policy implications on the ability of the monetary authorities to convey the same effect to regulated and unregulated loans.

Some of the conclusions we reach in this chapter, as will be seen later, differ from those reached in the existing literature because of the differentiating characteristics of the financial markets we are considering.

I. THE EFFECTS OF CHANGING ACTUAL INSTRUMENTS ON THE UNREGULATED LOAN MARKET UNDER DIFFERENT OPERATING REGIMES

In this section, we will examine the effects of varying actual instruments on the net supply of unregulated loans and thus, the unregulated loan rate \( ru \) under both regimes. Then, we will vary the instrument regime and analyze the effect of this change on the activity in the unregulated loan market. In order to do that, we rely on the techniques employed in Benavie and Froyen [1982]. The results are derived in Appendix B, reported in (17) and (18), and summarized in Table IV-1.
TABLE IV-1

The Effect of Varying Actual Instruments on the Unregulated Loan Market, and Regulated Loans \( L^s \)

<table>
<thead>
<tr>
<th>Fixed Exchange Rate Regime</th>
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<tbody>
<tr>
<td>Actual Instruments</td>
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<td>( a )</td>
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<tr>
<td>( r_c )</td>
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<td>( r_d )</td>
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<thead>
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<tr>
<td>( r_c )</td>
</tr>
<tr>
<td>( r_d )</td>
</tr>
<tr>
<td>( N_{BB} )</td>
</tr>
</tbody>
</table>

+ = positive effect
- = negative effect
1. A Fixed Exchange Rate Regime

Under this regime, monetary authorities use the exchange rate as their instrument of policy by fixing it through open market operations with foreign assets held by the central bank $FAdc$. In this case, the system of equations (10-15) determines the unregulated loan rate $ru$ (eq. 10), the supply of regulated loans $L^d_T$ (eq. 11), the supply of demand deposits $D$ (eq. 12), $FAdc$ (eq. 13), government securities held by the central bank (eq. 14), and nonborrowed base NBB (eq. 15).

The following results are derived in Appendix B.

$$\frac{\partial ru}{\partial d} > 0, \frac{\partial ru}{\partial a} > 0, \frac{\partial ru}{\partial c} < 0, \frac{\partial ru}{\partial rd} > 0, \frac{\partial ru}{\partial e} < 0 \quad (17)$$

Assuming that the time derivative of $ru$ is a decreasing function of an increase in the net supply of unregulated credit $NL^d$, the results reached can be interpreted as follows: An increase in the discount rate $d$ reduces the demand for borrowed reserves. Commercial banks are now faced with a portfolio allocation problem. They reduce their demand for loans $L^d_T$ (eq. 11), their holdings of foreign assets $FAdF$ (eq. 13), and their demand for excess reserves. We note here that banks cannot increase their supply of demand deposits $D$, since we assumed in Chapter III that $D$ is not a choice variable for a financial intermediary that has to accept any amount of deposits at the fixed rate $rd$. The decrease in $FAdF$ places downward pressure on the exchange rate $e$, which is the equivalent of an increase in the value of domestic currency as a result of the sale of foreign assets. The central bank, in order to keep $e$ fixed, buys enough foreign assets
to preserve the target level of the exchange rate, \( \frac{\partial FA_{d,e}}{\partial d} > 0 \) (a result derived in Appendix B). At the level of the non-bank public, the only direct change in the independent variables of the model occurs in the supply of regulated loans \( L^e_x \). Like the commercial banks in the demand deposits market, the public has no direct control over \( L^e_x \) in the presence of fixed loan rates. As we have seen in Chapter III, \( L^e_x \) is reduced with a reduction in the demand for loans and increases with an increase in \( L^d_x \). Therefore, in this case, \( L^e_x \) decreases and by (eq. 10), the net supply of unregulated credit decreases too. It follows that \( ru \) increases and therefore \( \frac{\partial ru}{\partial d} > 0 \).

The effect of varying the reserve requirement ratio \( \alpha \) on \( ru \) is similar to the effect of varying the discount rate just discussed. Even though an increase in \( \alpha \) increases borrowed reserves, we saw in Chapter III that increasing \( \alpha \) reduces \( L^d_x \) (eq. 4). Commercial banks would face the same portfolio allocation problem, i.e., reducing \( FA_{d,F} \) and \( ER \). The same process explained earlier takes place and the end result would be an increase in \( ru \). The effect of varying the regulated loan rate \( rc \) on the unregulated loan rate \( ru \) is negative. An increase in \( rc \) leads financial intermediaries to reallocate their portfolios of assets. They increase their demand for regulated loans and reduce their holdings of excess reserves and foreign assets. Selling foreign assets places downward pressure on the exchange rate. But at the same time, a change in \( rc \) affects the portfolio of the non-bank public through its effects on the supply of unregulated loans by this group. An increase in the supply of unregulated loans increases the non-bank public's holdings of foreign
assets (eq. 13). In order to keep the exchange rate fixed, monetary authorities intervene in the foreign exchange market, this time selling foreign assets \( \frac{\partial \text{FA}_{d \text{c}}}{\partial x_c} < 0 \), Appendix B, which shows that the public bought more foreign assets than banks sold. Looking at equation (10), with the exchange rate remaining fixed and the supply of regulated loans increasing, the net supply of unregulated loans ends up increasing too. This reduces the unregulated loan rate and therefore, \( \frac{\partial \text{ru}}{\partial x_c} < 0 \).

The effect of increasing the deposit rate \( r_d \) on \( \text{ru} \) is positive. We use the correspondence principle to sign the fourth element in (17) (Appendix B). The rationale behind this result is as follows. An increase in \( r_d \) leads the non-bank public to reallocate its portfolio of assets. As a result, this group holds more demand deposits and less of the other assets. A reduction in the holdings of foreign assets puts downward pressure on the exchange rate. The monetary authorities interfere in the foreign exchange market to keep the exchange rate fixed. Examining equation (10), with \( e \) remaining fixed, we notice that the net supply of unregulated loans \( \text{NL}_{d \text{u}} \) changes with a change in \( r_d \) and the supply of regulated loans \( \text{L}_{d \text{r}} \). An increase in \( r_d \) reduces \( \text{NL}_{d \text{u}} \). But at the same time, \( \text{NL}_{d \text{u}} \) increases with an increase in \( \text{L}_{d \text{r}} \). The increase in \( \text{L}_{d \text{r}} \) resulted from the increase in demand deposits (eq. 11 and Appendix B). This leaves us with a situation where an increase in \( r_d \) reduces \( \text{NL}_{d \text{u}} \) and an increase in \( \text{L}_{d \text{r}} \) increases \( \text{NL}_{d \text{u}} \). Therefore, we resort to the correspondence principle to show that \( \frac{\partial \text{ru}}{\partial r_d} < 0 \). This means that \( \text{NL}_{d \text{u}} \) decreases with an increase in \( r_d \).
Increasing the policy instrument \( e \) (reducing the value or domestic currency) increases \( NL^u \) (eq. 10). It also increases \( L^d_r \) (eq. 11) and therefore \( L^u_r \). An increase in \( L^u_r \) increases \( NL^u \) further. The increase in the net supply in the unregulated loan market results in a reduction in \( ru \) and therefore, \( \frac{\partial ru}{\partial e} < 0 \).

The previous analysis shows that under a system of fixed exchange rate regime, monetary authorities can use four instruments \( d, a, rc \) and \( rd \) to affect movements in the unregulated loan market. In this section, our aim is not only to determine how the actual instruments can affect \( ru \), but to study the relationship between actual instruments and \( ru \) for stabilizing the loan market. What we would like to examine is the effects of contractionary or expansionary movements by the monetary authorities on the unregulated loan market activity. A contractionary move is defined as a move aimed at reducing the activity in the real sector. In our study, it is perceived as one that potentially leads to an increase in the interest rate in a given market. The opposite holds for an expansionary one. In the case where interest rates are regulated, such as in the regulated loan market, a contractionary move would be one that potentially reduces the activity in this market. This, for example, can take the form of a reduction in the equilibrium quantity of regulated loans made.

Increasing the discount rate \( d \) or the reserve requirement ratio \( a \) is usually compatible with a contractionary policy aimed at reducing the activity in the real sector. Our results show that increasing \( d \) or \( a \) led to an increase in the unregulated loan rate, a move that is perceived to be contractionary.
Increasing the regulated loan rate $rc$ is also viewed as a contractionary move by the monetary authorities. Under a fixed exchange rate regime, our results show that increasing $rc$ conveyed an expansionary move to unregulated loans since it led to a decrease in the unregulated loan rate.

There exists no unanimity in the literature on deposit rates concerning the effect of changing $rd$ on the real sector in the type of economies we are studying. On the one hand we have McKinnon's complementarity hypothesis [McKinnon 1973] which states that real capital and real money balances are complements rather than substitutes in investors' portfolios. Since investors rely on self-finance for capital accumulation, they demand more money in the form of savings if they want to accumulate capital. Therefore, in less developed countries, an increase in $rd$ is compatible with an expansionary monetary policy since an increase in $rd$ increases savings, which is needed to self-finance investment.

There is some evidence that contradicts McKinnon's thesis. Fry [1978] performed an empirical test for ten Asian less developed countries that did not support the complementarity hypothesis. In another study by Van Wijnbergen [1983], it was shown that raising time deposit rates is contractionary if money shifts to deposits out of an asset providing more intermediation. It also remains to be mentioned that in portfolio models, increasing $rd$ is assumed to be contractionary [Benavie and Froyen 1982].

In our model, as we have seen earlier, increasing $rd$ was shown to increase the unregulated loan rate and, thus, to convey contractionary effects to the unregulated loan market.
Another issue to examine in this section is the one of instrument variation. In a system of fixed exchange rates, an upward change in $e$ represents a devaluation of the domestic currency. Historically, exchange rates were adjusted frequently in the post World War II period even though countries had presumably adopted fixed exchange rates. The present model allows us to alter the exchange rate in an adjustable peg manner. In other words, $e$ can be used as an instrument of stabilization. An increase in $e$ was shown to reduce $ru$. This means that devaluation conveys expansionary effects to the unregulated loan market.

2. A Flexible Exchange Rate Regime with Non Borrowed Base as the Instrument or Policy

Under a flexible rate regime, the monetary authorities allow the exchange rate to fluctuate and use the nonborrowed base $NBB$ as their instrument of policy. We elect to choose $NBB$ as the instrument of policy in order to contrast an external regime of fixed exchange rates with an internal regime of non borrowed base when exchange rates fluctuate.

Under an $NBB$ regime, the system of equations (10-15) determines $ru$ (eq. 10), $L^b$ (eq. 11), $D$ (eq. 12), $e$ (eq. 13), $GS^{dc}$ (eq. 14), and $FAdc$ (eq. 15). The following results were derived in Appendix B:

$$\frac{\delta ru}{\delta d} > 0, \frac{\delta ru}{\delta a} > 0, \frac{\delta ru}{\delta xc} > 0, \frac{\delta ru}{\delta rd} > 0, \frac{\delta ru}{\delta NBB} < 0$$  (18)

The effect of changing the discount rate on $ru$ is positive. An increase in $d$ reduces the demand by banks for loans, foreign assets, and excess reserves. The decrease in $FAdc$ puts downward pressure on $e$. Because the
monetary authorities are following a flexible exchange rate policy, no
intervention takes place in the foreign exchange market. Therefore, the
domestic currency appreciates (e decreases) until the market for foreign
assets clears \( \frac{\partial e}{\partial d} < 0 \), Appendix B). The decrease in e decreases NL^S_u.
Also, the increase in d and the decrease in e reduce \( L^d_x \) and therefore,
\( L^S_x \) and \( NL^S_u \). The end result is an increase in ru.

The same result applies to the reserve requirement ratio \( \alpha \). An
increase in \( \alpha \) reduces \( FAD^F \) and \( L^d_x \), which reduces e (Appendix B), \( L^S_x \),
\( NL^S_u \), and increases ru.

The effect of varying the loan rate \( r_c \) on ru under a NBB regime,
differs from the one under a fixed exchange rate regime. \( r_c \) affects ru
positively under this regime. The rationale for this result is as
follows. Increasing \( r_c \) reduces \( FAD^F \), which reduces e. Also,
increasing \( r_c \) increases \( L^d_x \). But the reduction in e reduces \( L^d_x \) and D,
which reduces \( L^d_x \) further. The end result, as will be seen in Part II of
this chapter, is for \( L^d_x \) to decrease. This means that, without any
intervention from the monetary authorities, e decreases enough to
reverse the effect of increasing \( r_c \) on \( L^d_x \). A final decrease in \( L^d_x \)
implies a decrease in \( L^S_x \). With the decrease in e, \( NL^S_u \) decreases and
therefore, ru ends up increasing. This result was derived through the
use of the correspondence principle.

When the monetary authorities vary the deposit rate \( r_d \), the effect
on ru is positive. An increase in \( r_d \) reduces \( NL^S_u \). Also, the increase
in \( r_d \) reduces \( FAD^N \), which reduces e and \( NL^S_u \) further. Using the
correspondence principle, we sign the fourth element in (18) as positive.

The effect of varying the instrument of policy NBB on ru is
negative. Increasing $N_{BB}$, given $S^{dc}$, is tantamount to increasing $FA^{dc}$, which increases $e$. The increase in $e$ increases $NL_u$. Therefore $\frac{\partial ru}{\partial N_{BB}} < 0$.

3. Conclusion to Part I

The previous analysis shows that under both policy regimes, monetary authorities can change the actual instruments and affect unambiguously the direction of the movement in the unregulated loan market. Our results also show that monetary authorities can vary the policy regime itself and still predict the direction of the effect on unregulated loans.

Increasing the discount rate or the reserve requirement ratio, which is perceived to be contractionary, was shown to convey contractionary effects to unregulated loans under both regimes by leading to an increase in the unregulated loan rate. The results differed when the regulated loan rate was varied. Increasing this rate, which is perceived to be contractionary, signalled an expansionary move to unregulated loans under a fixed exchange rate regime and a contractionary one under a nonborrowed base regime. Increasing the deposit rate was shown to convey contractionary moves to unregulated loans under both regimes.

II. THE EFFECTS OF CHANGING ACTUAL INSTRUMENTS ON THE REGULATED LOAN MARKET UNDER DIFFERENT OPERATING REGIMES

What follows in this section is an analysis of the effect of changing actual instruments on the regulated loan market under both a fixed exchange rate regime and a nonborrowed base regime. We will examine the effects of varying actual instruments on $L^F$ or the supply of regulated loans by the non-bank public. All the results are derived in Appendix B.
and reported in (19), (20), and Table IV-1.

1. A Fixed Exchange Rate Regime

Under a fixed exchange rate regime, we obtained the following comparative statics results:

\[
\frac{\partial L_f^s}{\partial d} < 0, \quad \frac{\partial L_f^s}{\partial \alpha} < 0, \quad \frac{\partial L_f^s}{\partial \omega} > 0, \quad \frac{\partial L_f^s}{\partial \sigma} > 0, \quad \frac{\partial L_f^s}{\partial \theta} > 0 \quad (19)
\]

As we have seen in the previous part of this chapter, increasing \(d\) and \(\alpha\) reduced \(L_f^d\) in the presence of a fixed exchange rate regime, which justifies the negative signs of the first two elements in (19).

Increasing \(\sigma\) increases \(L_f^d\). With \(\omega\) remaining fixed, \(L_f^d\) ends up increasing too.

The effect of increasing \(\sigma\) on \(L_f^d\) is positive. An increase in \(\sigma\) increases \(D\) which increases \(L_f^d\). This leads to an increase in \(L_f^s\).

Increasing the policy instrument \(e\) increases \(D\). The increase in both \(e\) and \(D\) increase \(L_f^d\), which justifies the positive relationship between \(L_f^s\) and the exchange rate.

The results we reach show that monetary authorities can affect movements in the regulated loan market using four actual instruments. Regarding two of these instruments, \(d\) and \(\alpha\), the analysis is compatible with the conventional results in the literature. An increase in \(d\) or \(\alpha\) which is perceived to be a contractionary move on behalf of the monetary authorities has contractionary effects on regulated loans.
The effect of changing \( r_c \) is different. An increase in \( r_c \), which is perceived to be contractionary leads to an increase in the quantity supplied of loans by the public because of the way regulated loan markets function in the type of economy we are considering. Since \( r_c \) is fixed below market determined levels, the public supplies any additional quantity of loans demanded by financial intermediaries and therefore, increasing \( r_c \) causes an expansion of regulated credit.

The effect of changing \( r_d \) on \( L^* \) is shown to be expansionary. Our model is not intended to test McKinnon's thesis, nor does it have a real sector with a flow of savings that allows us to examine the effect of changing the deposit rate on private investment. But, if our aim is to examine the expansionary-contractionary nature of \( r_d \) in our model for the sake of deriving some policy implications, we would classify our results with those that have underscored the complementarity hypothesis.

Regarding the variation of the instrument regime, a devaluation (an increase in \( e \)) is shown to expand unregulated loans. The vast literature on devaluation shows no unanimity concerning the effect of devaluation on the real sector.

2. A Flexible Exchange Rate Regime with Nonborrowed Base as the Instrument of Policy

The results reached under a NBB regime are as follows:

\[
\frac{\partial L^*}{\partial d} < 0, \quad \frac{\partial L^*}{\partial c} < 0, \quad \frac{\partial L^*}{\partial r_c} < 0, \quad \frac{\partial L^*}{\partial r_d} < 0, \quad \frac{\partial L^*}{\partial \text{NBB}} > 0
\]  

(20)

The process through which a change in \( d \) and \( c \) affects bank's portfolios under a NBB regime was explained in Part I of this chapter. It
remains to be mentioned that the decrease in $e$ resulting from selling $\text{FA}^d$ in the absence of any intervention by the central bank, reinforces the downward effect of $d$ and $\alpha$ on $\text{L}^d$ directly and through a decrease in $D$. Therefore, we end up with a situation where both $D$ and $\text{L}^d$ decrease as a result of varying $d$ and $\alpha$.

In order to sign the third element in (20), we rely on the correspondence principle. A negative relationship between the loan rate $\text{rc}$ and the quantity supplied of regulated loans by the public would not be surprising in a conventional model. But in our model, this result looks surprising. Unlike the case of the fixed exchange rate regime, where $\frac{\partial \text{L}^d}{\partial \text{rc}} > 0$, under a NBB regime, an increase in $\text{rc}$ ends up reducing rather than increasing the quantity demanded for regulated loans by banks. The reason was explained in Part I of this chapter. There, we have shown that, in the absence of any intervention by the central bank in the foreign exchange markets, $e$ decreases enough to decrease $\text{L}^d$ and $D$ which decreases $\text{L}^d$ further. The decrease in $\text{L}^d$ resulting from the decrease in $e$ and $D$ seems to more than offset the increase in $\text{L}^d$ resulting from increasing $\text{rc}$. Therefore, $\frac{\partial \text{L}^d}{\partial \text{rc}} < 0$.

Another surprising result concerns the negative effect of $\text{rd}$ on $\text{L}^d$. An increase in $\text{rd}$ increases the demand for deposits $D^d$ and reduces the net supply of unregulated loans $\text{NL}^u$, foreign assets held by the nonbank public $\text{FA}^d\text{N}$, and currency demand $\text{C}^d$. The decrease in $\text{NL}^u$ decreases $\text{ru}$, which reduces $D^d$. Also, the sale of foreign assets decreases $e$, which decreases both $D^d$ and $\text{NL}^u$ and increases $\text{ru}$ further. In the absence of intervention, $e$ ends up decreasing. The end result is that
the decrease in $e$ and the increase in $r_u$ outweigh the effect of increasing $rd$ on $D^d$. With $D^d$ decreasing, $D$ ends up decreasing too. The decrease in $D$ and $e$ reduces $L^d_\tau$ and it follows that $\partial L^d_\tau / \partial rd < 0$, which was signed using the correspondence principle.

The last result in (20) concerns the effect of changing NBB on $L^s_\tau$. An increase in NBB through open market operations with foreign assets increases $e$ and therefore $L^d_\tau$ and $L^s_\tau$. The results in (20) show that monetary authorities can affect the direction of regulated loans by using discretionary monetary policy through varying actual instruments. Increasing three of the instruments ($d$, $a^*$, and $r_c$), a move which is perceived to be contractionary, was shown to convey contractionary results to the regulated loan market. Unlike the case of the fixed exchange rate regime, $r_c$ gave conventional results in a "non-conventional" specification of the loan market.

The effect of varying $rd$ on regulated loans was contractionary, unlike the case of fixed exchange rates. This result is not compatible with McKinnon's complementarity hypothesis.

3. Conclusion to Part II

Under both policy regimes, monetary authorities were shown to affect movements in regulated loans with a degree of certainty through actual instrument variations.

The effect of changing the discount rate or the reserve requirement ratio on regulated loans was in line with conventional wisdom. Increasing $d$ or $a^*$, which is perceived to be contractionary, led to a decrease in regulated loans.
The effect of varying the loan rate on regulated loans differed under the two regimes. An increase in \( r_c \) increased the quantity supplied of regulated loans under a fixed exchange rate regime. Even though this result is not compatible with the conventional ones, it is not surprising because of the differentiating characteristic of the loan market in our model. What is unexpected was getting conventional results shown to reduce the quantity of loans supplied by the public in a model with fixed loan rates.

Increasing the deposit rate was shown to expand regulated loans in the case of a fixed exchange rate regime and to contract it when the nonborrowed base is the instrument of policy. Since there exists no unanimity concerning the effect of the deposit rate on regulated loans, it becomes hard to compare our results with the conventional ones. We can only state that our results underscore the complementarity hypothesis when the exchange rate is fixed and undermine it when exchange rates fluctuate.

A devaluation was shown to be expansionary in the sense that increasing \( e \) expanded regulated loans. Open market operations purchases with foreign assets that led to an increase in NBB (eq. 15) were shown to increase regulated loans, which is compatible with the conventional literature.

III. THE EFFECTS OF CHANGING ACTUAL INSTRUMENTS ON BOTH LOAN MARKETS UNDER DIFFERENT OPERATING REGIMES

Affecting the activity in one loan market might not achieve the expected results if an opposite effect is conveyed to the other loan market. Therefore, in this part, we will examine the ability of monetary
authorities to cause a consistent outcome in both loan markets when they vary an actual instrument. The results reached are summarized in Table IV-2.

1. **A Fixed Exchange Rate Regime**

Under a fixed exchange rate regime, increasing $d$ or $a$ was shown to increase $ru$ and reduce $L^S_\$\$, that is, to transmit contractionary moves to both loan markets.

Increasing $ro$ led to a decrease in $ru$ and an increase in $L^S_\$. This shows that varying the regulated loan rate causes a consistent outcome in both loan markets. Increasing $rd$ was shown to increase $ru$ and $L^S_\$. This means that increasing $rd$ causes a contraction in unregulated loans and an expansion in regulated ones.

Varying the policy instrument itself was shown to convey similar effects to both loan markets.

2. **A Flexible Exchange Rate Regime with NonBorrowed Base as the Instrument of Policy**

Under a flexible exchange rate regime, all actual instruments were shown to convey the same effect to both loan markets. Two major differences are in order. First, increasing $ro$ led to an increase in $ru$ and a decrease in $L^S_\$. This means that the effects transmitted to both loan markets were contractionary and not expansionary like in the fixed exchange rate case. Second, increasing the deposit rate $rd$ was shown to cause a consistent outcome in both loan markets.
### TABLE IV-2

**The Effects of Varying Actual Instruments Unregulated and Regulated Loans**

<table>
<thead>
<tr>
<th>Actual Instruments</th>
<th>Fixed Exchange Rate Regime</th>
<th>Flexible Exchange Rate Regime</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>ru</td>
<td>L&lt;sub&gt;r&lt;/sub&gt;</td>
</tr>
<tr>
<td>t&lt;sub&gt;d&lt;/sub&gt;</td>
<td>↑ (contraction)</td>
<td>↑ (contraction)</td>
</tr>
<tr>
<td>t&lt;sub&gt;a&lt;/sub&gt;</td>
<td>↑ (contraction)</td>
<td>↑ (contraction)</td>
</tr>
<tr>
<td>t&lt;sub&gt;rc&lt;/sub&gt;</td>
<td>↓ (expansion)</td>
<td>↑ (expansion)</td>
</tr>
<tr>
<td>t&lt;sub&gt;rd&lt;/sub&gt;</td>
<td>↑ (contraction)</td>
<td>↑ (expansion)</td>
</tr>
<tr>
<td>t&lt;sub&gt;e&lt;/sub&gt;</td>
<td>↓ (expansion)</td>
<td>↑ (expansion)</td>
</tr>
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<table>
<thead>
<tr>
<th>Actual Instruments</th>
<th>Fixed Exchange Rate Regime</th>
<th>Flexible Exchange Rate Regime</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ru</td>
<td>L&lt;sub&gt;r&lt;/sub&gt;</td>
</tr>
<tr>
<td>t&lt;sub&gt;d&lt;/sub&gt;</td>
<td>↑ (contraction)</td>
<td>↑ (contraction)</td>
</tr>
<tr>
<td>t&lt;sub&gt;a&lt;/sub&gt;</td>
<td>↑ (contraction)</td>
<td>↑ (contraction)</td>
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<td>↓ (contraction)</td>
</tr>
<tr>
<td>t&lt;sub&gt;NBB&lt;/sub&gt;</td>
<td>↓ (expansion)</td>
<td>↑ (expansion)</td>
</tr>
</tbody>
</table>

↑ = Increase  
↓ = Decrease
3. **Conclusion to Part III**

The following policy implications for central bank management are derived in Part III.

In the case of a flexible exchange rate regime, monetary authorities can alter all actual instruments under its discretion and cause a consistent outcome in both loan markets.

Under a fixed exchange rate regime, increasing \(d\), \(a\), or \(rc\) was shown to convey the same effects to both loan markets. Still, increasing \(rc\), which is perceived to be contractionary, conveyed expansionary effects to both loan markets. Increasing the deposit rate was shown to transmit opposite effects to both loan markets under a fixed exchange rate regime. This result allows the central bank to expand the role of one loan market at the expense of the other. This is of importance if the monetary authorities, for example, are concerned about the unregulated loans going to some non-priority or inflationary sectors. Regulated loans can then be expanded and unregulated loans contracted through increasing the deposit rate.
1. Even though there exists no unanimity in the monetary targeting literature on whether central banks ought to target a credit or a money supply aggregate, it appears that some countries have followed credit control policies. In France, for example, the monetary target is administered through the "encadrement du crédit," which is a system of quantitative controls on bank lending, Britain [1981]. In some less developed countries, ceilings on domestic credit expansion have been accepted as part of the conditions for an International Monetary Fund (IMF) loan. Between 1973 and 1978, 18 member countries of the IMF accepted such ceilings [Foot, 1981, p. 14].
CHAPTER V

SOME MONETARY POLICY IMPLICATIONS IN THE PRESENCE OF UNREGULATED LOAN MARKETS AND CAPTIVE BUYERS OF GOVERNMENT SECURITIES

This chapter is divided into three parts. We first examine the effects of varying actual instruments on the money supply and the monetary base under different policy regimes. Our aim is to draw some conclusions concerning the ability of the monetary authorities to affect the two aggregates when they are used as intermediate targets of policy.

In the second part, the effects of financing budget deficits by captive buyers of government securities are discussed. Our purpose in raising this issue is to analyze whether monetary authorities can use a money aggregate as an intermediate target while financing part of the budget deficits through captive buyers. We are interested in examining the regime(s) under which the effect of such policies on these aggregates is predictable.

Third, we will study how changing actual instruments affects the policy regimes themselves. This means that if the monetary authorities vary the discount rate, for example, would they be able to predict the effect of this change on the potential instrument regime in order to counteract the move and keep the policy instrument at its target level?

I. THE EFFECTS OF VARYING ACTUAL INSTRUMENTS ON THE MONEY SUPPLY AND THE MONETARY BASE

In this part, we will examine the effects of varying an actual
instrument (d, a, rc, rd) on the money supply MS and the monetary base MB. All the results are reported in Table V-1.

1. The effects of Varying Actual Instruments on the Money Supply

We use a narrow definition of the money supply that includes currency held by the non-bank public and demand deposits. The effects of varying actual instruments on Deposits D is determined endogenously in the model and the results are derived in Appendix B. The effects on Currency C will be derived indirectly in what follows:

a. A Fixed Exchange Rate Regime

\[
\frac{\partial MS}{\partial d} = \frac{\partial D}{\partial d} + \frac{\partial C}{\partial ru} \frac{\partial ru}{\partial d} + \frac{\partial C}{\partial L_r^s} \frac{\partial L_r^s}{\partial d} < 0 \tag{21}
\]

\[
\frac{\partial MS}{\partial a} = \frac{\partial D}{\partial a} + \frac{\partial C}{\partial ru} \frac{\partial ru}{\partial a} + \frac{\partial C}{\partial L_r^s} \frac{\partial L_r^s}{\partial a} < 0 \tag{22}
\]

\[
\frac{\partial MS}{\partial rc} = \frac{\partial D}{\partial rc} + \frac{\partial C}{\partial ru} \frac{\partial ru}{\partial rc} + \frac{\partial C}{\partial L_r^s} \frac{\partial L_r^s}{\partial rc} > 0 \tag{23}
\]

\[
\frac{\partial MS}{\partial rd} = \frac{\partial D}{\partial rd} + \frac{\partial C}{\partial ru} \frac{\partial ru}{\partial rd} + \frac{\partial C}{\partial L_r^s} \frac{\partial L_r^s}{\partial rd} + \frac{\partial C}{\partial rd} > 0 \tag{24}
\]

\[
\frac{\partial MS}{\partial e} = \frac{\partial D}{\partial e} + \frac{\partial C}{\partial ru} \frac{\partial ru}{\partial e} + \frac{\partial C}{\partial L_r^s} \frac{\partial L_r^s}{\partial e} > 0 \tag{25}
\]

The system of equations (21-25) shows the important role played by the unregulated loan market rate ru in affecting the money supply through
its effect on currency demand. Under a fixed exchange regime, and in the presence of fixed deposit and loan rates, the only interest rate that moves endogenously to affect the demand and supply functions of members of the non-bank public is \( r_u \). The other endogenous variable affecting the demand for currency is \( L^S_T \). It is indirectly affected by what happens in the demand side of the regulated loan market.

The results we reach concerning the effects of changing actual instruments on \( M_S \) are interpreted as follows: Increasing the discount rate \( d \) or the reserve requirement ratio \( a \) reduces \( M_S \). An increase in \( d \) or \( a \) was shown to reduce \( L^S_T \) and increase \( r_u \) in the previous chapter. Both these effects lead to a reduction in the demand for deposits and currency and therefore, the equilibrium money stock. This result is compatible with the perception in the literature, since increasing \( d \) and \( a \) is viewed to be contractionary.

Equation (23) tells us that \( r_c \) and the money supply are directly related when the exchange rate is fixed. Increasing \( r_c \) was shown in Chapter IV to reduce \( r_u \) and increase \( L^S_T \), a result that leads to an increase in \( C \) and \( D \) and, therefore, \( M_S \). This result is not in line with the conventional results, where increasing \( r_c \) is thought of as being contractionary. But because of the constraint imposed on \( r_c \) in our model, we saw in the previous chapter that regulated credit activity expands with an increase in \( r_c \).

The effect of changing \( r_d \) on \( M_S \) (eq. 24) is ambiguous since increasing \( r_d \) increases \( D \) but reduces \( C \). Our result is similar to the one derived in Benavie and Froyen [1982], where they considered the effect of varying the deposit rate on the money supply. In their study,
they assumed that the own effect of \( \text{rd} \) on \( \text{D} \) outweighs the cross effect of \( \text{rd} \) on \( \text{C} \) and therefore, they signed \( \frac{\partial \text{MS}}{\partial \text{rd}} > 0 \). Since we do not make this assumption, we cannot sign (24).

The last result we reach concerns the effect of varying the instrument regime itself on \( \text{MS} \) (eq. 25). Since an increase in \( e \) increases \( \text{D}, \text{C}, \text{L}_r^s \), and reduces \( \text{ru} \), the effect of varying the exchange rate on the money supply is positive.

**b. A Flexible Exchange Rate Regime with NonBorrowed Base as the Instrument of Policy**

\[
\frac{\partial \text{MS}}{\partial \text{d}} = \frac{\partial \text{D}}{\partial \text{d}} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \text{d}} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \text{d}} + \frac{\partial \text{L}_r^s}{\partial \text{d}} + \frac{\partial \text{C}}{\partial \text{e}} \frac{\partial \text{e}}{\partial \text{d}} < 0 \quad (26)
\]

\[
\frac{\partial \text{MS}}{\partial \alpha} = \frac{\partial \text{D}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \alpha} + \frac{\partial \text{L}_r^s}{\partial \alpha} + \frac{\partial \text{C}}{\partial \text{e}} \frac{\partial \text{e}}{\partial \alpha} < 0 \quad (27)
\]

\[
\frac{\partial \text{MS}}{\partial \alpha} = \frac{\partial \text{D}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \alpha} \frac{\partial \text{ru}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \alpha} \frac{\partial \text{ru}}{\partial \alpha} + \frac{\partial \text{L}_r^s}{\partial \alpha} \frac{\partial \alpha}{\partial \text{e}} \frac{\partial \text{e}}{\partial \alpha} < 0 \quad (28)
\]

\[
\frac{\partial \text{MS}}{\partial \alpha} = \frac{\partial \text{D}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \alpha} + \frac{\partial \text{L}_r^s}{\partial \alpha} \frac{\partial \alpha}{\partial \text{e}} \frac{\partial \text{e}}{\partial \alpha} + \frac{\partial \text{C}}{\partial \text{e}} \frac{\partial \text{e}}{\partial \alpha} < 0 \quad (29)
\]

\[
\frac{\partial \text{MS}}{\partial \text{NB}} = \frac{\partial \text{D}}{\partial \text{NB}} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \text{NB}} + \frac{\partial \text{C}}{\partial \text{ru}} \frac{\partial \text{ru}}{\partial \text{NB}} + \frac{\partial \text{L}_r^s}{\partial \text{NB}} + \frac{\partial \text{C}}{\partial \text{e}} \frac{\partial \text{e}}{\partial \text{NB}} > 0 \quad (30)
\]

The results in eq. (26–27) are similar to the ones derived under a fixed exchange rate regime. The reason is that along with increasing \( \text{ru} \) and reducing \( \text{L}_r^s \), increasing \( \text{d} \) was shown to reduce \( e \) (Appendix B) as was
discussed in the previous chapter. The decrease in e reduces both C and D and therefore MS.

The effect of varying rc (eq. 28) is different under this regime than under the previous one. As we have shown in Chapter IV, increasing rc reduces \( L^3_T \) and e when exchange rates are flexible, and increases ru. All this leads to a decrease in C and D, and therefore MS. What is different here is that the results we reach are compatible with the conventional literature, in the sense that increasing rc conveys contractionary effects to the money supply.

The effect of varying rd on MS is negative now (eq. 29), rather than ambiguous (eq. 24). The reason is that, as we have shown in Chapter IV, when the exchange rate is flexible, an increase in rd reduces D. Also an increase in rd increases ru, and reduces \( L^3_T \) and e, which reduces C. With D and C decreasing, MS decreases too.

The last issue concerns the effect of open market purchase (increasing NBB) on the money supply. As is expected, this increases MS (eq. 30).

2. The Effects of Varying Actual Instruments on the Monetary Base

We define the monetary base from its liability side as the sum of Currency held by the non bank public and Total Reserves. The effects of varying actual instruments on Currency was derived in the previous section. In this section, we will derive the effects of changing the instruments on total reserves TR. Final results are reported in Table V-1.
**TABLE V-1**

THE EFFECTS OF VARYING ACTUAL INSTRUMENTS ON MS, AND MB

<table>
<thead>
<tr>
<th>Policy Regimes</th>
<th>Fixed Exchange Rate Regime</th>
<th>Flexible Exchange Rate Regime with NBB as the Instrument of Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Instruments</td>
<td>MS</td>
<td>MB</td>
</tr>
<tr>
<td>d</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>a</td>
<td>-</td>
<td>?</td>
</tr>
<tr>
<td>rc</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>rd</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>e</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>NBB</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

- = negative effect
+ = positive effect
? = ambiguous effect
NA = Non Applicable
a. **Fixed Exchange Rate Regime**

\[
\frac{\partial MB}{\partial d} = \frac{\partial C}{\partial d} + \frac{\partial TR}{\partial d} + \frac{\partial TR}{\partial D} \frac{\partial D}{\partial d} \triangleright 0 \tag{31}
\]

\[
\frac{\partial MB}{\partial a} = \frac{\partial C}{\partial a} + \frac{\partial TR}{\partial a} + \frac{\partial TR}{\partial D} \frac{\partial D}{\partial a} \triangleright 0 \tag{32}
\]

\[
\frac{\partial MB}{\partial rc} = \frac{\partial C}{\partial rc} + \frac{\partial TR}{\partial rc} + \frac{\partial TR}{\partial D} \frac{\partial D}{\partial rc} \triangleright 0 \tag{33}
\]

\[
\frac{\partial MB}{\partial rd} = \frac{\partial C}{\partial rd} + \frac{\partial TR}{\partial rd} \frac{\partial D}{\partial rd} \triangleright 0 \tag{34}
\]

\[
\frac{\partial MB}{\partial e} = \frac{\partial C}{\partial e} + \frac{\partial TR}{\partial e} + \frac{\partial TR}{\partial D} \frac{\partial D}{\partial e} \triangleright 0 \tag{35}
\]

Increasing \(d\) reduces \(MB\) since it reduces \(C\) and \(TR\). \(TR\) decreases since borrowed reserves and excess reserves decrease with an increase in \(d\).

The effect of increasing \(a\) on \(MB\) is ambiguous because of the ambiguous relationship between \(a\) and \(TR\), since increasing \(a\) increases required reserves but reduces excess reserves.

Increasing \(rc\) increases \(C\) but affects \(TR\) ambiguously and, therefore, the results in eq. (33) are ambiguous.

Equation (34) shows ambiguous results since the effect of \(rd\) on \(C\) is ambiguous.

The effect of devaluation (eq. 35) is expansionary. Increasing \(e\) increases \(MB\).
b. A Flexible Exchange Rate Regime with NonBorrowed Base as the Instrument of Policy

\[
\begin{align*}
\frac{\delta \text{MB}}{\delta d} &= \frac{\delta C}{\delta d} + \frac{\delta \text{TR}}{\delta d} + \frac{\delta \text{TR}}{\delta D} \frac{\delta D}{\delta d} + \frac{\delta \text{TR}}{\delta e} \frac{\delta e}{\delta d} < 0 \\
\frac{\delta \text{MB}}{\delta a} &= \frac{\delta C}{\delta a} + \frac{\delta \text{TR}}{\delta a} + \frac{\delta \text{TR}}{\delta D} \frac{\delta D}{\delta a} + \frac{\delta \text{TR}}{\delta e} \frac{\delta e}{\delta a} > 0 \\
\frac{\delta \text{MB}}{\delta \text{rc}} &= \frac{\delta C}{\delta \text{rc}} + \frac{\delta \text{TR}}{\delta \text{rc}} + \frac{\delta \text{TR}}{\delta D} \frac{\delta D}{\delta \text{rc}} + \frac{\delta \text{TR}}{\delta e} \frac{\delta e}{\delta \text{rc}} < 0 \\
\frac{\delta \text{MB}}{\delta \text{rd}} &= \frac{\delta C}{\delta \text{rd}} + \frac{\delta \text{TR}}{\delta \text{rd}} \frac{\delta D}{\delta \text{rd}} + \frac{\delta \text{TR}}{\delta e} \frac{\delta e}{\delta \text{rd}} < 0 \\
\frac{\delta \text{MB}}{\delta \text{NNB}} &= \frac{\delta C}{\delta \text{NNB}} + \frac{\delta \text{TR}}{\delta \text{NNB}} \frac{\delta D}{\delta \text{NNB}} + \frac{\delta \text{TR}}{\delta e} \frac{\delta e}{\delta \text{NNB}} > 0
\end{align*}
\]  

(36-40)

The results in eq. (36-37) are still the same for the same reasons discussed earlier.

In eq. (38-39), rc and rd affect C negatively for reasons discussed earlier. As we can see, increasing rc reduces total reserves since it reduces D and e. Also increasing rd reduces TR for the same reasons. Therefore, the effects of rc and rd on MB are contractionary. This result is similar to the one derived when money supply was the intermediate policy target.

An open market purchase (eq. 40) increases the monetary base in the same manner it increased the money supply.
3. Conclusion to Part I

The previous analysis shows that under a system of fixed exchange rates, all instruments except the deposit rate have an unambiguous effect on the money supply. Only one instrument, the discount rate, has an unambiguous effect on the monetary base, however.

Under a system of flexible exchange rates, all instruments have clear a priori effects on the money stock. All instruments but the reserve requirement ratio affected the monetary base unambiguously.

II. THE EFFECTS OF CHANGING BUDGET DEFICITS ON MONEY AGGREGATES

The present study does not model a government budget constraint that allows us to vary a budget deficit variable and examine its effects on income, employment and some monetary aggregates. However, in reviewing the bond market characteristics in Chapter II, we saw that in the types of economies we are studying, government budget deficits are partly financed by selling securities to financial intermediaries. We also saw that there exists a lack of ownership motive for holding these securities, and that financial intermediaries include them in their portfolios of assets solely because they are captive buyers. Therefore, we assume that any increase in government securities held by commercial banks is the result of an increase in budget deficits. This allows us to use $G_{dF}$ in our equilibrium conditions (10-15), as a proxy for a budget deficit variable.

In the literature on financing budget deficits by selling government bonds to captive buyers, Aghevli and Khan [1971], and Coats and Khatkhate [1978], among others, state that if these deficits are financed by the
monetary authorities, this causes the monetary base and the money supply to expand directly. In other words, if the central bank permits financial intermediaries to increase their demand for borrowed reserves dollar for dollar to pay for government securities, the effect on the monetary aggregates would be expansionary. If budget deficits are financed by commercial banks, the effect on the monetary aggregates depends on the effect of this policy on excess reserves [Coats and Khatkhate, 1978].

In any portfolio balance model including a discount window, both effects are present. This means that our model allows commercial banks to increase their demand for borrowed reserves while, at the same time, adjusting their portfolios to accommodate the increase in their demand for government securities. The results we reach imply that under both regimes, the effect on the money supply and the monetary base are contractionary rather than expansionary since increasing budget deficits by selling government securities to captive buyers is similar to an open market operations sale.

In what follows, we will examine how changing $GSD_F$ affects $R_u$, $L_T$, and $D$ under different policy regimes, in order to draw conclusions on the effect of budget deficits on money supply, and the monetary base. All the results are derived in Appendix B and reported in Table V-2.

1. A Fixed Exchange Rate Regime

\[
\frac{\partial R_u}{\partial GSD_F} > 0, \quad \frac{\partial L_T}{\partial GSD_F} < 0, \quad \frac{\partial D}{\partial GSD_F} < 0
\]  

(41)

An increase in $GSD_F$ leads to a portfolio reallocation by the banks. Since
TABLE V-2
THE EFFECTS OF VARYING \( Gs^F \) ON MONEY AND CREDIT AGGREGATES

and

THE EFFECT OF VARYING ACTUAL INSTRUMENTS AND \( Gs^F \) ON \( FA^{dc} \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed Exchange Rate Regime</th>
<th>Flexible Exchange Rate Regime With NBB as the Instrument of Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument</td>
<td>( FA^{dc} )</td>
<td>( FA^{dc} )</td>
</tr>
<tr>
<td>( d )</td>
<td>( + )</td>
<td>0</td>
</tr>
<tr>
<td>( a )</td>
<td>( + )</td>
<td>0</td>
</tr>
<tr>
<td>( rc )</td>
<td>( - )</td>
<td>0</td>
</tr>
<tr>
<td>( rd )</td>
<td>( - )</td>
<td>0</td>
</tr>
<tr>
<td>( Gs^F )</td>
<td>( + )</td>
<td>0</td>
</tr>
<tr>
<td>( ru ) ( L^F ) ( D )</td>
<td>( MS ) ( MB )</td>
<td>( ru ) ( L^F ) ( D )</td>
</tr>
<tr>
<td>( Gs^F )</td>
<td>( + ) ( - ) ( - )</td>
<td>( - )</td>
</tr>
</tbody>
</table>

+ = positive effect
- = negative effect
financial intermediaries have to increase their holdings of government securities, they increase their demand for borrowed reserves and reduce their holdings of foreign assets, excess reserves and regulated loans. As a result of selling foreign assets, domestic currency appreciates and the central bank intervenes, buying foreign securities to keep \( e \) fixed. The final result would be a decrease in \( L^S_T \) resulting from a decrease in \( L^d_T \). The decrease in \( L^S_T \) reduces \( D \) and \( N_L^S \). The reduction in the net supply of unregulated loans increases \( r_u \).

Differentiating \( M_S \) and \( B_I \) with respect to \( G_S^{dF} \), we get:

\[
\frac{\partial M_S}{\partial G_S^{dF}} = \frac{\partial D}{\partial G_S^{dF}} + \frac{\partial C}{\partial G_S^{dF}} + \frac{\partial r_u}{\partial G_S^{dF}} + \frac{\partial C}{\partial L^S_T} \frac{\partial L^S_T}{\partial G_S^{dF}} < 0 \tag{42}
\]

\[
\frac{\partial M_B}{\partial G_S^{dF}} = \frac{\partial C}{\partial G_S^{dF}} + \frac{\partial TR}{\partial G_S^{dF}} + \frac{\partial TR}{\partial D} \frac{\partial D}{\partial G_S^{dF}} < 0 \tag{43}
\]

The effect on \( M_S \) and \( M_B \) is negative since increasing \( G_S^{dF} \) reduces \( D \), \( C \), and \( TR \).

An increase in \( G_S^{dF} \) reduces the supply of regulated loans and the unregulated loan rate \( r_u \).

2. **A Flexible Exchange Regime with NonBorrowed Base as the Instrument of Policy**

\[
\frac{\partial r_u}{\partial G_S^{dF}} > 0, \quad \frac{\partial L^S_T}{\partial G_S^{dF}} < 0, \quad \frac{\partial D}{\partial G_S^{dF}} < 0 \tag{44}
\]

Under this regime, the same portfolio reallocation process takes place except that now, selling foreign assets reduces \( e \) (Appendix B)
since the central bank does not intervene in the foreign exchange market because it is targeting NBB and not e.

The decrease in e reduces L^S further, which reduces L^S. The reduction in e and L^S reduces D and NL^S. Therefore, ru increases.

The effects on MS and MB are as follows:

$$\frac{\partial MS}{\partial GS_{dF}} = \frac{\partial D}{\partial GS_{dF}} + \frac{\partial C}{\partial ru} + \frac{\partial ru}{\partial GS_{dF}} + \frac{\partial C}{\partial L^S} + \frac{\partial L^S}{\partial GS_{dF}} + \frac{\partial C}{\partial e} + \frac{\partial e}{\partial GS_{dF}} < 0 \quad (45)$$

$$\frac{\partial MB}{\partial GS_{dF}} = \frac{\partial C}{\partial GS_{dF}} + \frac{\partial TR}{\partial GS_{dF}} + \frac{\partial TR}{\partial D} + \frac{\partial D}{\partial GS_{dF}} + \frac{\partial TR}{\partial e} + \frac{\partial e}{\partial GS_{dF}} < 0 \quad (46)$$

MS and MB decrease with an increase in GS_{dF} since this increase reduces C, D, and TR. An increase in GS_{dF} reduces regulated loans and increases the unregulated loan rate.

3. Conclusion to Part II

Financing budget deficits by selling government securities to captive buyers was shown to reduce the money supply and the monetary base. This result is not compatible with the case where monetary authorities finance budget deficits through discount window borrowing. Because commercial banks reallocated their holdings of assets, excess and total reserves decreased, which reduced the monetary base. Similarly, the portfolio reallocation led to a decrease in the demand for regulated loans by financial intermediaries. This reduced the supply of regulated loans by the public and thus, decreased the net supply of unregulated loans. The decrease in NL^S increased ru. The increase in ru reduced currency and deposits demand. Therefore, the equilibrium level of the money stock
decreased since MS was defined as the sum of C and D.

The decrease in $L^S_x$ and the increase in $ru$ imply that financing budget deficits through captive buyers of government securities conveys contractionary effects to both loan markets.

III. THE EFFECTS OF VARYING ACTUAL INSTRUMENTS AND BUDGET DEFICITS ON THE POLICY REGIMES

In this part, we will examine the effects of varying an actual instrument and budget deficits on the two policy regimes. We are interested in determining the ability of the monetary authorities to keep the policy regime at its target level after varying an actual instrument.

1. A Fixed Exchange Rate Regime

Under this regime, foreign assets held by monetary authorities are used to keep the exchange rate $e$ at its target level. The central bank trades the amount of foreign securities needed to counteract the effect of changes in actual instruments or budget deficits on $e$.

In order to determine the ability of the monetary authorities to keep $e$ at its target level, we examine the effects of changing an actual instrument or varying $GS^d_F$ on $FA^d_C$. If the monetary authorities predict unambiguously the effect of varying actual instruments on $FA^d_C$, then they should know whether they ought to buy or sell foreign assets while they are changing actual instruments. All results are derived in Appendix B and reported in Table V-2.

$$\frac{\partial FA^d_C}{\partial d} > 0, \frac{\partial FA^d_C}{\partial a} > 0, \frac{\partial FA^d_C}{\partial x} < 0, \frac{\partial FA^d_C}{\partial y} < 0, \frac{\partial FA^d_C}{\partial GS^d_F} > 0 \quad (47)$$
An increase in \( d, \mu, \) or \( G_{SdF} \) were shown to reduce \( FA_{dF} \) and \( L^d \). A decrease in \( L^d \) leads to a decrease in foreign assets held by the non-bank public. With both the banks and the public selling foreign assets, monetary authorities buy foreign assets to keep \( e \) fixed.

Increasing \( rc \) and \( rd \) have negative effects on \( FA_{dc} \). This means that central banks sell foreign assets to keep \( e \) fixed after increasing \( rc \) and \( rd \). An increase in \( rc \) was shown to increase \( L^d \) and reduce \( FA_{dF} \). The increase in \( L^d \) increases \( FA_{dN} \). With the bank selling foreign assets and the public buying them, we have two effects on the exchange rate working in opposite directions. To sign the third element in (47), we rely on the correspondence principle. The result we reach shows that the effect of \( FA_{dN} \) on the exchange rate is greater than the effect of \( FA_{dF} \).

The same analysis can be generalized to the case of the deposit rate and, therefore, the fourth element in (47) is negative too, through the correspondence principle.

2. A Flexible Exchange Rate Regime with NonBorrowed Base as the Instrument of Policy

Under a NBB regime, monetary authorities keep their holdings of foreign assets fixed to keep NBB fixed at its target level, for a given \( GS_{dc} \) (eq. 15). To study the ability of the central bank in keeping NBB at its target level, let us examine the effect of varying actual instruments and changing budget deficits on \( FA_{dc} \). All the results are derived in Appendix B and reported in Table V-2.
\[ \frac{\partial FA^d_0}{\partial d} = 0, \quad \frac{\partial FA^d_0}{\partial a} = 0, \quad \frac{\partial FA^d_0}{\partial r} = 0, \quad \frac{\partial FA^d_0}{\partial r_0} = 0, \quad \frac{\partial FA^d_0}{\partial Gsd^F} = 0 \quad (48) \]

The results in (48), imply that under a NBB regime, varying actual instruments and $Gsd^F$ have no effect on $FA^d_0$. This means that the exchange rate fluctuates enough to adjust the system to instrument variations.

3. Conclusion to Part III

Monetary authorities were shown to be able to keep the instrument regime at its target level when they vary their actual instruments or the proxy for the budget deficit variable $Gsd^F$. The direction of the move in $FA^d_0$ was unambiguous under a fixed exchange rate regime. In the case of a NBB regime, there was no effect on $FA^d_0$. 
CHAPTER VI

THE FUNCTIONING OF A REGULATED MARKET FOR GOVERNMENT SECURITIES: THE CASE OF TAIWAN

Our discussion of the characteristics of the financial system of small open economies in Chapters II and III did not refer to any specific country. The analysis was theoretical, and aimed at highlighting as many of the small country's characteristics as possible.

The differences between the financial markets in small open less developed economies and those of the developed economies were emphasized. Our purpose was to argue that when financial characteristics differ, it becomes misleading to generalize the results on money and credit policies in the literature to less developed countries.

In this chapter, rather than attempting to apply a general model to a specific country, we will raise an issue that is related to money and credit policies in many small open less developed economies. Then, we will analyze it in the context of a selected country.

It should be emphasized that not all small open economies benefit from a financial environment where policies aimed at controlling money and credit are feasible. In some less developed economies monetization is not spread equally across all sectors; the banking system and other financial intermediaries are still in an infant stage; and the monetary authorities do not have all necessary policy tools at their discretion. Therefore, while looking for a suitable country, our search was confined to the growing small open economies that have experienced financial development.
and innovation in the last two decades such as Taiwan, Korea, and some Latin American countries, notably, Argentina, Brazil, and Mexico. Our decision to select Taiwan, where the economic growth averaged 11.3 percent per annum from 1976 to 1979 [Ho, 1981, p. 1190], can be justified on two grounds. The first reason is that in the last decade, the Central Bank of China (C.B.C. hereafter) has undertaken several measures aimed at developing a financial system. The second concerns the information on unregulated loan markets. Since this market plays a pivotal role in our study, having figures on the unregulated loan rates provides a basis for comparing these rates with other interest rates. As far as we are aware, the C.B.C. is the only bank that reports figures on unregulated rates in its monthly financial statistics.

To elaborate on the first reason, we will emphasize two major financial developments.

The first concerns the market for government securities. In 1971, the Taiwanese monetary authorities announced that all securities would be traded at free market prices and a market for treasury bills with variable prices was also created. In fact, the monetary authorities undertook open market operations for the first time in 1979 [C.B.C. Annual Reports 1979]. Since then, the C.B.C. has been regularly pursuing this policy.

The second financial development occurred in the foreign exchange market. On July 11, 1978, the monetary authorities made a major change in the foreign exchange system by adopting a floating exchange regime. They decided that a foreign exchange market should be established so that the new Taiwan dollar's exchange rate could be determined by market forces. This was achieved on February 1, 1979. Later, the system was modified to
a managed floating regime. Since that time the C.B.C. has intervened on many occasions as both a buyer and a seller of currencies to maintain what was termed as an orderly foreign exchange market [C.B.C. Annual Reports 1978-1980].

The issues we have selected to study deal with the functioning of regulated markets for government securities, and with measures aimed at promoting and diversifying these markets. They are also of importance to the functioning of monetary policy, since a well diversified market for government securities may facilitate the task of monetary management.

The approach we take in this chapter is as follows: Section I is a description of the current status and functions of the market for government securities in Taiwan. In Section II, we discuss whether it is necessary to have a larger and more diversified market for government securities in Taiwan. Section III reviews the literature on measures to promote and diversify markets for government securities. Section IV relates the measures discussed in Section III to the Taiwanese regulated market for government securities. In Section V, we use the model developed in Chapter III, to discuss measures that might allow the promotion and diversification of a regulated market for government securities considering the differentiating characteristics of our model. Section VI is a conclusion.

I. THE STATUS AND FUNCTIONS OF THE REGULATED MARKET FOR GOVERNMENT SECURITIES IN TAIWAN

The "market" for government securities in Taiwan is highly regulated. This is in line with government policies that regulate other
financial markets. Therefore, we choose to refer to the "market" for government securities in Taiwan as a "regulated market," as opposed to a dealer market or an organized exchange.

Markets for government securities may be classified as either a dealer market, or an organized exchange which implies the broker function [Treasury Federal Reserve Study of the U.S. Government Securities Market 1959, 1970, 1971, 1973]. In a dealer market, government securities dealers buy directly from customers and sell directly to customers. They also trade securities with each other and with brokers, acting as principals in the market rather than agents for their customers. In this sense, they speculate in trading securities by expecting to profit from the spread between buying and selling prices rather than from charging a commission, with no risk involved in the transactions. Whereas in an organized exchange, brokers charge a commission on purchases or sales of government securities, by acting as agents for their customers.

One of the functions of the C.B.C., after resuming its operations in 1961, was to manage the sale and purchase of government bonds. From 1961 until 1971, all bonds floated by the government were sold through the C.B.C. and other banks acting as agents of the C.B.C. [C.B.C. Annual Reports various issues]. During that period, there were no private dealers nor brokers of government securities. This remained the case until July 2, 1971, when the C.B.C. established an open market for government bonds by authorizing ten financial institutions to function as government bond brokers. Beginning then, transactions in government securities were made through brokers on a bid and ask basis [C.B.C. Annual
Thus, before 1971, the regulated market for government securities in Taiwan did not fit into either of these two market classifications. There were no organized exchanges and no dealer activities. The C.B.C. was responsible for selling government bonds to the participants. From 1971 to the present period, the regulated market can be classified under the heading of organized exchange, due to the existence of brokers. Still, we are using the term "regulated market" as opposed to "organized exchange" to emphasize two main issues that interfere with the functioning of a free market. The first concerns the presence of captive buyers of government securities (the financial institutions that were required to hold a certain quota of government bonds after every new issue). The second deals with the non-market determined interest rates on government securities. Monetary authorities adjust the interest rate on government securities in line with adjusting all interest rates.

Government securities in Taiwan are currently used for debt and monetary management purposes. Since 1961 the C.B.C. has been regularly selling government bonds on behalf of the government. From 1961 to 1979, issuing government bonds was solely for debt management purposes since it was not until 1979 that the C.B.C. undertook its first open market operation aimed at affecting monetary conditions in the economy.

Table VI-1 shows the share of government revenues from selling bonds from 1970 to 1984. The composition of government revenue before 1970 did not specify separately the revenue from bonds but included this figure in a category called "other revenues." In 1977, the central government started reporting figures on current revenues and capital revenues
### TABLE VI-1

**RATIO OF GOVERNMENT REVENUE FROM BONDS TO TOTAL GOVERNMENT REVENUE AND CAPITAL REVENUES**

<table>
<thead>
<tr>
<th>Year</th>
<th>Bond Revenue</th>
<th>Total Revenue</th>
<th>Capital Revenue</th>
<th>Year</th>
<th>Bond Revenue</th>
<th>Total Revenue</th>
<th>Capital Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>5</td>
<td>N/A</td>
<td></td>
<td>1977</td>
<td>1.28</td>
<td>17.4</td>
<td>17.4</td>
</tr>
<tr>
<td>1970</td>
<td>5.6</td>
<td>N/A</td>
<td></td>
<td>1978</td>
<td>3.39</td>
<td>41.6</td>
<td>41.6</td>
</tr>
<tr>
<td>1971</td>
<td>5.7</td>
<td>N/A</td>
<td></td>
<td>1979</td>
<td>1.88</td>
<td>27.3</td>
<td>27.3</td>
</tr>
<tr>
<td>1972</td>
<td>3.0</td>
<td>N/A</td>
<td></td>
<td>1980</td>
<td>0.56</td>
<td>8.5</td>
<td>8.5</td>
</tr>
<tr>
<td>1973</td>
<td>3.9</td>
<td>N/A</td>
<td></td>
<td>1981</td>
<td>2.24</td>
<td>27.1</td>
<td>27.1</td>
</tr>
<tr>
<td>1974</td>
<td>0.1</td>
<td>N/A</td>
<td></td>
<td>1982</td>
<td>4.2</td>
<td>47.3</td>
<td>47.3</td>
</tr>
<tr>
<td>1975</td>
<td>0.6</td>
<td>N/A</td>
<td></td>
<td>1983</td>
<td>2.43</td>
<td>36.5</td>
<td>36.5</td>
</tr>
<tr>
<td>1976</td>
<td>0.6</td>
<td>N/A</td>
<td></td>
<td>1984</td>
<td>1.33</td>
<td>22.3</td>
<td>22.3</td>
</tr>
</tbody>
</table>

*Source: C.B.C. Annual Reports*

*N/A: Non Available*
defined to include revenues from bond issues, borrowing, sale of public property, recalled capital and others.

Even though the share of revenue from bonds out of total revenue was never higher than 5.7 percent, issuing government bonds was a major source of capital revenue. As can be seen from Table VI-1, 47.3 percent of the capital revenue in 1982 was generated from the sale of bonds. In order to guarantee this yearly revenue, the fiscal authorities, through the C.B.C., assign prescribed quotas of government securities to financial intermediaries at the time of the flotation of every new issue. Since September 1965, the C.B.C. has been extending loans to financial institutions against government bonds at an interest rate slightly higher than the bond yield but lower than the Central Bank's rediscount rate [C.B.C. Annual Reports 1965, p. 41]. Such a policy guarantees the existence of buyers of government securities and at the same time, keeps the interest rate on these securities relatively low to minimize payments on government debt.

Monetary management with government securities started in 1979, when the first open market operation by the C.B.C. was undertaken. In 1973, the C.B.C. had begun issuing treasury bills through bids. Also introduced were bankers' acceptances and negotiable certificates of deposits in 1975, and commercial paper in 1976. The first open market operation took the form of an open market purchase involving buying treasury bills, commercial paper and long-term government bonds [C.B.C. Annual Reports 1979, p. 32].
The purpose of this operation, as was stated by the C.B.C. in 1979 was to "alleviate the tight liquidity position" [C.B.C. Annual Reports 1979, p. 2]. In subsequent reports, it was stated after every open market purchase that the reason was "to cope with monetary stresses caused by seasonal or erratic shifts in the supply of and the demand for money" [C.B.C. Annual Reports, 1979-84]. It is also to be mentioned that in 1979, reserve requirement ratios were lowered twice. Based on such statements and actions, we infer that "tight liquidity position" and "monetary stresses" are indicative of shortages in banks' reserves. This means that open market purchases were aimed at affecting bank reserves directly. It is important to note that open market operations in Taiwan do not affect interest rates directly since all these rates are administered. Therefore, monetary management through government securities becomes synonymous with changing banks' reserves.

II. IS THERE A NEED FOR A LARGER AND MORE DIVERSIFIED MARKET FOR GOVERNMENT SECURITIES IN TAIWAN?

The regulated market for government securities in Taiwan is characterized by the existence of captive buyers. There also exists a lack of ownership motives for holding government securities for reasons we will discuss in Section IV. Table VI-2 shows the holdings of government securities in Taiwan by groups from 1961 to 1984. The fact that total holdings of government securities by financial institutions have been rising does not necessarily imply that the regulated market is promoted. Financial institutions were given a specific quota of government securities at every new issue. Financial intermediaries did not hold
<table>
<thead>
<tr>
<th>End of Period</th>
<th>Total Amount Outstanding</th>
<th>&quot;Others&quot;</th>
<th>Percent</th>
<th>End of Period</th>
<th>Total Amount Outstanding</th>
<th>&quot;Others&quot;</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>776</td>
<td>370</td>
<td>47.7</td>
<td>1973</td>
<td>11,314</td>
<td>4,668</td>
<td>41.2</td>
</tr>
<tr>
<td>1962</td>
<td>1,123</td>
<td>431</td>
<td>38.4</td>
<td>1974</td>
<td>9,147</td>
<td>3,288</td>
<td>35.9</td>
</tr>
<tr>
<td>1963</td>
<td>1,539</td>
<td>465</td>
<td>30.2</td>
<td>1975</td>
<td>10,727</td>
<td>3,142</td>
<td>29.2</td>
</tr>
<tr>
<td>1964</td>
<td>2,094</td>
<td>590</td>
<td>28.2</td>
<td>1976</td>
<td>14,334</td>
<td>2,936</td>
<td>20.4</td>
</tr>
<tr>
<td>1965</td>
<td>3,137</td>
<td>927</td>
<td>29.6</td>
<td>1977</td>
<td>16,443</td>
<td>2,547</td>
<td>15.4</td>
</tr>
<tr>
<td>1966</td>
<td>4,753</td>
<td>1,677</td>
<td>35.3</td>
<td>1978</td>
<td>24,581</td>
<td>2,668</td>
<td>10.8</td>
</tr>
<tr>
<td>1967</td>
<td>6,625</td>
<td>2,820</td>
<td>42.6</td>
<td>1979</td>
<td>22,550</td>
<td>2,975</td>
<td>13.1</td>
</tr>
<tr>
<td>1968</td>
<td>8,009</td>
<td>3,594</td>
<td>44.9</td>
<td>1980</td>
<td>20,032</td>
<td>1,984</td>
<td>9.9</td>
</tr>
<tr>
<td>1969</td>
<td>7,651</td>
<td>4,008</td>
<td>52.4</td>
<td>1981</td>
<td>27,122</td>
<td>3,945</td>
<td>14.5</td>
</tr>
<tr>
<td>1970</td>
<td>9,030</td>
<td>4,809</td>
<td>53.7</td>
<td>1982</td>
<td>45,386</td>
<td>8,326</td>
<td>18.3</td>
</tr>
<tr>
<td>1971</td>
<td>9,572</td>
<td>5,621</td>
<td>58.7</td>
<td>1983</td>
<td>62,938</td>
<td>6,457</td>
<td>10.2</td>
</tr>
<tr>
<td>1972</td>
<td>9,636</td>
<td>5,811</td>
<td>60.5</td>
<td>1984</td>
<td>67,009</td>
<td>6,750</td>
<td>10.07</td>
</tr>
</tbody>
</table>

Source: Central Bank of China, Taiwan Financial Statistics Monthly

1"Others" is a category that excludes Central Bank and all financial institutions. Financial institutions are defined to include deposit money banks, investment and trust companies, postal saving systems and life insurance companies.

2After 1972, total amount outstanding is the sum of government bonds and treasury bills outstanding.
these securities on the basis of their attractiveness. On the contrary, it was possible for these institutions to incur a loss on these securities held, since the C.B.C. extended loans against government securities at an interest rate above the rate on securities. At the same time, ownership of government securities was not diversified. In 1983 and 1984, for example, the group "Others" which is a category that excludes commercial banks and other financial institutions, held only 10.02 percent and 10.07 percent of the amount of securities outstanding. Moreover, the absolute amount held by this other group declined after the mid-70s (until 1980). On a year-by-year comparison, the holdings of government securities by others between 1968 and 1973 was greater than the ones between 1974 and 1980.

Even though the regulated market for government securities was not diversified, government securities in Taiwan were used for monetary management purposes. But the success of open market operations does not imply nor necessitate the existence of a market for government securities. From 1979 to 1984, the C.B.C. undertook several open market purchases. In each case, these operations involved buying money market certificates such as commercial paper, banker's acceptances and negotiable orders of withdrawal. From 1979 to 1981, the C.B.C. also bought long-term government bonds and in 1984, for the first time, open market purchases did not involve buying treasury bills, but rather were undertaken solely with other money market instruments.

On the other hand, excluding issuing treasury bills, the C.B.C. undertook open market sales only once, in 1982. This took place through
selling commercial paper rather than government securities.

The C.B.C. could have undertaken open market operations with foreign assets in the portfolio of financial institutions. Ratios of foreign assets to total ones are reported in Table VI-3, from 1961 to 1984. Except for the year 1962, financial institutions held at least 20 percent of their total assets in the form of foreign assets, with the percentage reaching as high as 32.15 percent in 1972 and 29.83 percent in 1984. In comparison, based on Table VI-4, financial institutions held a maximum of 4.79 percent of their assets in the form of government securities and for the years 1972 and 1984, the percentages were 1.68 and 1.95 percent respectively.

Is there a need for a larger and more diversified market for government securities in Taiwan? Our answer is yes for three main reasons. The first is that the presence of this market can facilitate debt management, especially since the Taiwanese fiscal authorities have been relying on revenues from bonds as Table VI-1 showed. The second concerns the fact that in a growing financial environment, the success of financial development can be directly related to the presence of a wide spectrum of financial assets. This makes it hard to argue against the presence of government bonds and treasury bills. The third reason concerns open market operations with foreign assets. If monetary authorities are emphasizing an external regime such as keeping the exchange rate within a defined range, foreign assets have to be used to achieve external balance rather than domestic monetary management. In the case of foreign assets being the instrument of policy, undertaking open market operations with foreign assets to achieve a domestic monetary
<table>
<thead>
<tr>
<th>Year</th>
<th>Foreign Assets</th>
<th>Year</th>
<th>Foreign Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>to Total Assets</td>
<td></td>
<td>to Total Assets</td>
</tr>
<tr>
<td>1962</td>
<td>16.41</td>
<td>1974</td>
<td>21.69</td>
</tr>
<tr>
<td>1963</td>
<td>26.45</td>
<td>1975</td>
<td>19.98</td>
</tr>
<tr>
<td>1964</td>
<td>28.03</td>
<td>1976</td>
<td>24.72</td>
</tr>
<tr>
<td>1965</td>
<td>24.34</td>
<td>1977</td>
<td>27.41</td>
</tr>
<tr>
<td>1966</td>
<td>24.52</td>
<td>1979</td>
<td>26.4</td>
</tr>
<tr>
<td>1967</td>
<td>24.73</td>
<td>1980</td>
<td>23.43</td>
</tr>
<tr>
<td>1968</td>
<td>20.88</td>
<td>1981</td>
<td>23.43</td>
</tr>
<tr>
<td>1969</td>
<td>20.87</td>
<td>1982</td>
<td>24.4</td>
</tr>
<tr>
<td>1970</td>
<td>22.41</td>
<td>1983</td>
<td>27.67</td>
</tr>
<tr>
<td>1971</td>
<td>25.74</td>
<td>1984</td>
<td>29.83</td>
</tr>
<tr>
<td>1972</td>
<td>32.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: C.B.C. *Financial Statistics Monthly*
TABLE VI-4

RATIO OF TOTAL LOANS* AND GOVERNMENT SECURITIES OF FINANCIAL INSTITUTIONS TO TOTAL ASSETS

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Loans</th>
<th>Government Securities</th>
<th>Year</th>
<th>Total Loans</th>
<th>Government Securities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Assets</td>
<td>Total Assets</td>
<td></td>
<td>Total Assets</td>
<td>Total Assets</td>
</tr>
<tr>
<td>1961</td>
<td>69.99</td>
<td>1.32</td>
<td>1973</td>
<td>65.4</td>
<td>2.02</td>
</tr>
<tr>
<td>1962</td>
<td>75.95</td>
<td>1.96</td>
<td>1974</td>
<td>72.61</td>
<td>1.40</td>
</tr>
<tr>
<td>1963</td>
<td>66.12</td>
<td>2.6</td>
<td>1975</td>
<td>74.12</td>
<td>1.43</td>
</tr>
<tr>
<td>1964</td>
<td>63.71</td>
<td>2.89</td>
<td>1976</td>
<td>68.9</td>
<td>1.74</td>
</tr>
<tr>
<td>1965</td>
<td>65.60</td>
<td>3.95</td>
<td>1977</td>
<td>64.99</td>
<td>1.65</td>
</tr>
<tr>
<td>1966</td>
<td>64.31</td>
<td>4.78</td>
<td>1978</td>
<td>62.24</td>
<td>1.96</td>
</tr>
<tr>
<td>1967</td>
<td>63.9</td>
<td>4.79</td>
<td>1979</td>
<td>63.11</td>
<td>1.53</td>
</tr>
<tr>
<td>1968</td>
<td>67.96</td>
<td>4.63</td>
<td>1980</td>
<td>66.83</td>
<td>1.17</td>
</tr>
<tr>
<td>1969</td>
<td>70.44</td>
<td>3.20</td>
<td>1981</td>
<td>63.41</td>
<td>1.27</td>
</tr>
<tr>
<td>1970</td>
<td>69.82</td>
<td>2.97</td>
<td>1982</td>
<td>62.33</td>
<td>1.71</td>
</tr>
<tr>
<td>1971</td>
<td>67.41</td>
<td>2.97</td>
<td>1983</td>
<td>59.3</td>
<td>2.15</td>
</tr>
<tr>
<td>1972</td>
<td>61.96</td>
<td>1.68</td>
<td>1984</td>
<td>57.12</td>
<td>1.95</td>
</tr>
</tbody>
</table>

Source: C.B.C. Financial Statistics Monthly

*Total Loans include loans made to government agencies and government enterprises.
target becomes very unlikely.

Based on these three reasons, the existence of a larger and more diversified market for government securities becomes advisable. The market in Taiwan is still at an infant stage, as has been discussed earlier. Measures aimed at promoting and diversifying this market will be discussed in the remainder of this chapter.

III. MEASURES TO PROMOTE AND DIVERSIFY MARKETS FOR GOVERNMENT SECURITIES IN THE CONTEXT OF THE LITERATURE

The literature on markets for government securities states that a well promoted, diversified, and efficient market must at least possess "depth, breadth, and resiliency" [Joint Treasury Federal Reserve Study of the U.S. Government Securities Market, Staff Studies Part 2, 1971, p. 97]. Depth, breadth and resiliency are defined as follows:

"The market possesses depth when there are orders, either actual orders or orders that can be readily uncovered, both above and below the market. The market has breadth when these orders are in volume and come from widely divergent investor groups. It is resilient when new orders pour promptly into the market to take advantage of sharp and unexpected fluctuations in prices." 1

The literature on measures to promote a market for government securities in small, open, less-developed economies [Porter 1965, Tun Wai and Patrick 1973, Drake 1977, Khatkhate 1977] states that "inefficient" security markets are not the result of the less developed financial system as much as of government policies aimed at fixing the prices and the rate of returns on government securities in order to minimize interest payments on
government debt. Therefore, to promote government security markets, existing studies advocated the freeing of interest rates from governmental control and allowing security prices and yields to be determined freely by market forces.

Inflation is also blamed for the lack of attractiveness of government securities, especially in some Latin American countries that have experienced high inflation rates. One solution to this problem is to protect bonds against inflation by price indexing government securities as is done in Brazil and Chile. If other financial assets such as currency and deposits are not price indexed, there might be a move in favor of government bonds [Tan Wai and Patrick, 1973, p. 283].

Khatkhate [1977] described the experience of Taiwan with government securities and open market operations. According to his analysis, the presence of an "efficient" market for government securities is a necessity for the success of open market operations. Therefore, the major factors interfering with the promotion of the bond market have to be remedied. In his opinion, these factors are: (i) the fixed security prices which denied the monetary authorities the chance to vary the structure of interest rates; (ii) the relatively high alternative rates of return on other assets (such as time deposits); and (iii) the narrow spectrum of financial assets (for example, the non-existence of treasury bills) [p. 96-98]. Still, the author concludes with an optimistic note concerning the possibilities of the success of future open market operations in Taiwan because of what he calls a slow and cautious beginning toward a free and open market for government bonds. His
argument is based on the change in policies mentioned in the previous chapter concerning freeing bond prices in 1971 and the introduction of treasury bills in 1973.

In support of his argument, Khatkhate reports data showing the ownership of government bonds by different economic groups for the years 1961 to 1972. For example, in 1972, the share of the group "others", defined to exclude central bank, financial institutions and insurance companies, amounted to 60.5 percent of government bonds outstanding. "Others" comprised some public and private enterprises as well as individuals. Data for separate holdings was not available, but it was estimated that the proportion of government bonds held by private and public enterprises amounted to 17 percent. Therefore, Khatkhate concluded that individuals might have held as much as 36 percent of the total public debt in Taiwan in 1972. He expected this trend to continue, especially after the changes made in 1971 and 1973 and mentioned earlier.

Table VI-2 shows the ownership by groups of government securities in Taiwan from 1961 to 1984 and allows for a comparison between the data reported by Khatkhate up to the time bond prices were freed and treasury bills were introduced, and the post 1972 data which is based on figures we have estimated. The striking feature is that even though the total amount outstanding of government securities increased from National Taiwanese dollar (NT$) 9.6 billion in 1972 to NT$ 67.009 billion in 1984, the amount held by "others" changed only from NT$ 5.8 billion in 1972 to NT$ 6.75 billion in 1984. This means that the amount of government securities held by "others" out of total securities outstanding decreased from 60.5 percent in 1972 to 10.07 percent in 1984.
Based on this analysis, it can be concluded that the introduction of treasury bills and the liberalization of securities' prices did not broaden the base of the securities' market. On the contrary, government securities are now mainly held by financial intermediaries. In 1984, they held 89.93 percent of the total amount of securities outstanding. This fact shows that the measures recommended to develop security markets are not necessarily valid in diversifying the ownership of government securities. Also, the increase in total securities outstanding might have largely resulted from the presence of captive buyers. Therefore, in the fourth section of this chapter, we will analyze some additional reasons that might be responsible for limiting the promotion and diversification of the market for government securities in Taiwan.

IV. THE TAIWANESE REGULATED MARKET FOR GOVERNMENT SECURITIES AND THE MEASURES SUGGESTED TO PROMOTE SUCH MARKETS

Our discussion in Section II imply that financial institutions hold government securities because they are assigned specific quotas at every new issue. This means that the regulated market for government securities in Taiwan does not meet the characteristics of depth since most market participants are not willing to hold this asset voluntarily. At the same time, we saw that this regulated market is not well diversified, and, thus, does not possess any breadth. In the absence of depth and breadth, it would be impossible for the market to be resilient since resiliency exists when new orders pour promptly into the market. Therefore, it can be concluded that in the presence of captive buyers and lack of ownership
motives, the concepts of depth, breadth, and resiliency break down.

In the previous section, the discussion ended with a question concerning the failure of the measures taken in Taiwan in helping to promote and to diversify the market for government securities. In this section, we will first assess the importance of government securities as assets in the portfolios of the financial institutions and the non-bank public in Taiwan. As the figures will show, these assets do not play a significant role in either portfolio, as compared to other assets. Second, we examine the possible explanations for the relatively small holdings of government securities by comparing the return on other assets and the return on these securities.

Even though the data in Table VI-2 show that financial institutions have been consistently increasing their holding of government securities, Table VI-4 shows that the share of these securities in the portfolio of assets of these institutions remains very low. The ratio of government securities to total assets reached a maximum of 4.79 percent in 1967, and from 1974 to 1984, this ratio was below 2 percent except for the year 1983, when it was 2.15 percent. In comparison, the ratio of loans to total assets have been as high as 75.95 percent in 1962 and 74.12 percent in 1975, with a low of 57.12 percent in 1984.

The total assets of the non-bank public cannot be estimated since there exists no data on the loans made in the unregulated credit market. Instead, we considered the holdings of government securities by the non-bank public as a percentage of total deposits excluding deposits held in foreign currency and government deposits. The figures are reported in Table VI-5. As can be seen from the data, the percentage has been
<table>
<thead>
<tr>
<th>Year</th>
<th>Government Securities Deposits</th>
<th>Year</th>
<th>Government Securities Deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>2.63</td>
<td>1973</td>
<td>2.68</td>
</tr>
<tr>
<td>1962</td>
<td>2.62</td>
<td>1973</td>
<td>1.48</td>
</tr>
<tr>
<td>1963</td>
<td>2.15</td>
<td>1974</td>
<td>1.48</td>
</tr>
<tr>
<td>1964</td>
<td>2.13</td>
<td>1975</td>
<td>1.1</td>
</tr>
<tr>
<td>1965</td>
<td>2.88</td>
<td>1976</td>
<td>0.81</td>
</tr>
<tr>
<td>1966</td>
<td>4.26</td>
<td>1977</td>
<td>0.53</td>
</tr>
<tr>
<td>1967</td>
<td>5.82</td>
<td>1978</td>
<td>0.42</td>
</tr>
<tr>
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<td>0.43</td>
</tr>
<tr>
<td>1969</td>
<td>6.1</td>
<td>1980</td>
<td>0.24</td>
</tr>
<tr>
<td>1970</td>
<td>6.08</td>
<td>1981</td>
<td>0.4</td>
</tr>
<tr>
<td>1971</td>
<td>5.47</td>
<td>1982</td>
<td>0.66</td>
</tr>
<tr>
<td>1972</td>
<td>4.24</td>
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<tr>
<td></td>
<td></td>
<td>1984</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Source: C.B.C. Financial Statistics Monthly
historically low, reaching a high of 6.6 percent in 1968. It is interesting to mention that from 1973 to 1984, or the period that was not included in the study by Khatkhate, the ratio was above one percent only from 1973 to 1976, reaching a low of 0.24 percent in 1980. This shows that the introduction of the treasury bills and the freeing of bonds' prices did not contribute to an expansion of the market for government securities relative to other assets.

It has become clear from the previous discussion that government securities constitute a small fraction of the assets of financial institutions and the non-bank public in Taiwan. Plausible reasons for the low holding of government securities by banks might be found in the relatively higher return on other assets such as regulated loans. The first two columns in Table VI-6 show the loan rate $r_c$ compared to the rate on government securities $r_s$. From 1961 to 1984, $r_c$ has been continuously higher than $r_s$ except for the year 1982. The relationship between the two rates differed in 1982 because the pace of economic growth slowed down in that year, a fact that prompted the C.B.C. to reduce the base lending rate and the deposit rate by 4 percentage points [C.B.C. Annual Report 1982, p. 32].

Another reason contributing to the lack of ownership motives for holding government securities relates to the policies of the C.B.C. Financial institutions end up with a loss on some of the securities they are required to hold since they are extended loans by the C.B.C. against government bonds at an interest rate higher than the current yield on government securities but lower than the discount rate. The discrepancy
TABLE VI-6

LOAN RATES (rc)*, RATES ON GOVERNMENT SECURITIES (rs)**, DEPOSIT RATES (rd)***

<table>
<thead>
<tr>
<th>Year</th>
<th>rc</th>
<th>rs</th>
<th>rd</th>
<th>Year</th>
<th>rc</th>
<th>rs</th>
<th>rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>20.4</td>
<td>18</td>
<td>18.43</td>
<td>1973</td>
<td>13.75</td>
<td>8.07</td>
<td>11.00</td>
</tr>
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<td>14</td>
<td>14.82</td>
<td>1974</td>
<td>15.50</td>
<td>11.38</td>
<td>13.50</td>
</tr>
<tr>
<td>1963</td>
<td>19.13</td>
<td>14</td>
<td>13.42</td>
<td>1975</td>
<td>14.00</td>
<td>8.65</td>
<td>12.00</td>
</tr>
<tr>
<td>1964</td>
<td>16.8</td>
<td>10.4</td>
<td>11.57</td>
<td>1976</td>
<td>12.75</td>
<td>8.37</td>
<td>10.75</td>
</tr>
<tr>
<td>1965</td>
<td>16.6</td>
<td>10.4</td>
<td>11.35</td>
<td>1977</td>
<td>11.50</td>
<td>6.22</td>
<td>9.50</td>
</tr>
<tr>
<td>1966</td>
<td>15.8</td>
<td>10.4</td>
<td>10.62</td>
<td>1978</td>
<td>11.50</td>
<td>7.12</td>
<td>9.50</td>
</tr>
<tr>
<td>1967</td>
<td>15.25</td>
<td>10.0</td>
<td>10.29</td>
<td>1979</td>
<td>15.0</td>
<td>10.7</td>
<td>12.50</td>
</tr>
<tr>
<td>1970</td>
<td>13.20</td>
<td>10.0</td>
<td>9.72</td>
<td>1982</td>
<td>10.75</td>
<td>11.45</td>
<td>9.00</td>
</tr>
<tr>
<td>1972</td>
<td>11.75</td>
<td>9.4</td>
<td>8.75</td>
<td>1984</td>
<td>10.0</td>
<td>6.19</td>
<td>8.00</td>
</tr>
</tbody>
</table>

Source: C.B.C. Annual Reports and C.B.C. Financial Statistics Monthly

*rc = regulated loan rate on unsecured loans.

**rs = rate on government bonds until 1972. After that, we report the rate on treasury bills.

***rd = deposit rate on a one-year fixed savings deposit.
between the discount rate and the rate on government securities is a clear
signal that bonds' rates are kept intentionally low to minimize interest
payments on government debt.

The non-bank public's lack of ownership motives might be explained on
the grounds that other assets, especially the unregulated loans, earn a
far higher return than government securities. Table VI-7 shows the yearly
rates charged in the unregulated loan markets of the three largest cities
in Taiwan. Except for the period between 1970 and 1973 when these rates
were in the range of 24 to 29 percent, lenders in the unregulated credit
markets have charged 30 percent and above on their unsecured loans. This
relatively high figure reflects the flourishing of these markets and
explains the willingness of some portfolio investors to hold this form of
asset rather than government securities.

Two additional considerations deserve some attention: inflation and
the risk associated with some assets. It is true that Taiwan witnessed an
accelerating inflation in the 1970s. But since bond's prices and rates of
return were not price-indexed, the effect of inflation was negative on the
real value of bond holdings and any other assets with a fixed yield.
Since the rate of return on unregulated loans was relatively high, as
Table VI-7 shows, real loan rates remained very high too, which is another
reason why some portfolio investors prefer making loans in unregulated
loan markets. It is also well known that there exists a risk associated
with unsecured loans in the unregulated loan markets as was mentioned in
Chapter II. Presumably, this risk was more than offset by high nominal
unregulated rates.
### TABLE VI-7

**UNSECURED LOAN RATES CHARGED IN UNREGULATED MONEY MARKETS***

<table>
<thead>
<tr>
<th>Year</th>
<th>Taipai</th>
<th>Kaohsiung</th>
<th>Taichung</th>
<th>Year</th>
<th>Taipai</th>
<th>Kaohsiung</th>
<th>Taichung</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>37.67</td>
<td>51.5</td>
<td>37.67</td>
<td>1973</td>
<td>24.68</td>
<td>28.08</td>
<td>26.51</td>
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<td>1962</td>
<td>37.67</td>
<td>42.5</td>
<td>37.67</td>
<td>1974</td>
<td>32.93</td>
<td>38.21</td>
<td>34.05</td>
</tr>
<tr>
<td>1963</td>
<td>32.92</td>
<td>37.67</td>
<td>37.67</td>
<td>1975</td>
<td>29.97</td>
<td>38.22</td>
<td>35.27</td>
</tr>
<tr>
<td>1964</td>
<td>28.32</td>
<td>34.4</td>
<td>37.67</td>
<td>1976</td>
<td>30.31</td>
<td>38.10</td>
<td>38.43</td>
</tr>
<tr>
<td>1965</td>
<td>32.92</td>
<td>34.4</td>
<td>37.67</td>
<td>1977</td>
<td>29.71</td>
<td>33.29</td>
<td>36.68</td>
</tr>
<tr>
<td>1966</td>
<td>28.32</td>
<td>34.4</td>
<td>37.67</td>
<td>1978</td>
<td>29.01</td>
<td>33.25</td>
<td>36.27</td>
</tr>
<tr>
<td>1967</td>
<td>28.32</td>
<td>34.4</td>
<td>37.67</td>
<td>1979</td>
<td>33.4</td>
<td>34.88</td>
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<tr>
<td>1969</td>
<td>32.92</td>
<td>34.4</td>
<td>37.67</td>
<td>1981</td>
<td>36.04</td>
<td>35.19</td>
<td>44.17</td>
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<tr>
<td>1970</td>
<td>24.67</td>
<td>29.26</td>
<td>27.19</td>
<td>1982</td>
<td>32.71</td>
<td>29.78</td>
<td>42.24</td>
</tr>
</tbody>
</table>

**Source:** *C.B.C. Financial Statistics Monthly*

*Based on inquiries conducted by three commercial banks, namely the First Commercial Bank, Hua-nan Commercial Bank and Chung-hua Commercial Bank, with 150 firms in Taipei City, 45 firms in Kaohsiung City and 18 firms in Taichung City. Figures are reported on a monthly basis. We transformed them to yearly basis in order to compare them to the rates in Table VI-6.*
The gap between the deposit rates \( rd \) and those on government securities \( rs \) is narrower than the one between unregulated loan rates and \( rs \) as Table VI-6 shows. For some years, \( rd \) was higher than \( rs \) and for some others, the opposite held. But from 1973 to 1984, or the period following the one considered in the study by Khatkhate, deposit rates were clearly higher than the treasury bills rate except for the period between 1980 and 1982. In 1980, the C.B.C. determined a set of deposit rate ceilings with a maximum of 12.5 percent per annum which is the figure reported in Table VI-6 for that year [C.B.C. Annual Report 1980, p. 31]. This fact allowed \( rs \) to surpass \( rd \) for that year. In 1982, it was stated earlier that the deposit rate was reduced by 4 percentage points. For the period before 1973, Table VI-5 shows that \( rs \) and \( rd \) were closer to each other than the post-1972 period. In fact, the C.B.C. reduced \( rd \) in 1966 from 11.35 percent to 10.62 percent while keeping \( rs \) constant at 10.4 percent in order to minimize the difference between the two rates "since it was anticipated that by lowering the savings deposit rates, the public would have a greater incentive in purchasing and holding government bonds" [C.B.C. Annual Report 1966, p. 56]. But the C.B.C. was not consistent in this policy since in the year that followed, the rate on government securities was also reduced to 10 percent, which contradicts the statement made in 1966. The contradiction emanates from the fact that in 1967, the interest rate on a one year fixed savings deposit was reduced from 10.62 to 10.29 percent or by 3.1 percent, whereas the rate on government securities was reduced from 10.4 to 10 percent or by 3.8 percent.
V. MEASURES AIMED AT PROMOTING AND DIVERSIFYING A REGULATED MARKET FOR GOVERNMENT SECURITIES IN A HIGHLY REGULATED FINANCIAL SYSTEM

The purpose of this section is to use the model and the results discussed in the previous chapters of the dissertation to advocate some measures that would allow the promotion and diversification of a regulated market for government securities. In order to do that, we emphasize few methods that affect the portfolios' composition in favor of the government security asset. As was stated earlier, Taiwan adopted a flexible exchange rate regime in 1979. In light of this change, we discuss the measures aimed at promoting and diversifying a regulated market for government securities under both regimes assumed in Chapters IV and V.

A few preliminary comments are in order: First, the purpose of the thesis is to discuss money and credit policies given the constraints of the regulated financial markets. Therefore, rather than recommending freeing all interest rates and liberalizing economic activity, we will confine the discussion to some possible measures to promote and diversify regulated markets for government securities in a regulated financial system.

Second, there might exist a conflict between promoting a regulated market for government securities and other monetary policy objectives. Our discussion will be confined to some possible measures, in isolation to what is happening in the rest of the economy.

Third, the literature on measures to promote markets for government securities [Tun Wai and Patrick 1973, Drake 1977, Khatkhate 1977] suggested that either bonds' prices should be freed or interest rates on
bonds should be brought more in line with the rates of return on alternative assets. Existing studies [Porter, 1965, Tun Wai and Patrick, 1973, Drake, 1977, Khatkhate, 1977] were descriptive in nature and did not attempt to develop a model from which conclusions can be drawn in support of the advocated measures. Since interest rates are administered by the monetary authorities, a solution to the problem was to reduce the regulated loan rates and deposit rates and to increase the rate on government securities along with the introduction of treasury bills and freeing bond prices. But as can be seen from Table VII, unregulated loans seem to be a more attractive asset than government securities based on the rates of return on the two assets. Since unregulated loan rates are not administered by the monetary authorities, it becomes necessary to examine the effect of changing the administered rates on the unregulated rates to determine the effect on the holdings of government securities, a fact that no study has attempted to address. Changing "actual" instruments can sometimes defeat the purpose of promoting and diversifying the market for government securities if an unwanted effect is transmitted to the unregulated loan market. Our argument becomes clearer when we consider the following two results from our theoretical model (Chapter IV):

a. If the monetary authorities reduce deposit rate (rd) and as a result, the unregulated loan rate (ru) increases or remains the same, there might be a shift in the assets from deposits to unregulated loans rather than government securities, which defeats the purpose of promoting a market for these securities or contributing to its depth.

b. If the regulated loan rate (ro) is reduced and as a result, ru remains the same or increases, financial institutions would end up buying
more government bonds but the non-bank public might end up making more unregulated loans. This might help promote a market for government securities but defeats the purpose of diversifying it or contributing to its breadth.

Therefore, what needs to be done is to coordinate the policies of the monetary authorities in such a way as to reduce ru along with the reduction of rc or rd.

1. A Fixed Exchange Rate Regime

If the monetary authorities reduce the regulated loan rate rc, our results derived in Appendix B and discussed in Chapter IV state that the supply of regulated loans by the public decreases along with the net supply of unregulated loans. This increases the unregulated loan rate ru. In this case, reducing rc might increase the banks' holdings of government securities, but it can also reduce the incentive to hold government securities by the non-bank public.

A decrease in the deposit rate rd would lead, according to our results, to a decrease in the amount of regulated loans, but an increase in the net supply of unregulated ones, and therefore, a decrease in ru. With both rd and ru decreasing, the public would have more incentives to hold and buy government securities.

2. A Flexible Exchange Rate Regime with Non Borrowed Base as the Instrument of Policy

In this case, since the exchange rate e is allowed to vary, we need to examine the effect of varying rc and rd not only on ru, but also on e since a change in e affects the return on foreign assets held by
both the banks and the non-bank public.

Under a flexible exchange regime, a decrease in rc increases the supply of regulated loans by the public and the net supply of unregulated credit, which reduces ru. Our results in Appendix B also show that a reduction in rc increases the value of the exchange rate (depreciates the domestic currency), which leads to a decrease in the holdings of foreign assets. Since the return on unregulated loans and foreign assets decreases with a decrease in rc, the incentives to hold government securities become greater for the banks and non-bank public. The same results hold in the case of a reduction in rd.

VI CONCLUSION

The previous discussion shows that the market for government securities in Taiwan is still at an infant stage, with government securities held mostly by financial institutions. Even though more financial assets, such as treasury bills, were introduced after 1973, diversification in the holdings of securities did not occur. It is true that the C.B.C. has been conducting open market operations regularly since 1979. But successful open market operations do not necessarily imply a well developed and diversified market for government securities. As has been stated earlier, the C.B.C. has been buying and selling large amounts of commercial paper, bankers' acceptances, and negotiable certificates of deposits, along with government securities to ensure the success of open market operations. These operations could have as well been undertaken with foreign assets since financial institutions were shown to hold a
large percentage of their assets in the form of foreign ones.

Still, for reasons stated in this chapter, we thought that there exists a need for a market for government securities. The results discussed in Section V state that under a fixed exchange regime, a reduction in the regulated loan rate increases the unregulated loan rate, a policy that is counterproductive when it comes to diversifying a market for government securities. Reducing the deposit rate was shown to reduce the unregulated loan rate, a fact that contributes to the promotion of a market for government securities.

In the case of a flexible exchange regime, it was shown that reducing the loan rates and the deposit rates helps promote and diversify a government's securities market since under both conditions the unregulated loan rate decreases and the exchange rate increases.
FOOTNOTES


2. The meaning of some public enterprises is not defined in the study of Khatkhate nor in the reports of the C.B.C. Also, it was mentioned in Khatkhate [1977] that one observer estimated the holdings of government securities, but the identity of the observer was not specified.
CHAPTER VII

CONCLUDING COMMENTS

The purpose of this chapter is to highlight the major points of the thesis. We start with a description of the approach we have taken in the analysis by discussing the salient features of our model. Then, we summarize our findings and interpret their significance.

Existing studies that have dealt with the functioning of money and credit policies did not encompass the differentiating characteristics of small, open, less developed economies, and, therefore, it would be inappropriate to generalize their results to the case of these countries. Based on this presumption, a model of the financial markets in small open economies with regulated financial systems was developed.

Five major important characteristics of these markets were incorporated in the model. First, the model contains two loan markets: a regulated market composed of financial intermediaries, and an unregulated one that is not subject to the direct regulations of the monetary authorities. Second, the model clearly reflects two major characteristics of the market for government securities in the kind of economies we consider: The first relates to the presence of captive buyers of government securities. This forces banks to optimize under the constraint of being assigned predetermined quotas of these securities at the time of every new issue. Therefore, there exists no separate asset demand function for government securities held by banks, but the amount of these securities enters as an argument in the other asset and liability...
demand functions of financial intermediaries. The second is the lack of
ownership motives for holding government securities. This is reflected by
the absence of these securities as assets in the portfolio of the non-bank
public. Third, since deposit rates are fixed by the monetary authorities,
financial intermediaries accept any amount of deposits the public wishes
to hold at a given interest rate. This means that banks have no direct
control on their supply of deposits, and, therefore, there is no separate
supply of deposits function. Deposit supply enters as an argument in
other asset demand and supply equations. Fourth, a similar analysis
applies to the case of the regulated loan market. Since regulated loan
rates are fixed, the non-bank public accommodates the demand for loans by
financial intermediaries. No separate loan supply function is specified,
with the supply of loans entering as an argument in the asset demand and
supply functions of the non-bank public. Fifth, the model has a foreign
sector that allows the examination of the functioning of money and credit
policies under different exchange rate regimes.

The model developed is a portfolio balance model with three major
participants: The financial intermediaries, the non-bank public, and the
monetary authorities. The asset demand and supply functions of the non-
bank public and the financial intermediaries, were derived through a micro
optimization technique and signed accordingly.

After developing the model and reducing it to a set of equilibrium
conditions, four instruments that the monetary authorities do control
precisely were defined: The discount rate, the reserve requirement ratio,
the deposit rate, and the loan rate. Three other variables were shown to
be potential instruments or ones that the monetary authorities could
control precisely: the exchange rate, the foreign assets held by the monetary authorities and the nonborrowed base. We considered two policy regimes, one in which the policy-makers peg the exchange rate and allow both their holdings of foreign assets and the nonborrowed base to adjust; the other in which the nonborrowed base is policy determined, and the exchange rate and the foreign assets held by the central bank are endogenous.

The next step was to examine the effects of varying actual instruments on the unregulated and regulated loan markets under different monetary policy regimes. Since the unregulated loan market rate is the only interest rate in our model that is not fixed by the monetary authorities, we examined the actual instruments that can affect the behavior of participants in the unregulated loan market and thus its rate under different policy regimes. At the same time, we studied the effect of changing actual instruments on the regulated loan market.

Studying the effects of varying an actual instrument on regulated loans is of major importance if the monetary authorities, for example, use a fixed exchange rate regime or an unborrowed base regime to target an aggregate like regulated loans. Similarly, examining the effect of varying actual instruments on regulated loans only, might be misleading since a large part of the loan market activity takes place through unregulated channels. Therefore, in the types of economies we are considering, it is essential to examine the effect on both loan markets.

Using comparative statics techniques, we reached the following results: Monetary authorities can affect the activity in the unregulated
and regulated loan markets under both policy regimes and with several actual instruments. The direction of the movement in regulated loans, unregulated loans, and the unregulated loan rate is known unambiguously when an actual instrument is varied. An increase in the discount rate or the reserve requirement ratio, which is perceived to be contractionary, was shown to convey contractionary effects to unregulated and regulated loans under both operating regimes. This result would allow the monetary authorities to change the direction in the total amount of loans by varying these two instruments. Only under a fixed exchange rate regime, varying the deposit rate was shown to convey different signals to both loan markets. This result emphasizes the substitutability between the two loan markets, a fact that allows the monetary authorities to stimulate the role of one market at the expense of the other through policy manipulations and depending on the conditions in the economy.

Increasing the loan rate was shown to convey expansionary moves to regulated loans under a fixed exchange rate regime. This result is not in line with the conventional analysis where increasing the loan rate is perceived to be contractionary. The result we reach is due to model's specification. The direct relationship between the loan rate and regulated loans might reduce the reliability of this actual instrument if monetary authorities operate on conventional grounds. Under a flexible exchange rate regime, an indirect relationship between the loan rate and regulated loans seems to exist. This result is compatible with the conventional one in the literature.

The direction of the movement in the money supply and the monetary base, as a result of varying actual instruments, was also examined under
both policy regimes. Our purpose was to study whether monetary authorities can predict what would happen to these two aggregates when they are used as intermediate targets of policy.

The effects of varying actual instruments on the money supply were shown to be predictable in all cases under a flexible exchange rate regime. In a regime of fixed exchange rates, the only indeterminate effect on the money supply occurred in the case of the deposit rate. Money supply was defined as the sum of currency and deposits. An increase in the deposit rate was shown to reduce currency holdings and increase the holdings of deposits, which resulted in an ambiguous effect on the equilibrium money stock.

The effects of varying the reserve requirement ratio on the monetary base were ambiguous under both operating regimes. The monetary base was defined as the sum of currency and total reserves. Since the effect of varying the reserve requirement ratio on total reserves is ambiguous, the effect on the monetary base is also ambiguous.

The effects of varying the deposit and loan rates on the monetary base were unambiguous in the case of a flexible exchange rate regime and ambiguous in the case of a fixed exchange rate regime. The effects of varying the discount rate were predictable under both regimes.

The results reached imply that monetary authorities can use, under certain circumstances, the money supply or the monetary base as an intermediate policy target, and, predict unambiguously the effect of varying an actual instrument on these targets.
The literature on the effect of financing budget deficits through captive buyers of government securities on the money supply and the monetary base is inconclusive. The outcome, as was discussed in Chapter V, depends on whether these deficits are financed by the monetary authorities, or by commercial banks with excess reserves and/or a reduction in their holdings of other assets.

Since our model is a portfolio balance one, banks and the non-bank public were shown to adjust their portfolios to the changes resulting from the increase in budget deficits, that is, the increase in banks' holdings of government securities.

With the monetary base being defined as the sum of currency held by the non-bank public and total reserves, increasing budget deficits was shown to reduce excess reserves and thus total reserves. It was also shown to reduce currency holdings through its effects on the unregulated loan rate as was discussed in Chapter V. These two results led to the conclusion that financing budget deficits through captive buyers of government securities reduces the monetary base in our model under both regimes. The same result held for the money supply since the increase in the unregulated loan rate reduced currency and demand deposits.

Our results imply that in the presence of unregulated loan markets, and a highly regulated financial environment, financing budget deficits through captive buyers of government securities was shown to reduce the money supply and the monetary base. This is mainly due to portfolio reallocation in favor of unregulated loans and away from currency, deposits, and total reserves.
The literature on developing measures to promote a market for government securities in small, open, less-developed economies was descriptive in nature. The recommendations discussed in Chapter VI, in this sense, were based on economic intuition and did not result from any specific model. In Chapter VI, our present model was used to recommend such measures. We first examined the status of the market for government securities in Taiwan. It was shown that the Taiwanese market for government securities is still at an infant stage, with government securities held mostly by financial intermediaries.

The literature on markets for government securities shows that several less developed countries share the Taiwanese experience in the sense that they are not characterized by a well-developed and diversified market for government securities. Therefore, after making a case for the need of a market for government securities, our model was used to recommend measures aimed at promoting and diversifying this market. The results reached suggest that under a fixed exchange regime, a reduction in the regulated loan rate increases the unregulated loan rate, a policy that is counterproductive when it comes to diversifying a market for government securities. Reducing the deposit rate was shown to reduce the unregulated loan rate, a fact that contributes to the promotion of a market for government securities. In the case of a flexible exchange regime, it was shown that reducing the loan and the deposit rate helps promote and diversify a market for government securities.

Our recommendations do not address freeing all interest rates in the economy and liberalizing the financial structure in order to promote and diversify the market for government securities. The objective of the
dissertation was to examine the functioning of money and credit policies, given the constraints faced by the economies under consideration.
Appendix A

Appendix A deals with a list of symbols and notations and with the derivation of demand and net supply equations for the financial intermediaries and the non-bank public.

\[
\begin{align*}
L_r &= \text{regulated loans} \\
ER &= \text{excess reserves} \\
RR &= \text{required reserves} \\
D &= \text{deposits} \\
BR &= \text{borrowed reserves} \\
FA^F &= \text{foreign assets held by financial intermediaries} \\
GS^F &= \text{government securities held by financial intermediaries} \\
L^d_r &= \text{demand for regulated loans} \\
NW &= \text{net worth of financial intermediaries} \\
C &= \text{currency in circulation held by the non-bank public} \\
FA^N &= \text{foreign assets held by the non-bank public} \\
NL^s_u &= \text{net supply of loans in the unregulated credit market} \\
L^s_r &= \text{supply of regulated loans} \\
WF^N &= \text{financial wealth of the non-bank public} \\
TR &= \text{total reserves} \\
FA^C &= \text{foreign assets held by the central bank} \\
GS^C &= \text{government securities held by the central bank} \\
FA^s &= \text{supply of foreign assets} \\
GS^s &= \text{supply of government securities} \\
\alpha &= \text{reserve requirement ratio} \\
rs &= \text{interest rate paid on government securities}
\end{align*}
\]
\[ r^* = \text{foreign interest rate} \]
\[ e = \text{exchange rate} \]
\[ \hat{e} = \text{expected exchange rate} \]
\[ r_d = \text{interest rate paid on deposits} \]
\[ d = \text{discount rate} \]
\[ r_u = \text{interest rate in unregulated loan markets} \]
\[ MS = \text{money supply} \]
\[ MB = \text{monetary base} \]

I. Financial Intermediaries

\[ \beta = H(ER) + rs GS^F + (r^*(\hat{e} - e)) FA^F + rc L_r - dBR \]
\[ - rdD - L(ER, FA^F, GS^F, L_r, D, BR) \]
\[ + \lambda(NW + (1 - \alpha)D + BR - L_r - ER - FA^F - GS^F). \]

**First order conditions are:**

\[ \frac{\partial\beta}{\partial FA^F} = r^* - L_{FA^F} - \lambda = 0 \quad (1) \]

\[ \frac{\partial\beta}{\partial BR} = - d - L_{BR} + \lambda = 0 \quad (2) \]

\[ \frac{\partial\beta}{\partial ER} = H_{ER} - L_{ER} - \lambda = 0 \quad (3) \]

\[ \frac{\partial\beta}{\partial r_r} = rc - L_r - \lambda = 0 \quad (4) \]

\[ \frac{\partial\beta}{\partial \lambda} = NW + (1-\alpha)D + BR - L_r - ER - FA^F - GS^F = 0 \quad (5) \]
where \( L_{FA}^F = \frac{\partial L}{\partial FA} \) and so on, and where \( L_{FA}^F = \frac{\partial^2 L}{\partial FA^2} > 0 \)

\( H_{ER} = \frac{\partial^2 H}{\partial ER^2} < 0. \)

Differentiating with respect to \( r^*, d, e, \hat{e}, rc, GS^F, \alpha, D, \) we get the following:

\[
\begin{bmatrix}
- L_{FA}^F & 0 & 0 & 0 & -1 \\
- L_{BR}^F & 0 & 0 & 1 & 0 \\
0 & H_{ER}^F - L_{ER}^F & 0 & -1 & 0 \\
0 & 0 & 0 & - L_{Lr}^F & -1 \\
-1 & 1 & -1 & -1 & 0
\end{bmatrix}
\begin{bmatrix}
\frac{\partial FA^F}{\partial x} \\
\frac{\partial BR}{\partial x} \\
\frac{\partial ER}{\partial x} \\
\frac{\partial L}{\partial x} \\
\frac{\partial \lambda}{\partial x}
\end{bmatrix}
= \begin{bmatrix}
-1 \\
0 \\
0 \\
0 \\
0
\end{bmatrix}
\]

\( A = 5\times5 \) matrix of the system whose determinant is shown to be positive

\( |A| > 0. \)

\( x = \) Any variable which we differentiate with respect to. In this case, it is \( r^*. \)

\[
|A| = (- L_{FA}^F) (- L_{BR}^F) \left[ (- H_{ER}^F + L_{ER}^F) + (L_{Lr}^F) \right] \\
+ (L_{FA}^F) (- H_{ER}^F + L_{ER}^F) (L_{Lr}^F) + (- L_{BR}^F) (- H_{ER}^F + L_{ER}^F) (- L_{Lr}^F) \\
|A| > 0.
\]
1) Differentiating with respect to $r^*$, we get

\[
\left( L_{BR}^{'\prime} \right) \left[ \left( H_{ER}^{'\prime} - L_{ER}^{'\prime} \right) (-1) + (L_{LR}^{'\prime}) \right] \\
+ (-H_{ER}^{'\prime} + L_{ER}^{'\prime}) (L_{LR}^{'}) \\
\frac{\partial F_F}{\partial r^*} = \frac{\left( L_{BR}^{'\prime} \right) \left[ \left( H_{ER}^{'\prime} - L_{ER}^{'\prime} \right) (-1) + (L_{LR}^{'\prime}) \right] + (-H_{ER}^{'\prime} + L_{ER}^{'\prime}) (L_{LR}^{'})}{|A|} > 0
\]

\[
\frac{\partial BR}{\partial r^*} = \frac{(-H_{ER}^{'\prime} + L_{ER}^{'\prime}) (L_{LR}^{'})}{|A|} > 0
\]

\[
\frac{\partial ER}{\partial r^*} = \frac{(L_{BR}^{'\prime}) (-L_{LR}^{'})}{|A|} < 0
\]

\[
\frac{\partial L_{LR}}{\partial r^*} = \frac{(-L_{BR}^{'\prime}) (-H_{ER}^{'\prime} + L_{ER}^{'\prime})}{|A|} < 0
\]

2) Differentiating with respect to $\varepsilon$ and $\hat{\varepsilon}$

We get opposite results for $\varepsilon$ than for $r^*$. The results for $\hat{\varepsilon}$ are similar to the ones for $r^*$.

3) Differentiating with respect to $d$, we get
\[ \frac{\partial F_{AF}}{\partial d} = \frac{(-H_{ER}^r + L_{ER}^r)(-L^r_x)}{|A|} < 0 \]

\[ \frac{\partial F_{BR}}{\partial d} = \frac{-L_{BR}^r [(-H_{ER}^r + L_{ER}^r) + (L_x^r)] + (-H_{ER}^r + L_{ER}^r)(-L^r_x)}{|A|} < 0 \]

\[ \frac{\partial F_{ER}}{\partial d} = \frac{(L_{BR}^r)(-L_x^r)}{|A|} < 0 \]

\[ \frac{\partial L_r}{\partial d} = \frac{(-L_{BR}^r)(-H_{ER}^r + L_{ER}^r)}{|A|} < 0 \]

4) Differentiating with respect to \( r_c \), we get

\[ \frac{\partial F_{AF}}{\partial r_c} = \frac{(L_{BR}^r)(H_{ER}^r - L_{ER}^r)}{|A|} < 0 \]

\[ \frac{\partial F_{BR}}{\partial r_c} = \frac{-L_{BR}^r [ + (H_{ER}^r - L_{ER}^r)]}{|A|} > 0 \]

\[ \frac{\partial F_{ER}}{\partial r_c} = \frac{(L_{BR}^r)(L_{ BR}^r)}{|A|} < 0 \]
\[
\frac{\partial L^{b}}{\partial r_{c}} = \frac{(L^{b}_{FA} \cdot (L^{b}_{BR} + L^{b}_{EBR}) + (L^{b}_{BR} \cdot (H^{b}_{ER} + L^{b}_{ER}))}{|A|} + > 0
\]

5) **Differentiating with respect to** \( G_{S}^{F} \), **we get**

\[
\frac{\partial F^{a}_{A_{r}}}{\partial G_{S}^{F}} = \frac{(L^{a}_{BR} \cdot (H^{a}_{ER} + L^{a}_{ER}) \cdot (L^{a}_{L_{r}})}{|A|} - < 0
\]

\[
\frac{\partial B^{r}_{R}}{\partial G_{S}^{F}} = \frac{(+ L^{r}_{FA}) \cdot (H^{r}_{ER} + L^{r}_{ER}) \cdot (L^{r}_{L_{r}})}{|A|} + > 0
\]

\[
\frac{\partial E^{r}_{R}}{\partial G_{S}^{F}} = \frac{(- L^{r}_{FA}) \cdot (-L^{r}_{BR}) \cdot (- L^{r}_{L_{r}})}{|A|} - < 0
\]

\[
\frac{\partial L^{r}_{r}}{\partial G_{S}^{F}} = \frac{(- L^{r}_{FA}) \cdot (-L^{r}_{BR}) \cdot (H^{r}_{ER} - L^{r}_{ER})}{|A|} - < 0
\]

6) **Differentiating with respect to** \( \alpha \), **we get**

\[
\frac{\partial F^{a}_{A_{r}}}{\partial \alpha} = \frac{D(L^{a}_{BR} \cdot (H^{a}_{ER} + L^{a}_{ER}) \cdot (L^{a}_{L_{r}})}{|A|} - < 0
\]
Differentiating with respect to \( D \), we get

\[
\frac{\partial \mathcal{E}_{BR}}{\partial \alpha} = \frac{-\left(\alpha - 1\right) \mathcal{L}_{BR}^\prime \left(\mathcal{H}_{ER}^\prime - \mathcal{L}_{ER}^\prime\right) \mathcal{L}_{LR}^\prime}{|A|^2} < 0
\]

\[
\frac{\partial \mathcal{E}_{ER}}{\partial \alpha} = \frac{-\left(\alpha - 1\right) \mathcal{L}_{BR}^\prime \left(\mathcal{H}_{ER}^\prime - \mathcal{L}_{ER}^\prime\right) \mathcal{L}_{LR}^\prime}{|A|^2} < 0
\]

7) **Differentiating with respect to \( D \), we get**

\[
\frac{\partial \mathcal{E}_{FA}^F}{\partial D} = \frac{-\left(\alpha - 1\right) \mathcal{L}_{BR}^\prime \left(\mathcal{H}_{ER}^\prime + \mathcal{L}_{ER}^\prime\right) \mathcal{L}_{LR}^\prime}{|A|^2} > 0
\]

We assume that \( 1 - \alpha > 0 \).

\[
\frac{\partial \mathcal{E}_{BR}}{\partial D} = \frac{-\left(\alpha - 1\right) \mathcal{L}_{BR}^\prime \left(\mathcal{H}_{ER}^\prime + \mathcal{L}_{ER}^\prime\right) \mathcal{L}_{LR}^\prime}{|A|^2} < 0
\]

\[
\frac{\partial \mathcal{E}_{ER}}{\partial D} = \frac{-\left(\alpha - 1\right) \mathcal{L}_{BR}^\prime \left(\mathcal{H}_{ER}^\prime + \mathcal{L}_{ER}^\prime\right) \mathcal{L}_{LR}^\prime}{|A|^2} > 0
\]
II. Non Financial Intermediary Public

\[ \beta' = \rho D + \rho_u N_L u + (r^* + (\hat{e} - e)) F_A N + E(C) \]
\[ - rc L_r - K(D, N_L u, F_A N, L_r, C) \]
\[ + \lambda' (W_F N - D - N_L u - F_A N - C + L_r) \]

First Order Conditions Are

\[ \frac{\partial \beta'}{\partial D} = \rho D - K_D - \lambda' = 0 \]
\[ \frac{\partial \beta'}{\partial N_L u} = \rho_u K_u - \lambda' = 0 \]
\[ \frac{\partial \beta'}{\partial F_A N} = r^* + (\hat{e} - e) - K_{F_A N} - \lambda' = 0 \]
\[ \frac{\partial \beta'}{\partial E} = E_C - K_C = \lambda' = 0 \]
\[ \frac{\partial \beta'}{\partial \lambda} = W_F N - D - N_L u - F_A N - C + L_r = 0 \]

Differentiating with respect to \( \rho D, \rho_u, r^*, L_r, e, \) and \( \hat{e} \), we get the following system, (assuming \( E_C' = \lambda' = 0 \)).
\[
\begin{bmatrix}
-K_D' & 0 & 0 & 0 & -1 \\
0 & -K_{NL} u' & 0 & 0 & -1 \\
0 & 0 & -K_{FN}' & 0 & -1 \\
0 & 0 & 0 & E_C' - K_C' & -1 \\
-1 & -1 & -1 & -1 & 0
\end{bmatrix}
\]

\[
A' = 5 \times 5 \text{ matrix of the system whose determinant is shown to be positive, } |A'| > 0
\]

\[
x' = \text{any variable which we differentiate with respect to. In this case, it is } rd.
\]

Using Cramer's rule, the comparative statics results are as follows:

1) When we differentiate with respect to \( rd \)

\[
\frac{\partial D}{\partial rd} = \frac{(K_{NL}' K_{FN}') + (-K_{FN}')(E_C' - K_C')}{|A'|} + > 0
\]

\[
\frac{\partial N}{\partial rd} = \frac{(K_{FN}'')(E_C' - K_C')}{|A'|} - < 0
\]
\[
\frac{\partial F_A^N}{\partial \rho_d} = \frac{(K'_{NLu}) (E'_C - K'_C)}{|A'|} + < 0
\]

\[
\frac{\partial C}{\partial \rho_d} = \frac{(- K'_{NLu} K'_{FA N})}{|A'|} + < 0
\]

2) When we differentiate with respect to \(\rho_u\)

\[
\frac{\partial D}{\partial \rho_u} = \frac{(K'_{FA N}) (E'_C - K'_C)}{|A'|} + < 0
\]

\[
\frac{\partial N_{LU}}{\partial \rho_u} = \frac{(K'_{D}) \left[ (K'_{FA N}) + (- E'_C + K'_C) \right] - \left[ (K'_{FA N}) (E'_C - K'_C) \right]}{|A'|} + > 0
\]

\[
\frac{\partial F_A^N}{\partial \rho_u} = \frac{(K'_{D}) (E'_C - K'_C)}{|A'|} + < 0
\]

\[
\frac{\partial C}{\partial \rho_u} = \frac{(- K'_{D}) (K'_{FA N})}{|A'|} + < 0
\]
3) When we differentiate with respect to \( r^* \)

\[
\frac{\partial D}{\partial r^*} = \frac{\left( K'_{NL_{u}} \right) \left( E'_C - K'_C \right)}{|A'|} + < 0
\]

\[
\left( - K'_{D} \right) \left[ \left( - K'_{NL_{u}} \right) \right] + \left( - K'_{D} \right) \left( E'_C - K'_C \right)
\]

\[
\left( - K'_{NL_{u}} \right) \left( E'_C - K'_C \right)
\]

\[
\frac{\partial F_{AN}}{\partial r^*} = \frac{\left( - K'_{D} \right) K'_{NL_{u}} \left( E'_C - K'_C \right)}{|A'|} + > 0
\]

4) When we differentiate with respect to \( L_r \)

\[
\frac{\partial C}{\partial r^*} = \frac{\left( - K'_{D} \right) K'_{NL_{u}} \left( E'_C - K'_C \right)}{|A'|} + < 0
\]

\[
\frac{\partial D}{\partial L_r} = \frac{\left( - K'_{NL_{u}} \right) \left( E'_C - K'_C \right)}{|A'|} + > 0
\]

\[
\frac{\partial N_{NL_{u}}}{\partial L_r} = \frac{\left( - K'_{D} \right) \left( E'_C - K'_C \right)}{|A'|} + > 0
\]
\[
\frac{\partial F_{AN}}{\partial L_r} = \frac{(- K_D' K_{NL u}^i) (E_C' - K_C')}{|A'|} \quad + > 0
\]

\[
\frac{\partial C}{\partial L_r} = \frac{(K_D' K_{NL u}^i K_{NL u}^o) F_{AN}^i}{|A'|} \quad + > 0
\]

5) When we differentiate with respect to \(e\) and \(\hat{e}\)

\(\hat{e}\) gives the same results as \(r^*\) and \(e\) the opposite results as \(r^*\).
Appendix B: Comparative Statics Results

\[
\begin{align*}
NL^S_u (rd, ru, r^*, L^S, e, \hat{\varepsilon}) &= 0 \quad (10) \\
L^d_r (r^*, e, \hat{\varepsilon}, d, rc, GS^F, \alpha, D) - L^S_r &= 0 \quad (11) \\
D^d (rd, ru, r^* L^S, e, \hat{\varepsilon}) - D &= 0 \quad (12) \\
FA^{dN} (rd, ru, r^*, L^S_r, e, \hat{\varepsilon}) + FA^{dF} (r^*, e, \hat{\varepsilon}, d, rc, GS^F, \alpha, D) + FA^{dc} - FA^S &= 0 \quad (13) \\
GS^{dF} + GS^{dc} - GS &= 0 \quad (14) \\
FA^{dc} + GS^{dc} - NBB &= 0 \quad (15) \\
NBB - C^d (rd, ru, r^*, L^S, e, \hat{\varepsilon}) - TR^d (r^*, e, \hat{\varepsilon}, d, rc, GS^F, \alpha, D) + BR^d (r^*, e, \hat{\varepsilon}, d, rc, GS^F, \alpha, D) &= 0 \quad (16)
\end{align*}
\]

I. Fixed Exchange Rate Regime

The system determines ru, \( L^S_r \), D, \( FA^{dc} \), \( GS^{dc} \), NBB.

The Jacobian matrix of the model after differentiating with respect to actual instruments becomes:
\[A = \text{Jacobian matrix for the model}\]
\[x = \text{any actual instrument, in this case } d.\]

We use the correspondence principle to sign the determinant of \( A \). A plausible dynamic counterpart of this model is that the time rates of change in \( r_u, L_r^S, D, FA^{dc}, GS^{dc}, \) and \( NBB \) are a decreasing function of the increase in net supply of loans (for \( r_u \)), and increasing functions of the excess demand of loans (for \( L_r^S \)), the excess demand for deposits (for \( D \)), the excess supply of foreign assets (for \( FA^{dc} \)), the excess supply of government securities (for \( GS^{dc} \)), and the excess supply of reserves (for \( NBB \)).
The correspondence principle allows us to sign the determinant as negative: \(|A| < 0\).

1) Differentiating with respect to \(d\), we get:

\[
\frac{\partial u}{\partial d} = \frac{\partial L_x^d}{\partial d} \frac{\partial N_L^s}{\partial u} \frac{\partial N_L^s}{\partial L_x^d} |A| > 0
\]

\[
\frac{\partial L_x^s}{\partial d} = \frac{\partial N_L^s}{\partial u} \left( \frac{\partial L_x^d}{\partial d} - \frac{\partial L_x^d}{\partial d} \right) + < 0
\]

\[
\frac{\partial D}{\partial d} = \frac{\partial N_L^s}{\partial u} \left( \frac{\partial D}{\partial u} - \frac{\partial L_x^d}{\partial d} \right) \frac{\partial L_x^d}{\partial d} + < 0
\]
To sign $\frac{\partial FA}{\partial d}$, we use the following method:

1) The second and third elements in bracket (1) cancel each other since they are equal:

From Appendix A: $\frac{\partial L^d_r}{\partial d} \frac{\partial FA}{\partial d} = \frac{\partial FA}{\partial d} \frac{\partial L^d_r}{\partial d}$.

2) The 2 elements in the second bracket cancel each other for the same reason.

Therefore, we are left with a negative numerator

$$\frac{\partial GS}{\partial d} = 0$$
$\frac{\partial \text{NBB}}{\partial d} > 0$. We sign $\frac{\partial \text{NBB}}{\partial d}$ the same way we signed $\frac{\partial \text{FA}}{\partial d}$ since they contain the same elements.

2) **Differentiating with respect to $\alpha$ or $\text{GS}^F$:**

When we differentiate with respect to $\alpha$ or $\text{GS}^F$, we get the same results as differentiating under $d$ since:

$$
[A], [B] = \begin{bmatrix}
0 \\
\frac{-\partial \text{L}^d}{\partial \alpha} & \frac{-\partial \text{L}^d}{\partial \text{GS}^F} \\
0 \\
\frac{-\partial \text{FA}}{\partial \alpha} & \frac{-\partial \text{FA}}{\partial \text{GS}^F} \\
0 \\
0
\end{bmatrix}
$$

so: $\frac{\partial \text{ru}}{\partial \alpha} > 0$, $\frac{\partial \text{L}^s}{\partial \alpha} < 0$, $\frac{\partial \text{D}}{\partial \alpha} < 0$, $\frac{\partial \text{FA}}{\partial \alpha} > 0$, $\frac{\partial \text{GS}^dC}{\partial \alpha} = 0$

$\frac{\partial \text{NBB}}{\partial \alpha} > 0$, $\frac{\partial \text{ru}}{\partial \text{GS}^F} > 0$, $\frac{\partial \text{L}^s}{\partial \text{GS}^F} < 0$, $\frac{\partial \text{D}}{\partial \text{GS}^F} < 0$, $\frac{\partial \text{FA}^dC}{\partial \text{GS}^F} = 0$, $\frac{\partial \text{NBB}}{\partial \text{GS}^F} > 0$. 

$\frac{\partial \text{FA}^dC}{\partial \text{GS}^F} > 0$, $\frac{\partial \text{GS}^dC}{\partial \text{GS}^F} = 0$, $\frac{\partial \text{NBB}}{\partial \text{GS}^F} > 0$. 
4) Differentiating with respect to $r_c$, we get:

$$\begin{bmatrix} [A] & [B] \end{bmatrix} = \begin{bmatrix} 0 \\ (-) \\ 3L_d r_c \\ 0 \\ (+) \\ 3FA dC r_c \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{align*}
\frac{\partial u}{\partial r_c} &= \frac{3L^d}{\partial r_c} \left( -\frac{3N^L}{\partial u} \right) \left( \frac{3L^s}{\partial r_c} \right) + \frac{3L^s}{\partial r_c} \left( \frac{3D}{\partial r_u} \right) - \left( -\frac{3L^d}{\partial r_c} \right) < 0 \\
\frac{\partial L^s}{\partial r_c} &= \frac{3NL^s}{\partial r_u} \left( -\frac{3D}{\partial L^s} \right) \left( \frac{3L^d}{\partial r_c} \right) - \frac{3L^s}{\partial r_c} |A| > 0 \\
\frac{\partial D}{\partial r_c} &= \frac{3NL^s}{\partial r_u} \left( -\frac{3D}{\partial L^s} \right) \left( \frac{3L^d}{\partial r_c} \right) \left( -\frac{3L^s}{\partial r_c} \right) |A| > 0 \\
\frac{\partial G^d}{\partial r_c} &= 0
\end{align*}$$
We sign \( \frac{\partial F_A}{\partial r_c} \) through the correspondence principle.

\( \frac{\partial N_{BB}}{\partial r_c} \) is shown to be equal to \( \frac{\partial F_A}{\partial r_c} \) and therefore, since it has the same elements with the same signs:

\[ \frac{\partial N_{BB}}{\partial r_c} < 0. \]
5) Differentiating with respect to $rd$, we get:

$$[A] \cdot [B] = \begin{bmatrix}
-\frac{\partial NL_u}{\partial rd} \\
0 \\
-\frac{\partial d^d}{\partial rd} \\
-\frac{\partial FA}{\partial rd} \\
0 \\
0
\end{bmatrix}$$

$$[C]$$

$$\frac{\partial ru}{\partial rd} = \frac{\frac{\partial NL_u}{\partial ru} + \frac{\partial NL_u}{\partial rd} \left(-\frac{\partial d^d}{\partial rd}\right) + \frac{\partial d^d}{\partial rd} \left(-\frac{\partial NL_u}{\partial ru}\right)}{|A|} > 0$$

We use the correspondence principle to sign $\frac{\partial ru}{\partial rd}$.

$$\frac{\partial L_r}{\partial rd} = \frac{\frac{\partial NL_u}{\partial ru} \left(-\frac{\partial d^d}{\partial rd}\right) + \frac{\partial d^d}{\partial ru} \left(-\frac{\partial NL_u}{\partial rd}\right)}{|A|} > 0$$

The own effect of $ru$ on $NL_u^s$ and $rd$ on $D$ is expected to outweigh the cross effect of $ru$ on $D$ and $rd$ on $NL_u^s$. 
\[
\frac{3D}{3rd} = \frac{\frac{3NL^s}{ru} \left( \frac{3D}{3rd} \right) + \frac{3D}{ru} \left( - \frac{3NL^s}{3rd} \right)}{>0}
\]

\(\frac{3D}{3rd}\) is signed as positive for the same reason \(\frac{3L^s}{3rd}\) is signed as positive.

\(\frac{3FA^{dc}}{3rd} < 0\) (by the correspondence principle)

\(\frac{3NBB}{3rd} < 0\) (same reason as \(\frac{3FA^{dc}}{3rd} < 0\))

\(\frac{3GS^{dc}}{3rd} = 0\).

6) Instrument Variation or Differentiating with respect to e

\[
\frac{3ru}{3e} = \frac{\left( + \right) \left( \frac{3NL^s}{ue} \right) + \left( - \frac{3NL^s}{ue} \right) \left( \frac{3D}{3L^s} \right) \left( \frac{3L^d}{3D} \right)}{\left| A' \right|} \frac{\left( + \right) \left( \frac{3L^d}{3L^s} \right) \left( \frac{3NL^s}{ue} \right) + \left( + \right) \left( \frac{3D}{3e} \right) \left( \frac{3L^s}{3L^s} \right) \left( \frac{3L^d}{3D} \right)}{<0
\]

The second element in the first bracket cancels out the element in the third bracket by Appendix A. Therefore,

\(\frac{3ru}{3e} < 0\).
\[
\frac{\varepsilon_{L_r}^s}{\varepsilon e} = \frac{\left(-\frac{\varepsilon_{L}^d}{\varepsilon e} + \left(-\frac{\varepsilon_{L}^d}{\varepsilon D}ight)\left(-\frac{\varepsilon_{L}^r}{\varepsilon D}\right)\right)}{|A'|} < 0
\]

\[
\frac{\varepsilon_{D}}{\varepsilon e} = \frac{\frac{\varepsilon_{NL}^s}{\varepsilon_{ru}} \left(-\frac{\varepsilon_{D}}{\varepsilon e} + \left(-\frac{\varepsilon_{L}^d}{\varepsilon e}\right)\left(-\frac{\varepsilon_{L}^r}{\varepsilon D}\right)\right) + \left(-\frac{\varepsilon_{D}}{\varepsilon_D}\right)\left(-\frac{\varepsilon_{L}^d}{\varepsilon_{ru}}\left(-\frac{\varepsilon_{L}^r}{\varepsilon D}\right)\right)}{|A'|} > 0
\]

\[
\frac{\varepsilon_{FA}^{dC}}{\varepsilon e} < 0 \text{ (using correspondence principle)}
\]

\[
\frac{\varepsilon_{NBB}}{\varepsilon e} < 0 \text{ (using correspondence principle)}
\]

\[
\frac{\varepsilon_{GS}^{dC}}{\varepsilon e} = 0.
\]
II. Flexible Exchange Regime with NBB as the Instrument of Policy

The system determines ru, L^s_r, D, e, GS^{dC}, FA^{dC}.

\[
\begin{pmatrix}
\frac{\partial ru}{\partial e} & \frac{\partial ru}{\partial L^s_r}
\end{pmatrix}
\begin{pmatrix}
ru
\end{pmatrix}
\begin{pmatrix}
\frac{\partial x}{\partial e}
\end{pmatrix}
=n
\]

\[
\begin{pmatrix}
\frac{\partial D}{\partial e}
\end{pmatrix}
\begin{pmatrix}
\frac{\partial D}{\partial L^s_r}
\end{pmatrix}
\begin{pmatrix}
\frac{\partial x}{\partial e}
\end{pmatrix}
=n
\]

\[
\begin{pmatrix}
0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix}
\begin{pmatrix}
\frac{\partial x}{\partial L^s_r}
\end{pmatrix}
\begin{pmatrix}
\frac{\partial x}{\partial e}
\end{pmatrix}
=n
\]

We use the correspondence principle to sign the determinant of A'. A dynamic counterpart of this model is that the time rates of change in ru, L^s_r, D, e, GS^{dC}, FA^{dC} are a decreasing function of an increase in L^s_r (for ru) and increasing functions of an excess Demand for Deposits (for D), excess demand for Loans (for L^s_r), excess demand for foreign assets (for e), excess supply of government securities for GS^{dC} and excess
supply of reserves (for \( \text{FA}^d \)). Therefore, \( |A'| < 0 \) (we sign the determinant as negative).

1) Differentiating with respect to \( d \), we get:

\[
\frac{\partial L^d}{\partial d} \left[ \frac{\partial N_{L^s}^u}{\partial L^s} \left[ \left( \frac{\partial \text{FA}^d}{\partial e} \right) - \left( \frac{\partial \text{FA}^d}{\partial e} \right) \right] \right] + \frac{\partial N_{L^s}^u}{\partial e} \left[ \left( \frac{\partial \text{FA}}{\partial L^s} \right) - \left( \frac{\partial \text{FA}^d}{\partial L^s} \right) \right]
\]

\[
\frac{\partial L^d}{\partial d} \left[ \frac{\partial L^s}{\partial d} \left( \frac{\partial \text{L}^d}{\partial e} \right) + \left( \frac{\partial L^d}{\partial e} \right) \right] + \frac{\partial L^s}{\partial e} \left[ 1 + \left( \frac{\partial \text{L}^s}{\partial L^s} \right) \left( - \frac{\partial L^d}{\partial L^s} \right) \right]
\]

\[
\frac{\partial ru}{\partial d} = \frac{|A'|}{\partial d} > 0
\]

We use the correspondence principle to sign \( \frac{\partial ru}{\partial d} > 0 \).
\[
\frac{\partial \text{NL}^s}{\partial u} \left[ -\frac{\partial d}{\partial d} \left( \frac{\partial F^d}{\partial e} + \frac{\partial F^N}{\partial e} \right) + \left( -\frac{\partial F^d}{\partial d} \right) \left( \frac{\partial d}{\partial e} \right) \right] + 
\frac{\partial F^d}{\partial d} \left[ \frac{L^d}{L^e} \left( \frac{\partial d}{\partial e} \right) + \left( \frac{L^d}{e} \right) \right] 
\]

\[
+ \left( \frac{\partial d}{\partial u} \right) \left[ -\frac{\partial F^d}{\partial d} \left( \frac{\partial d}{\partial e} \right) + \left( -\frac{\partial F^d}{\partial d} \right) \left( \frac{\partial d}{\partial e} \right) \right] + \frac{\partial F^N}{\partial d} \left( \frac{\partial d}{\partial e} \right) \left( -\frac{\partial d}{\partial e} \right). 
\]

\[
\frac{\partial L^s}{\partial d} = \frac{\partial L^u}{\partial d} < 0 
\]

We use the correspondence principle to sign \( \frac{\partial L^s}{\partial d} < 0 \).
In the third bracket, the first element outweighs the second one since in Appendix A, we showed that:

\[
\frac{\partial^{2} E_{dN}}{\partial r \partial u} = \frac{\partial^{2} E_{s}}{\partial L^{s}_{r}} + \frac{\partial^{2} E_{d}}{\partial L^{d}_{x}} \cdot \frac{\partial^{2} E_{u}}{\partial L^{u}_{r}}
\]

\[
\frac{\partial^{2} E_{d}}{\partial d^{2}} - \frac{\partial^{2} E_{u}}{\partial d^{2}} > 0
\]

In the third bracket, the first element outweighs the second one since in Appendix A, we showed that:

\[
\frac{\partial^{2} E_{d}}{\partial r \partial u} \left( \frac{\partial^{2} E_{s}}{\partial L^{s}_{r}} + \frac{\partial^{2} E_{d}}{\partial L^{d}_{x}} \cdot \frac{\partial^{2} E_{u}}{\partial L^{u}_{r}} \right)
\]

The third and the second elements in bracket one are equal by Appendix A. The two elements in bracket two are equal too by Appendix A; therefore \( \frac{\partial e}{\partial d} < 0 \).
\[ \frac{\partial FA}{\partial d} = 0. \]

\[ \frac{\partial GS}{\partial d} = 0. \]

2) **Differentiating with respect to \( \alpha \)**
We get the same results as differentiating with respect to \( d \).

3) **Differentiating with respect to \( GS^d F \)**
We get the same results as differentiating with respect to \( d \).

4) **Differentiating with respect to \( rc \), we get**

\[ \begin{align*}
\frac{\partial F}{\partial r} & = \left[ \frac{\partial N_L^s}{\partial r} \frac{\partial F}{\partial x} \right] \\
& + \left[ \frac{\partial N_L^s}{\partial x} \frac{\partial F}{\partial r} \right] \\
& + \left[ \frac{\partial N_L^s}{\partial \theta} \frac{\partial F}{\partial \theta} \right] \\
& + \left[ \frac{\partial N_L^s}{\partial \phi} \frac{\partial F}{\partial \phi} \right] \\
& + \left[ \frac{\partial N_L^s}{\partial \chi} \frac{\partial F}{\partial \chi} \right] \\
& + \left[ \frac{\partial N_L^s}{\partial \psi} \frac{\partial F}{\partial \psi} \right]
\end{align*} \]

\[ \frac{\partial ru}{\partial rc} = \frac{1}{|A'|} > 0 \]

We use the correspondence principle to sign \( \frac{\partial ru}{\partial rc} > 0 \).
We use the correspondence principle to sign $\frac{\partial L^s}{\partial r} < 0$.

We use the correspondence principle to sign $\frac{\partial D}{\partial r} < 0$. 
\[
\frac{\partial e}{\partial r_c} = \frac{1}{|A'|} \frac{\partial L}{\partial r_c} < 0
\]

We use the correspondence principle to sign \( \frac{\partial e}{\partial r} < 0 \).

\( \frac{\partial F_d}{\partial r_c} = 0, \)

\( \frac{\partial G_d}{\partial r_c} = 0. \)

5) Differentiating with respect to \( r_d \), we get
We use the correspondence principle to sign $\frac{\partial u}{\partial y} > 0$. 
We use the correspondence principle to sign $\frac{\partial L^s}{\partial r} < 0$. 

$|A'|$
We use the correspondence principle to sign $\frac{3D}{\partial r_d} < 0$

$$\frac{3D}{\partial r_d} = \frac{|A'|}{-} < 0$$

We use the correspondence principle to sign $\frac{3D}{\partial r_d} < 0$
6) **Instrument variation or differentiating with respect to NBB**

\[
\frac{\partial F_a}{\partial r_d} dC = 0, \\
\frac{\partial G_s}{\partial r_d} dC = 0.
\]

\[
\frac{\partial r_u}{\partial NBB} < 0, \\
\frac{\partial C}{\partial NBB} > 0, \\
\frac{\partial F_a}{\partial NBB} > 0, \\
\frac{\partial L_r}{\partial NBB} > 0, \\
\frac{\partial D}{\partial NBB} > 0.
\]
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