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Eduardo Lizano Fait

Financial sector reform and development finance sweet dreams and hard facts

INTRODUCTION

Economic policy has experienced a sea change in recent years. Countries have moved away from the model of import substitution industrialization, shifting toward another one of economic liberalization. In some countries this change has unfolded fast, while in other sit has moved at a more sedate pace; but in general the change of model and paradigm is a fact.

The acceptance of this new model has implications on many fronts: How may it affect development finance? Will development finance as such disappear under the new model? Will it change? If so, in what directions? What measures should be taken in response to the new situation? This paper will take a closer look at some of these problems from the viewpoint of a developing country, and more specifically, in the eyes of a central banker.

The first part of the paper will examine the main characteristics of development finance in the days before financial sector re-

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form. The second part discusses reform in the financial sector as such. The third will consider the difficulties of the transition from a pre-reform world to post-reform, including necessary conditions and the main obstacles. The fourth and final section examines some salient points to help reform to become a reality.

I. BEFORE FINANCIAL SECTOR REFORM

Prior to reform of the financial sector, the overall policy approach for promoting economic development was based on inward-looking strategies. This somewhat "nationalistic" view sought growth mainly through internal markets.

Two main instruments were used. First, protectionism was introduced as a main policy to insulate local producers from foreign competition. Internal markets were essentially kept captive to local producers. Second, state intervention was practiced to boost production levels and improve income distribution. It was believed that the state knew best, and the emphasis was on market "failures."

Consequently, import tariffs and export taxes were very high, and other types of controls were common, including import and export quotas. Local production was jealously protected, and competition on domestic markets was scant. Producers had little incentive to innovate, foster productivity, or become competitive, and nothing was available to attract them to international markets or export activities. Growth of local production was therefore limited by the size of the domestic market. At the same time, the state became more and more involved in determining what should be produced, how to produce it, and how to distribute national income. Not only did the state become a large-scale direct producer of goods and services, but it often wielded many specific measures as well, such as subsidies, tariffs, price controls, investment allocations, wage fixing, foreign direct investment controls, and the like. All too often, however, it brought undesirable side effects, including macroeconomic instability, high rates of inflation, fiscal deficit, and balance of payments crisis.

As part and parcel of this model, the financial sector was repressed and tightly controlled. On the external front, exchange rates were managed, often meaning the presence of multiple exchange rates, and controls were placed on capital movement to and from other countries. Internally, interest rates were controlled, preferential interest rates were common, and credit was

allocated by sector and activity, all under a system of quantitative limits. Risk assessment was not commonly practiced, and bank supervision was weak. The state tended to sit as owner of multiple financial institutions, generally characterized by poor management and high losses.

Now faced with severe state controls on financial transactions and financial institutions, would-be borrowers began resorting to a wide range of informal financial markets, including money lenders, input suppliers, crop buyers, and so on. Thus, the market learned to sidestep man-made obstacles to innovation and competition, known as “distortions.”

This same policy framework strictly protected business concerns from foreign competition. The state introduced a broad-based system of producer and consumer subsidies together with price controls (floors and ceilings) on factors (wages, rents, interest rates) as well as on goods and services. State enterprises were producing not only in so-called strategic sectors, but in many other activities as well.

Under this model of heavy protection from foreign competition and high levels of paternalistic intervention by the state, the financial sector was highly segmented and had few incentives to perform more efficiently or find a workable trade-off between profit and risk. Meanwhile, other businesses were unable to assess risks with any accuracy due to macroeconomic instability and microeconomic distortions; and they had no good reason to become competitive on international markets.

Reform of the financial sector is only one element of much more sweeping change. The general overhaul of the economic policy model is taking place at three different levels: in macroeconomic policy, within the financial sector and in the operation of most other enterprises. Substantial lags in any one of these areas would seriously hinder progress in overall policy reform; economic development likewise demands simultaneous progress in all three.

The new model is based on the simple and rather old idea that economic development to a large extent is an outgrowth of opportunities that stem from the size of the market. Possibilities for promoting economic growth therefore depend heavily on the size of the market in which economic agents operate. Therefore, the former model of import substitution industrialization, combined with broad state interventionism, should thus be changed in favor of a new model based on economic liberalization. The main characteristic of such a model are well-functioning markets (factors and goods), with an emphasis not on market failures, but on gov-

ernment failures as well as integration of markets at both the national and international levels. Competition on the local market and on international markets is thus encouraged as the means to reap the benefits of comparative advantage. Export promotion and access to foreign markets are key elements of this new model. However, no country can compete successfully unless the distortions derived from excessive, ill-conceived state intervention are removed.

II. AFTER FINANCIAL SECTOR REFORM

The new model calls for certain macroeconomic policy measures:

- promote “openness” by eliminating obstacles to foreign trade, such as tariffs and quotas;
- create well-functioning markets by eliminating distortions and bottlenecks, thus allowing for better allocation of the factors of production and making more reliable information available to consumers; and
- bring down inflation; stabilize macro-indicators such as exchange rates, wages and interest rates; and slim the public finance deficit and current account deficit.

The change of model calls for vigorous action in the financial sector, as well. Williamson and Mahar (1998, p. 2) outline the main steps:

- eliminate credit controls;
- deregulate interest rates;
- offer free entry into the banking sector, or more generally, the financial services industry;
- guarantee bank autonomy;
- emphasize private ownership of banks; and
- liberalize of international capital flows.

Other issues should be included such as:

- open the capital account of the balance of payments;
- set the exchange rate regime in one of the “corners” (anchor or float, but avoid trying to “manage” the exchange rate);

- promote competition among all financial intermediaries, forcing them to assess and manage risks more effectively;
- set Central Bank macroeconomic policy with the use of indirect instruments such as open market operations rather than direct instruments (quantitative and specific controls).

In essence, financial sector reform entails a shift from a situation of financial repression to one of financial deepening. Such a change can usher in major benefits and is a key factor for economic development. Among the main benefits that can be expected are:

- i) More financial resources become available in the economy when savings held in non-productive assets are transferred to income-producing instruments. This is followed by more investment, more production, and more consumption.
- ii) Financial resources are able to flow from one set of economic agents (savers) to another (producers, investors, consumers) much more smoothly (quicker, cheaper).
- iii) The costs of financial intermediation decline; savers begin obtaining better prices (higher interest rates) on their savings and credit users can find lower-cost loans, that is, lower interest rates.
- iv) Many members of society find new possibilities for obtaining access to credit, and thereby acquire greater purchasing power.
- v) Financial intermediaries are forced to assess their risks more accurately and pursue a more advantageous trade-off between profits and risks.
- vi) Factors of production are allocated in a better way, leading to higher economic growth rates.
- vii) Financial services proliferate and diversify (better quality at lower prices).

These modifications in the general economic policy framework force also most enterprises to change the way they do business. Companies whether micro, small, medium or large, need to operate in the newly competitive milieu. They must perform in far larger integrated markets, competing not only with locally produced goods and services, but also with imported offerings, due to a higher degree of “openness.” They also need to start compet-

ing on international markets if they hope to reap economies of scale and benefit from external economies.

Full competition means that subsidies, price controls and external tariffs all disappear or at least are substantially reduced. In most cases, state-owned enterprises are either privatized or simply closed down. Local enterprises need to become more innovative, more competitive, and more efficient. They must learn to operate in large, uncertain, volatile markets. They require new skills for assessing opportunities and risks, allocating factors of production more effectively, and incorporating new technologies. Moreover, they must be ready to change the production, factor and input mix on short notice. In sum, they have to learn to live in an environment of constant change (innovation, uncertainty and volatility). These are the rules of the game under the new model.

III. THE TRANSITION PERIOD

Reform of the financial sector, consisting of financial liberalization plus financial deepening, brings no doubt major benefits for the economy as a whole. Nevertheless such reform poses also dangers and risks and introduces new difficulties and obstacles, all of which need to be taken into account. Indeed, if financial sector reform stood to bring only benefits, all countries would have undertaken it long ago; but obviously this is not the case. Given the very substantial changes it may bring, reform is not likely to be an easy process.

Some of the main difficulties as seen from the Central Bank are the following.

1. While reform of the financial sector is a key element for economic development, it is only one facet of the over-arching process of replacing one growth model with another. It can be successful only in a setting of structural adjustment and economic liberalization. Two points are particularly important. First, liberalization must proceed simultaneously, at about the same pace, in all sectors. Otherwise, lag in some sectors will hinder progress in others. This means that financial sector reform depends very much on the progress of liberalization in the rest of the economy. Second, it is important never to lose sight of the fact that structural adjustment in one sector may work to the advantage or to the detriment of liberalization in

other sectors. For example, the benefits of open markets could make overall liberalization of the economy appear more attractive, and the resulting support would hasten reform of the financial sector. On the other hand, if open markets trigger other problems, widespread liberalization could encounter many enemies, and financial reform would be slowed. Alongside the trade opening policies already discussed, other interrelated issues include macroeconomic stability, effective rule of law, and dismantling of price controls, and production and consumer subsidies. In short, the success of financial sector reform depends greatly on changes made in other sectors of the economy.

2. Financial sector reform is a process. Time is needed to carry out required legal and institutional changes and secure the necessary human resources. No country can hope to move swiftly from financial repression to financial deepening. Nor should it advance too slowly by inching through a long series of marginal adjustments. Too small steps are of little help because they would actually hold back the benefits of reform. Distortions are usually so pronounced and profound that oftentimes major measures are needed to bring about a certain critical mass. This leads inevitably to a dilemma: financial reform cannot advance overly fast, but it must not go too slowly, either.
3. In the early stages of financial reform, it is especially important to address the financial and administrative status of financial intermediaries. Current conditions frequently prove unsatisfactory for a number of reasons. For example, the asset portfolio may be less than desirable because it contains a high proportion of doubtful loans, an unhealthy ratio between total liabilities and equity, or excessively high administrative costs. Such problems that are already serious before the financial reform may worsen with it. Financial intermediaries that can point to sound financial and management conditions are ready to fend off expected temporary negative effects without jeopardizing stability and operations; but not if they report the types of problems mentioned above. Therefore, financial sector reform frequently must go hand in hand with measures to shore up intermediaries. Hence it is often a matter of moving from a situation of financial repression to an intermediate stage of mild financial repression (Williamson and Mahar, 1998, p. 30) before advancing to financial deepening.

4. The pace of financial reform is not the only important issue to consider; also of concern is the sequence of actions, an issue that has sparked serious disagreement: What should be liberalized first? Interest rates? Allocation of credit resources? Legal reform of the Central Bank? Should financial liberalization take place simultaneously with the establishment of a system of prudential supervision? Some arguments center on the need to establish a clear sequence of reform measures. Others claim that the sequence cannot be determined in advance. In practice, the characteristics of the financial sector and the peculiar circumstances of each country determine whether one measure or another should be adopted first.

The real world contains highly diverse cases that illustrate financial reform unfolding at different speeds and in varied sequence. Stages of rapid steps forward frequently overlap with periods of little progress, and regression even occurs when reform fatigue sets in. Financial reform is unquestionably a slow, complex process. McKinnon (1991, p. x) goes so far as to describe the financial reform process, for all practical purposes, as a minefield. Every country, even knowing that the next step of financial reform may be its last, must press on and traverse this ground.

5. A serious obstacle to successful completion of financial reform is the lack of political will. This occurs when there is little sense of the need to reform the financial system and little conviction of the benefits reform will bring about. The result can be a climate of opportunism in which actions may be taken to please particular interest groups, reap political dividends, impress certain international institutions, or attract financial resources from abroad. None of this is based on a true political commitment to grapple with the difficulties and complexities of reforming the financial sector. Hence, needed policies are fraught with hesitation and backtracking, foot-dragging takes over, and progress becomes erratic and even is reversed whenever difficulties arise. As economic agents are filled with mistrust, one of the most critical conditions for success is lost.
6. Financial reform produces both winners and losers. In the days prior to reform, important major social groups (producers, bureaucrats, politicians) garnered benefits from financial intermediaries, especially those that were state-owned. They enjoyed preferential access to credit at subsidized interest rates, with few guarantee requirements and ample possibilities to postpone payment. Such discrimination brought predictable

consequences as these groups accumulated wealth and enjoyed a distribution of income favorable to them. It also paid dividends in terms of political power and social standing.

Thus, one of the most stubborn obstacles to financial reform is staunch opposition by pressure groups that benefited from the prevailing situation in the past. Many well-known procedures are available to those who would oppose reform. Some are subtle arguments (more study is needed, financial reform should advance more slowly, countervailing measures are called for); others entail far more obvious maneuvers such as organizing unions or producer groups against reform, or subverting political parties with contributions.

7. The political economy of financial reform, as in many other arenas where the economic model must undergo change, requires the full support of “winners” (those social groups that stand to benefit from the new model); otherwise the “losers” will succeed in blocking the reform move. Only if “winners” can organize and corral more political power than “losers” will financial reform move ahead. Unfortunately, no simple answers are available to the question of how to organize potential “winners” or have them create the necessary alliances with one another to build enough of a political base to foster reform.
8. Without a doubt, financial reform requires trained human resources. The need is particularly evident in three types of institutions: financial intermediaries, supervisory entities, and judicial bodies charged with settling financial disputes. Unless the right people are available, neither financial intermediaries, nor supervisory bodies, nor courts of justice will function as they should. Major changes are needed not only regarding capabilities required by employees of various institutions, but mostly in terms of new attitudes.

This, of course, is easier said than done. As institutions cease to be a “modus vivendi,” employees will need to:

- a) become more productive, which means they must:
 - be trained in new technologies and procedures;
 - learn to perform the same tasks in a new way;
 - learn to perform new tasks;
- b) take on responsibilities they did not have in the past and, consequently, assume new risks;

- c) understand that their compensation will be determined according to results and improved productivity, not by labor negotiations.

Unquestionably, changes of this nature are likely to spark resistance and opposition among employees who are expected to cease loafing chronically and learn to live dangerously. Change will be needed, not only among employees, but also on the management team:

- a) Management goals can no longer include patronage, accumulation of power and prestige, or extending of political favors.
- b) Management must be accountable not only to stockholders, but also to supervisors and the general public.
- c) Management must be prepared to compete with a plethora of other local and foreign financial intermediaries.
- d) Management must strike a delicate balance between the need for a highly profitable operation, and the need to avoid taking risks beyond the limits of prudence.

It is clear why management teams so frequently lodge vigorous opposition to financial reform. The natural response is to set up incentive systems based on results. Even in the presence of such systems, however, some management groups will prove incapable of adapting to change and will have to be replaced.

9. As part and parcel of financial reform comes the pressing need to modernize supervisory systems. Financial intermediaries, once set free from most control on credit allocation and interest rates and facing an open capital account, are prey to many temptations:

- they assume excessively high financial risks;
- their credit portfolios tend to balloon;
- they incur moral hazard;
- they grant credit to interrelated groups.

All this inevitably opens the way to financial crisis. Thereupon, contagion can easily transform a microeconomic problem into a widespread crisis of the financial system.

Thus, an essential prerequisite for ensuring healthy financial reform is to improve and modernize supervisory entities and

regulations. It is not an easy task, as it entails adoption of a whole new approach, replacing accounting supervision with financial risk assessment and management. In many cases, an early warning system must be set up to identify potential problems and thus ward off crisis in particular financial institutions, immunizing so to say the rest of the financial sector from the risk of contagion.

The new supervisory approach cannot be adopted without major changes in staff, procedures, technology and information systems. While all this may seem costly, good supervision ultimately costs much less than a crisis triggered by a deficient supervisory system.

10. When the financial system undergoes reform, the volume of transactions skyrockets; this, in turn, inevitably sparks conflict and complaints among economic agents and financial institutions. An appropriate legal framework is therefore of paramount importance, along with a smoothly functioning judicial system. Clear rules are needed to govern property rights and to guarantee the validity of contracts, as well as the execution of guarantee clauses, debt securitization, and the like.

Many difficulties arise from inadequate legal provisions, courts inexperienced in financial matters, and the lack of fully trained staff.

11. The incorporation of new technologies poses a major challenge for the progress of financial reform. New technology is critically important for reducing the production costs of financial services so that transaction volume can grow quickly, especially in rural zones. Most difficulties can be attributed to one of two factors. First, lack of trained personnel to make skillful use of these new technologies. Second, the initial cost of computer equipment is steep, compounded by costs of maintenance and replacement and the payment of software user fees.

12. The proliferation of information is one of the basic features of financial reform. Financial intermediaries and the general public, as well as supervisory entities and monetary authorities all need fast access to broad-based information of high quality. Only in this way can they make well-founded business decisions. However, it costs money to produce, supply, transmit and disseminate this information, and even more to analyze and interpret it. True enough, information is indispensable,

but serious decisions remain: What information to request? What is it produced for?

One particularly important source of information is monthly updates on the current status of each financial intermediary and on macroeconomic trends in the country. Other specific information centers also need to be set up, including a central database on debtors and a registry of incidents of fraud, providing financial intermediaries with the valuable up-to-date information they need for making credit decisions.

13. Last but not least, a good overall financial environment is critically important to the success of financial sector reform. As said among the key measures to be taken are:

- rein in the fiscal deficit;
- keep inflation from soaring above international levels;
- establish a clear, stable, exchange-rate regime;
- eliminate barriers to entry to new competitors.

Unless this type of favorable environment is created, the process of financial reform will come up against many additional barriers. While these obstacles need to be removed, reform cannot wait until all problems are solved. This is why the main difficulty is the pace and sequencing of financial reform.

IV. LOOKING AHEAD

As might be expected, financial sector reform has made major strides in many countries. Some have already moved from a situation of financial repression to one of relative financial deepening. Nevertheless, much remains to be done in nearly all countries, and the tasks ahead are numerous and complex. Indeed, we will be devoting much of our time during this seminar to studying the concrete problems of financial sector, particularly from the standpoint of development finance and micro-finance, based on specific case studies from various parts of the world.

At this point it is necessary to close by mentioning the most important points that have to be considered to make reform a reality.

Certain issues merit particular attention from the perspective of financial reform *per se*:

- more competition and more opening, which means fewer barriers to entry by domestic and foreign financial intermediaries;
- more opportunities for informal financial mechanisms, including financial NGOs, to enter the formal financial market; ideally, many of these informal market intermediaries can begin to operate like true banking entities;
- more reliance on the market and less on government controls to determine interest rates, credit allocation and exchange rates; this means that monetary authorities must replace indirect methods (open market operations) with direct instruments ;
- more prudential supervision, with the proviso that an overdose of supervision would be worse than the disease it seeks to remedy, as it would push financial intermediaries into informal market operations or to off-shore markets;
- more capitalization of financial intermediaries; this is the most important insurance against trouble when the lean years come, as they inevitably will from time to time in all countries; • more and better human resources to respond more effectively to the increasingly complex and numerous challenges of the financial sector;
- more technology, which together with better human resources, is the only means to obtain lasting productivity gains and diversification of financial services;
- more information and transparency, high in quality and swift to arrive, so that economic agents can make decisions on a firmer footing;
- more macroeconomic stability and, in general, a better legal and institutional environment in which financial intermediaries can operate.

More specifically, the areas of development finance and micro-finance reform need to take into consideration the following points:

- i) Overall reform of the financial sector is a necessary precondition, but in and of itself will not create a better system of development finance and micro-finances.
- ii) As already noted, development finance and especially micro-finance pose two distinct requirements (González 1994, p. 23).

First, the will: a clear-cut political decision to carry out these programs; and second, sufficient comparative institutional advantage in specific markets to complete the task.

- iii) Development finance, and especially micro-finance, should be insulated from political manipulation.
- iv) It is highly important to incorporate informal financial intermediaries into the financial reform; these entities are out on the front lines, have vast experience, and often possess much more valuable information than anyone operating on formal markets. Thus, the costs of screening loans and of monitoring customers can be slashed to the benefit of the whole financial system.
- v) Micro-finance is subject to specific special conditions. It is an activity characterized by high volume, low margins and high risk, and it requires aggressive provisioning and different loan technologies; the standards of prudential supervision need to make allowance for these features, adopting a different approach but taking care never to become lax.
- vi) Serious decisions need to be made regarding matters such as loan screening, client monitoring, contract enforcement, and movable collateral (accounts receivable, future wage earnings, livestock).
- vii) Excessive credit expansion must be avoided at all costs; it would be a very costly mistake to grow too fast.

Taking these points into consideration is the only way to move beyond sweet dreams and begin facing hard facts. It is indeed the only way in which micro-finance programs can become a key to foster economic growth and improve living standards in many poor regions of the world.

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Scott Hendry
Charleen Adam

The M1 vector-error-correction model: some extensions and applications

Conducting monetary policy ...is akin to driving without full vision—perhaps like driving in a rainstorm with defective windshield wipers. It can be done, but only very carefully (John Crow, Eric J. Hanson Memorial Lecture, 1988)

*The Fed's dilemma is like that of a tugboat captain pushing a long string of barges in a dense fog; the awkward load is difficult to pilot. He needs to start his turn half a mile before the bend. But he can't see the bend until it's too late (Allan Murray, *The Wall Street Journal*, 1989)¹*

INTRODUCTION

Monetary policy makers face a difficult task when evaluating the current state of the economy and deciding what actions are needed to achieve their objectives, such as keeping inflation within a given range. Because long and variable lags exist be-

¹ Many thanks to Pierre Duguay for assistance in finding the John Crow quotation. The Murray reference is from Dorfman (1999).

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tween a monetary policy action and its effects on economic variables, policy-makers need a way to assess whether their actions are having, or indeed will have, the desired effect.

Economists at the Bank of Canada use inflation forecasts, in addition to other variables considered to have leading-indicator properties, to inform policy-makers' views on the current and future state of the economy. Some of these variables are new orders and shipments, housing market activity, inflation, and various money and credit aggregates. Since no one single indicator is superior to all others, a good strategy is to monitor many variables to try to ensure that the best signals about the economy are being considered. This strategy also extends to models. Given that a model is simply a collection of assumptions or behavioural rules about the way an economy works, economists maintain several models for forecasting or conditional projections.²

Economists at the Bank have pursued modelling strategies along a continuum anchored at one end by purely theoretical approaches and at the other end by purely empirical approaches.³ The model we use in this paper is an M1 vector-error-correction model (VECM), which could be described as lying somewhere between the middle of the continuum and the purely empirical end. At the heart of this model is a long-run money-demand function. Several extensions have been made to the basic model Hendry (1995) presented to add more theory (or structure) to it in order to make it more useful for conducting counter-factual analysis: for asking "what if" questions.

Sections 1 and 2 provide some background and context for the M1 VECM and discuss the changes made to Hendry's original model. Section 3 details why gross M1 is no longer the preferred measure of narrow money for the VECM and outlines how adjusted M1, the preferred measure, is constructed. Section 4 discusses the identification of policy shocks in the VECM, and section 5 lays out the framework for using information from models to inform policy. Section 6 provides some direction for future work.

² Engert and Selody (1998) and Berk (1997) made excellent arguments for the use of multiple models in formulating monetary policy. No single model can capture all aspects of the economy, so it is useful for policy-makers to have several different models summarizing different views or aspects of the economy.

³ Thanks are due to Kevin Moran and Jack Selody for suggesting this analogy.

1. BACKGROUND

Inflation is essentially a monetary phenomenon. In the long run an excess creation of money is bound to lead to inflation. In the short run the links may not be as tight. After an unsuccessful attempt at using money-growth targets to reduce inflation in the 1970s both here in Canada and in the United States, many models now used to guide policy advice assume that money plays only a passive role and may be ignored for all practical purposes because the central bank and commercial banks are assumed to simply supply money passively in accordance with agents' demand. Consequently no causal role is given to money in these models of inflation. This paper uses an active-money paradigm in which money causes inflation. However, in this model, money's causal effect on inflation does not depend on using money as the instrument of monetary policy, as is the case in many theoretical models. A very short-term interest rate such as the overnight rate can be considered to be the instrument of monetary policy, consistent with the Bank of Canada's operating procedure. In responding to changes in the overnight rate, financial intermediaries make loans to agents in the economy and hence create deposits. These agents then transact with other agents using the newly created balances, leading to changes in the level of aggregate activity and prices. The underlying premise is that agents have a long-run demand for money, and the amount of money an agent actually holds fluctuates around these desired money holdings. For the purposes of the discussion below, the difference between actual money supply and estimated long-run money demand (using the long-run parameters but evaluated at the current values of the variables in the long-run demand function) is called the money gap.⁴

Laidler (1999) discussed the passive- and active-money views, drawing on the buffer-stock theory to explain why people may temporarily be off their long-run money-demand function.⁵ For

⁴ In this sense, what is being evaluated is the difference between actual money and today's value of the long-run demand for money. The long-run money-demand function could also be evaluated at the long-run values of the variables in the long-run demand function, but doing so causes the money gap to lose most of its predictive power. This is likely because rather than evaluating money supply at its actual value, the model should include some notion of long-run supply. Identifying the money-supply process is an area for future work.

⁵ Laidler's (1999) discussion focuses on narrow, or transactions, money.

example, suppose an agent receives an unanticipated lump sum of money. Information and transaction costs are involved in deciding what to do with the money and then doing it. Hence it is optimal to take some time to arrive at a decision, and consequently at any time an agent's actual holdings of transactions money might differ from his or her desired long-run holdings of money. That is, actual money holdings fluctuate around the desired level (i.e., long-run demand for money), much as a firm's inventories fluctuate around some level of desired inventory holdings. A firm or individual with money holdings exceeding the desired level of money balances will act to get rid of these excess balances by transacting with other agents in the economy. An excess aggregate supply of money can translate into inflationary pressure in much the same way that an excess demand for goods does; too much money chases too few goods. Hence a positive money gap, where the stock of money exceeds the aggregate long-run demand for money, is associated with periods of rising inflationary pressure, and a negative gap, where the stock of money is less than long-run demand for money, is associated with disinflationary pressures.

The adjusted-M1 VECM presented in this paper is an extension of work done by Hendry (1995), who estimated a unique long-run cointegrating vector between M1, output, prices, and a short-term interest rate. The vector can be thought of as a long-run money-demand function. Since money demanded does not have to be equal to money supplied at each point in time (though they must be equal in the steady state), the error-correction term of the VECM can be thought of as a money gap, which has been shown to have predictive power for inflation.⁶

2. DETAILS OF THE VECM

The model used in this paper is similar to Hendry's original model in that it estimates a unique and stable long-run cointegrating vector between quarterly data for nominal M1, real output, the consumer price index, and a short-term interest rate. This vector can be also considered to be a long-run money-

⁶ Armour et al. (1996) and Engert and Hendry (1998) found the VECM to be a good inflation-forecasting model at horizons of one to two years. As well, Fung and Kasumovich (1998) found that following an expansionary monetary policy shock, a positive money gap opens up, followed by an increase in prices.

demand function. (See the appendix for more details on the model.)

The Johansen–Juselius (1990) methodology was used to estimate the long-run cointegrating vector from a VECM of the form:

$$(1) \quad \Delta X_t = \Gamma(L) \Delta X_t + DZ_t + \alpha\beta[X_{t-1}]$$

where X_t is a vector of endogenous variables (i.e., money, output, prices, and interest rates), $\Gamma(L)$ is a matrix of parameters for a fourth-order lag process, Z_t is a vector of stationary exogenous variables including seasonal dummies, and D is the matrix of parameters associated with the exogenous variables. The α parameters measure the speed at which the variables in the system adjust to restore a long-run equilibrium, and the β vectors are estimates of the long-run cointegrating relationships between the variables in the model.

This system was found to have a unique stable long-run cointegrating relationship between money, inflation, output, and interest rates. Unitary price elasticity is imposed (i.e., prices move one for one with changes in money), and the long-run coefficient on output is around 0.5 while that on the interest rate is about -0.04 , both of which are consistent with previous work.⁷

However, the estimated short-run parameters of Hendry's original model (i.e., the parameters as well as the coefficients on the lagged endogenous variables) were unstable in that they varied greatly over the sample period. Consequently a number of exogenous variables were added to improve the estimates. One of the exogenous variables included is a measure of the output gap calculated using potential output from the Bank's Quarterly Projection Model (QPM), which measures potential using an extended multivariate filter (see Butler 1996 for details on this approach). Other exogenous variables added are the Can\$/US\$ spot exchange rate, the U.S. 90-day commercial paper rate, the U.S. inflation rate, the change in non-personal notice deposits post-1980, and a permanent shift dummy for the early 1980s. The 1980s shift variable is interpreted as a proxy for the financial innovations that occurred at chartered banks at that time.⁸ Many other variables, such as daily-interest account rates and dollar

⁷ The restriction of unitary price elasticity in an unrestricted regression was not rejected.

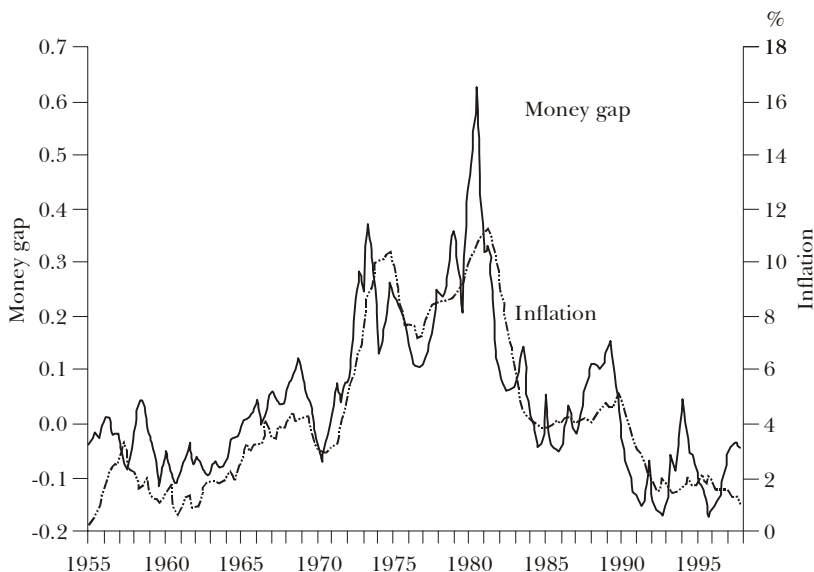
⁸ See Freedman (1983), Gomme (1998), and Aubry and Nott (2000) for discussions of some of these innovations.

values, the yield curve, and the volatility of long-term rates were also tried as proxy for these innovations; however, none of them successfully eliminated the need for the 1980s dummy variable.

Including non-personal notice deposits in the model as an exogenous variable was an attempt to internalize the shift between demand and notice deposits that has been occurring over the 1990s. Reserve requirements on demand and notice deposits were eliminated in the early 1990s, leading to some redistribution of funds on the part of agents (mainly business customers) out of notice deposits and into demand deposits. The redistribution has increased the growth rate of M1 in recent years; however, while the increase in M1 growth has been associated with some acceleration of real GDP growth, it has not spilled over into increased inflation to date. The shift between notice and demand deposits is not the only innovation to affect the M1 aggregate,⁹ and this is adjusted M1, rather than gross M1, is used in the model. The construction of adjusted M1 is discussed in section 3.

Some equilibrium conditions have been imposed on the model to force it to a particular steady state. In the steady state, potential

FIGURE 1. MONEY GAP VS. 8-QUARTER INFLATION RATE, 1955-95



⁹ See Bank of Canada (1998), Atta-Mensah and Nott (1999), and Aubry and Nott (2000) for discussions of the innovations affecting M1 in the 1990s.

output growth is assumed to be 2.3 per cent, inflation is 2 per cent, and money growth is 3.2 per cent, as implied by the long-run money-demand parameters and the assumptions on output and price growth. The steady-state overnight rate is about 4.9 per cent and is based on the historical relationship with U.S. interest rates.

As discussed in section 1, the difference between actual money supply and estimated long-run money demand is called the money gap. The money gap has moved very closely with actual inflation over the last 40 years (see Figure 1) and helps the model to predict inflation.

The main differences between the M1 VECM presented in this paper and Hendry's original are that the current model uses adjusted M1 (discussed in section 3) rather than gross M1 and the overnight interest rate rather than the 90-day commercial paper rate. The overnight rate has been the policy instrument in Canada since 1994, and there is evidence that the overnight rate provides a good way to measure monetary policy in Canada over a much longer period (see Armour, Engert, and Fung 1996). Moreover, because the overnight rate is highly correlated with the 90-day commercial paper rate (the correlation since 1956 is 0.98), changing the short-term interest rate used in the model had no significant effects on the estimated money-demand function or the model's forecasting performance.

3. DEALING WITH FINANCIAL INNOVATIONS IN NARROW MONEY

In Canada, changes in real M1 growth are correlated with changes in real GDP growth about two quarters in the future.¹⁰ M1 growth is also correlated with changes in prices about eight quarters in the future.¹¹ However, in the 1990s the relationship between money and other economic variables appears to have shifted, possibly in relation to the "restructuring" of the Canadian economy after the 1990–91 recession. This shift could also be related to the change in monetary policy to a regime of explicit inflation targeting. A last explanation could be that the many financial innovations in the 1990s appear to have changed the nature of deposit accounts.

¹⁰ See, for instance, Bank of Canada (1999, 29).

¹¹ As discussed in Hendry (1995) and Armour et al. (1996).

Given this last possibility, the definition of narrow money for use in the VECM was re-examined.¹² Narrow money is generally considered to be money used in transactions for goods and services. In Canada, narrow money is currently defined as M1, which comprises currency, personal chequing accounts, and current accounts. Over the period 1992 to 1994, reserve requirements on accounts were phased out, reducing the distinction between notice and demand accounts.¹³ Also, the improvement in electronic financial services in recent years and the increased popularity of debit cards, ATMs, and telephone/PC banking have led agents to economize on their cash balances and enabled them to more easily access non-M1 accounts for transactions purposes. These technological improvements seem to have increased the degree of substitutability between cash and demand or notice deposit accounts, and consequently a broader definition of transactions money might be more appropriate in an electronic world. As well, most of the products financial institutions currently offer have joint transactions and savings characteristics. Thus some proportion of these balances does not really belong in a transactions money measure and should be excluded. The problem is to come up with a reasonable way of approximating this proportion.

In Canada over the period 1980 to 1982, another series of financial innovations introduced instability into the parameters of the model's cointegrating vector. However, the 1980s innovations tended to simply move money from (M1) demand deposits to (M2) notice deposits. In order to deal with an environment of high interest rates and changing reserve requirements, banks offered customers incentives to move their accounts from ones that were costly for the banks to maintain (demand deposits) to ones that were more cost-effective for the banks (notice deposits). Banks introduced innovations such as daily-interest savings and daily-interest chequing accounts to motivate consumers to switch from non-interest-bearing demand accounts to interest-bearing

¹² Aubry and Nott (2000) examined the conceptual issues of what should be included in a measure of narrow money.

¹³ Reserve requirements were higher on demand deposits included in M1 than on notice deposits excluded from M1. As a consequence, beyond the essentially irrelevant withdrawal-notice requirement, the distinction between demand and notice accounts has become meaningless. So far, this innovation seems to have affected mainly business accounts. Banks have begun to pay more attractive rates of interest on current accounts, and businesses have shifted some of their funds into those accounts.

notice accounts. The shift in the 1990s has not only been related to a switch back from notice to demand accounts owing to the reduction and eventual removal of reserve requirements for demand accounts, but also to the advent of technological changes, as more types of accounts now have the characteristics of transactions money.

Adjusted M1 is a model-based measure of money that was constructed for this paper specifically to correct the VECM instability and estimate the size of the distortion in M1. This was done in two steps.

First, the money-forecasting equation from a gross-M1 VECM (estimated from 1956 to 1993) was used to forecast M1 growth from 1992Q1 to 1999Q1 using actual values for all other variables in the model. It yielded a time series we called “distortion-free” money. This series is an estimate of what M1 would have been had the data-generating process not changed in the 1990s.

Second, in order to relate the distortion-free money series to the observable money data, it was regressed on all the components of M1++(gross M1 plus all notice deposits). Because the coefficients were similar on some components that could reasonably be thought of as having the same sort of characteristics or users, these components were grouped together to reduce the number of parameters to estimate in order to improve efficiency, given the small sample size.

3.1 Calculating adjusted M1

Adjusted M1 is calculated as follows:

$$\text{adjusted M1} = 1.58 (\text{currency}) + 0.28 (\text{non-personal}) \\ \text{for } 92\text{Q1 to } 94\text{Q3}$$

$$\text{adjusted M1} = 1.19 (\text{currency}) + 0.22 (\text{non-personal}) \\ + 0.15 (\text{personal}) \text{ for } 94\text{Q4 to } 99\text{Q1},$$

where *non-personal* is the sum of current accounts and non-personal notice deposits, and *personal* is all personal notice deposits.¹⁴ Adjusted M1 differs from M1 in two respects:

1. Choice of components: Adjusted M1 includes notice accounts but not personal chequing accounts (PCAs) because the latter

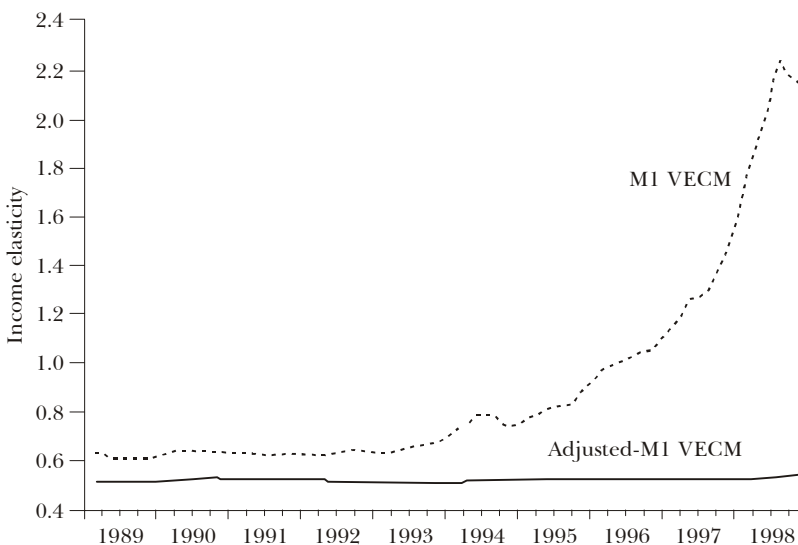
¹⁴ The sample was divided into two subperiods to reflect the fact that the parameter estimates after 1994Q3 are substantially different from those prior to it.

include investment dealer accounts (which today represent more than half of PCAs). The investment dealer accounts appear to be held predominantly to purchase financial assets such as mutual funds, stocks, and bonds, rather than to buy goods and services, and therefore should probably be classified within some broader aggregate that is defined as store-of-wealth money rather than in our measure of transactions money.

- Choice of weights: M1 uses fixed weights of 1 on each of its components, whereas the weights of adjusted M1 differ from 1 based on the estimation results. Adjusted M1 also permits the weights to change at discrete points in the sample.

Given the small size of the sample, as well as the extent to which the parameters have shifted over time, the weights reported here should be treated with caution. This issue will be discussed in more depth later.

FIGURE 2. INCOME ELASTICITY FROM ROLLING REGRESSION, 1989-98

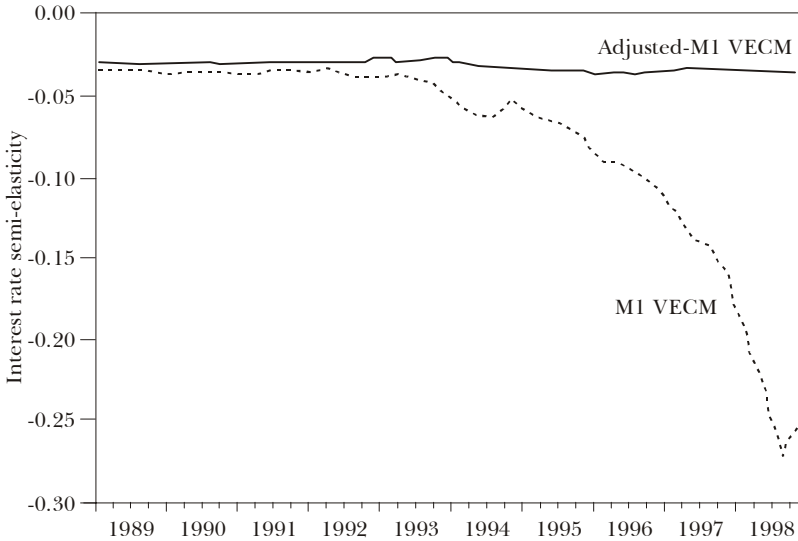


The primary purpose of his exercise was to correct the VECM instability, and Figures 2 and 3 clearly show that the adjusted-M1 VECM has more stable parameters, by design, than the original M1 VECM.

Figure 4 shows that the growth rate of adjusted M1 has been much weaker than that of gross M1 over much of the 1990s.

However, by design, adjusted M1 is more consistent with the actual movements of prices, output, and interest rates.

FIGURE 3. INTEREST RATE SEMI-ELASTICITY FROM ROLLING REGRESSION, 1989-98



In spite of this lower growth rate the inflation forecasts of the adjusted-M1 VECM are similar to those of Hendry's original M1 VECM (see Figure 5). This is likely because the M1 VECM version had shifted parameters to offset the high M1 growth and still obtained moderate inflation forecasts. The adjusted-M1 VECM uses lower money growth but more-stable parameters to obtain a reasonably similar forecast through most of the sample, with a root-mean-squared error (RMSE) of 0.91 compared to an RMSE of 0.94 for the original M1 VECM.

3.2 Why choose this approach?

The instability in the long-run parameters in Hendry's model could have been corrected with dummy variables, but this would not have provided any information about the sources of the instability.¹⁵ The approach taken in our paper is also more flexible

¹⁵ One problem with the dummy-variable approach is that it would treat the distortion in all components as equal. Our approach allows for the possibility that the amount of distortion in the components is different.

FIGURE 4. YEAR-OVER-YEAR GROWTH RATE OF GROSS M1 VS. ADJUSTED M1, 1990-99

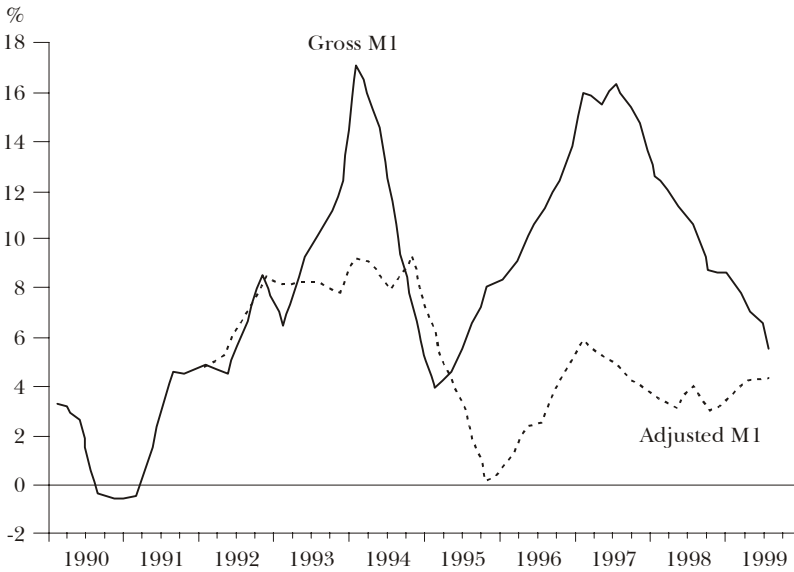
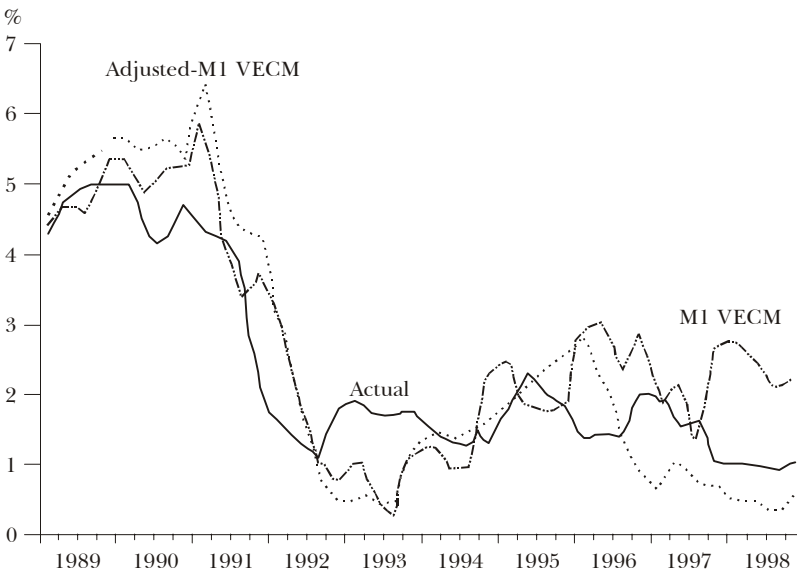


FIGURE 5. FORECAST AND ACTUAL 4-QUARTERS-AHEAD 4-QUARTER INFLATION RATE, 1989-98



than the dummy-variable approach in that it is not necessary to impose a priori when the distortion should end. As Figure 4 shows, the distortion to M1 (the difference between the growth rate of gross M1 and adjusted M1) has been about 6 to 7 per cent per year over the last three years. In previous work done at the Bank by Aubry and Nott (2000), distortions related to specific institutional events were examined (reclassification of current accounts at some banks from notice to demand, the effects of dealer accounts in PCAs, and the introduction of the \$2 coin), and the estimate of the size of the distortion was found to be only about 2 per cent per year.¹⁶

It can probably be assumed that these numbers provide upper- and lower-bound estimates of the size of the distortion. Since Aubry and Nott's work examined only three institutional events, it seems reasonable to conclude that their estimation of the size of distortion would be considered as a lower bound. Adjusted M1 can be considered as an upper bound because all possible sources of instability are attributed to distortions in M1.

Hence it can be argued that our approach might provide too much of a correction, as the methodology may also be attributing structural changes in the economic relationship between M1 and output and inflation to distortions in M1 related to financial innovations.

The alternative measures of money M1+ (M1+ is M1 plus chequable notice deposits) and M1++ were also tried as the money variable in VECMs, but a stable money-demand function could not be estimated using either definition. This result probably reflects the fact that neither M1+ nor M1++ adequately measures transactions money over history. To address this, "extended M1+" and "extended M1++" series were constructed using the level of M1 up to 1990 and then using the growth rate of M1+ (or M1++) to calculate the level of "extended M1+" (or "extended M1++") post-1990. However, even the extended definitions did not lead to a stable money-demand function, probably because the added components are not completely transactions-oriented, but also include some money held as a liquid store of value.

Since the weights on the components of adjusted M1 have changed because of financial innovations that occurred over time and not within a single quarter, assuming fixed weights on the

¹⁶ See Bank of Canada (1998), Atta-Mensah and Nott (1999), and Aubry and Nott (2000).

components could be problematic. A time-varying parameter model with Kalman filtering may seem appropriate, but estimating such a model has proven difficult given the small data sample available. The results are quite sensitive to the initial assumptions, and we do not have a ready technique to restrict the weights to be positive in this environment. As a compromise, the single break in the weights is allowed.

To sum up, adjusted M1 can be thought of as the money growth that should have been observed over the last few years if the relationship between money, output, interest rates, and prices had remained unchanged from the past. Of the three possible reasons for the observed instability in money's relationship with other economic variables in the 1990s, the first reason has to do with institutional changes and difficulties with our current data-reporting system that imply we may no longer be measuring the appropriate data. The second reason has to do with the changing nature of money demand in an electronic world. Finally, the instability may reflect the economy's structural changes that are not specifically related to financial innovations. The M1 distortion estimated using the VECM incorporates all of these elements, so even though adjusted M1 can be related to a measure of transactions money, one should be careful about making inferences based on this aggregate. In fact, we consider adjusted M1 to be an interim step on the path to finding a new narrow aggregate. However, given that some economic interpretation can be put on the components of adjusted M1 and its relation to distortion-free M1, adjusted M1 is, by design, the best aggregate now available for use in the VECM.

4. IDENTIFYING POLICY SHOCKS

Another change from the original VECM Hendry described is that policy shocks have now been identified in our model as the structural shocks to the interest rate equation as derived from a Choleski decomposition.¹⁷ That is, policy shocks are identified as unanticipated innovations to the overnight interest rate.

Previously the models were generating a "price puzzle," in that a policy-induced increase in the nominal interest rate was accom-

¹⁷ The ordering of the variables in the decomposition is: U.S. interest rate, U.S. prices, overnight rate, adjusted M1, non-personal chequable accounts, output, prices, and the exchange rate.

panied by a rise in inflation. The puzzle arose because an increase in the interest rate caused a decline in the estimated long-run demand for money, and the decreased demand in turn created a positive money gap that led to a persistent inflation bubble. One possible explanation for this outcome is that changes in the interest rate have been more closely correlated over history with changes in expected inflation rather than with monetary policy shocks, and the model has not yet properly identified all of the movements in expected inflation. However, it seems reasonable that long-run money demand should be based on a smoother measure of the opportunity cost of money. It is unlikely that the long-run demand for money will move substantially with every transitory change in the interest rate. Consequently an “unanticipated policy-free” interest rate series was computed by removing the model’s estimated structural policy shocks from the overnight rate, basing its removal on the argument that agents would not immediately adjust their long-run money demand to the latest interest rate policy shock. In a world with limited information regarding policy shocks, agents would respond slowly to policy innovations as they learned about the nature of the latest change in interest rates. It is this unanticipated policy-free rate that enters into the calculation of the long-run money-demand parameters and the money gap.

Using our unanticipated policy-free interest rate implies that a policy tightening will leave money demand unchanged in the quarter of the shock, thereby removing the price puzzle from the model. As well, in the first few quarters following the monetary policy tightening, the interest rate increase slows money growth by more than money demand, causing an excess demand for money, and that in turn causes inflation to fall.

The Bank is also continuing to investigate how best to measure the output and interest rate variables used in calculating money demand. Empirically the money gap that is calculated from current values of output and interest rates is the best predictor of inflation. Theoretically, however, long-run money demand calculated from long-run measures of output and interest rates—for instance, potential output and equilibrium interest rates—makes more sense (see Gerlach and Svensson 1999). We hope to examine these issues in future work.

With policy shocks as they are now identified in our model, it is possible to back out the shocks to interest rates that will move inflation to the midpoint of the Bank’s inflation-control target range over a given horizon.

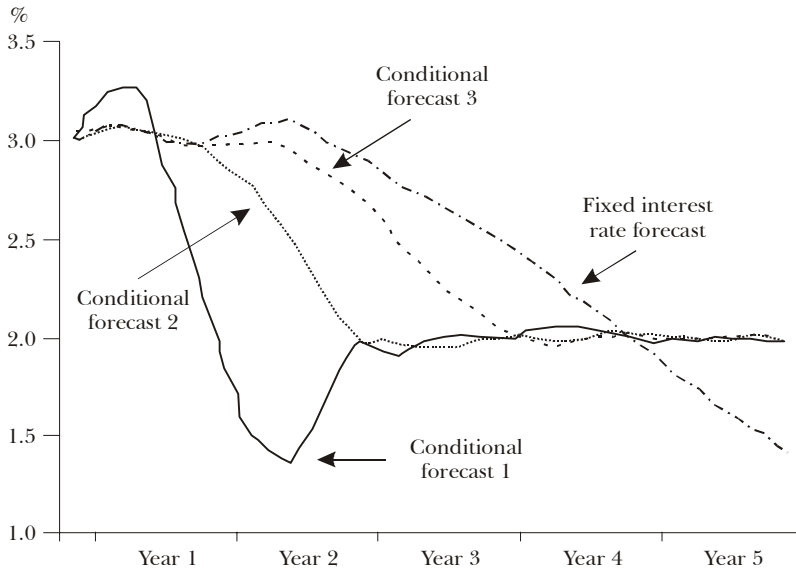
5. USING THE ADJUSTED-M1 VECM FOR FORECASTING

As an example of how the adjusted-M1 VECM could be a useful model for policy-makers, assume a set of initial conditions with 3 per cent inflation, 8 per cent money growth, 3.5 per cent output growth, and 6 per cent interest rates. These conditions were also chosen so that when the interest rate was held fixed at 6 per cent, the inflation rate would be stable around 3 per cent for the first two years out of sample.

Four separate forecasts could be provided with this model given these initial conditions. The first is a fixed interest rate forecast.¹⁸ The other three are conditional forecasts in which we estimated the series of interest rate shocks necessary to move the 4-quarter inflation rate to the midpoint of the inflation-control target range over 4, 8, or 12 quarters, and maintain inflation at 2 per cent in the fourth quarter of each year thereafter.

Figure 6 illustrates these forecasts. In the base case, in which the overnight rate is held fixed at 6 per cent (which is above the model's steady-state value for the overnight rate), inflation will eventually

FIGURE 6. INFLATION FORECASTS



¹⁸ We did not construct an explicit “inflation-forecast indicator” as Svensson (1999) did by using the deviation of the conditional unchanged-interest-rate inflation forecast from the inflation target, though we have done so implicitly.

decline to a point below 2 per cent in year 4. Because the overnight rate is fixed above its steady-state value, the inflation rate will converge to some new lower steady state. The line representing conditional forecast 1 shows the forecast in which the overnight rate is increased to move inflation back to 2 per cent in only 4 quarters, and the line representing conditional forecast 2 shows the forecast in which the overnight rate is increased to return inflation to 2 per cent in 8 quarters. Conditional forecast 3 moves the overnight rate to bring inflation back to 2 per cent in 12 quarters.

Figure 7 shows the money-growth forecasts associated with the inflation forecasts shown in Figure 6. In the fixed interest rate forecast, money growth is initially higher than in the forecasts in which inflation is lowered to 2 per cent more quickly. Money growth subsequently falls in then base case because the overnight interest rate is held fixed at a contractionary level above steady state.

FIGURE 7. MONEY-GROWTH FORECASTS

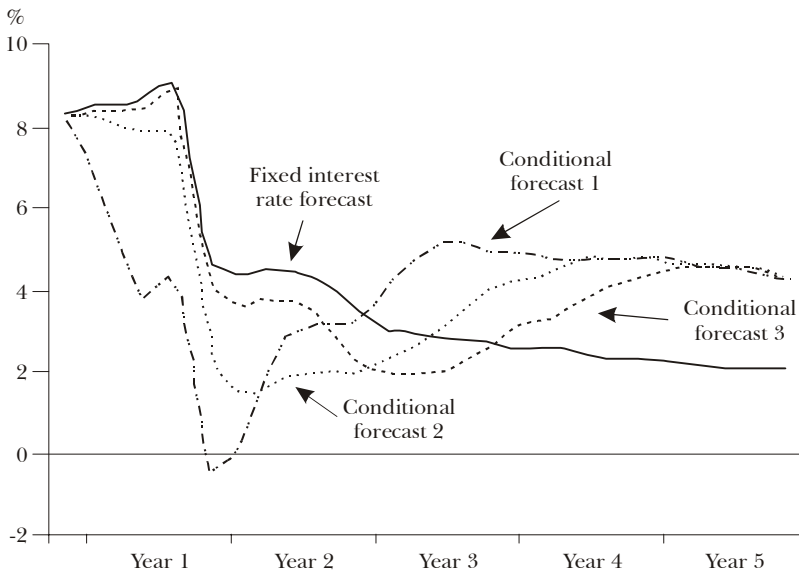
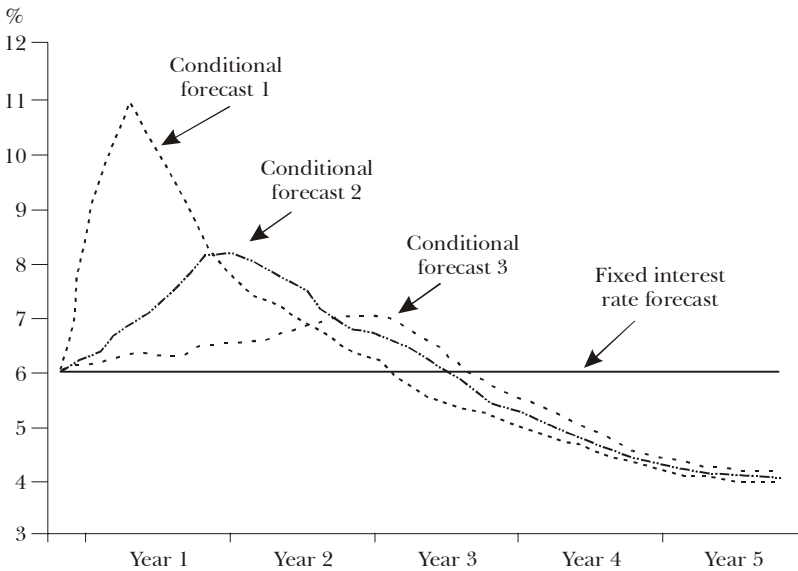


Figure 8 plots the path of the overnight rate for the same set of forecasts. Moving inflation to 2 per cent in this example requires tightening policy through an increase in the overnight rate. However, by year 3 the policy tightening is completely reversed to keep inflation from falling below 2 per cent. The closer the target horizon (4 quarters in conditional forecast 1 but 12 quarters in conditional forecast 3), the more the interest rate must be

increased to achieve the target. Similarly, money growth is more volatile for closer target horizons. Choosing the appropriate policy requires considering both the target horizon and the required interest rate or money-growth movements.

Another way of conveying information about the state of the world and possible future outcomes is to provide confidence intervals or probabilities of these outcomes. For instance, a “reference range” or “monitoring range” can be constructed for money growth that is consistent with achieving 2 per cent inflation over a given horizon. This reference range would have some associated probability of inflation remaining within the target range or, alternatively, some tighter bands. As actual money growth becomes known, deviations of growth from the range should then give early warning of any impending deviations of inflation from the target range. One advantage of using a money-growth reference

FIGURE 8. OVERNIGHT INTEREST RATE FORECASTS



range as an information variable, in addition to the inflation forecasts themselves, is that it helps to gauge the change in inflationary pressures in the months since the reference range was derived.¹⁹ Gerlach and Svensson (1999) found that the information

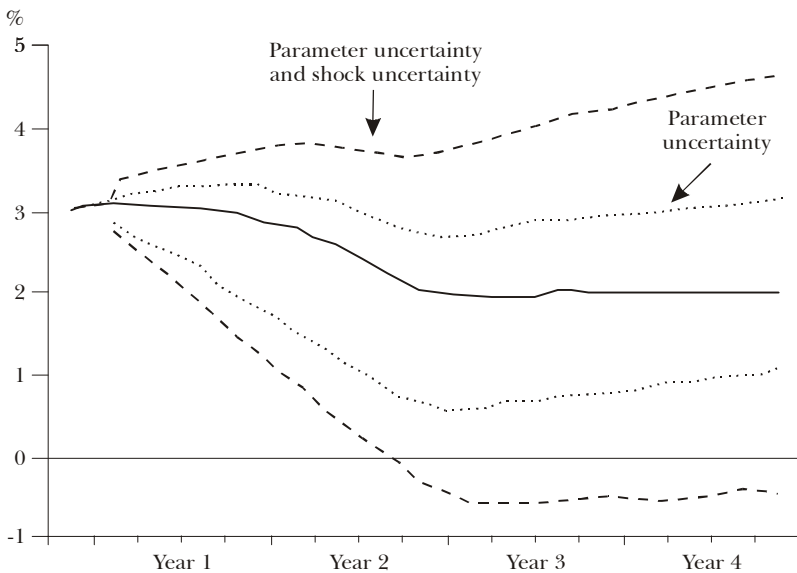
¹⁹ The main distinction between an intermediate target and an information variable lies in the degree of correlation between the intermediate target/in-

from a money-growth indicator is subsumed by a money gap. Our findings generally support this claim. However, an attraction of money growth rate indicators and reference ranges is that they are perhaps easier to explain than a money gap and thus may help a central bank explain its reasons for a policy action.

The European Central Bank (ECB) uses the 3-month growth rate of the 12-month moving average of M3 growth as one of the pillars of its two-pillar strategy of achieving and maintaining price stability.²⁰ Although the ECB uses a broad aggregate to allow for the possibility of shifts such those due to financial innovations, we have explicitly accounted for the shifts that have occurred in Canada in our narrow aggregate.

Alternatively, the probabilities of inflation remaining within the

FIGURE 9. CONDITIONAL INFLATION FORECAST 2 WITH ERROR BANDS



formation variable and the goal variable (GV). An intermediate target (IT) is assumed to have a tight correlation with the GV, whereas the correlation of an information variable with the GV is much looser. A related concern is the degree of controllability between the IT and the GV. If policy-makers are unable to control the IT, it seems unlikely that they would be able to control the GV.

²⁰ The ECB's stability-oriented monetary policy is based on: (i) a prominent role for money and (ii) a broadly based assessment, using financial and other indicators, of both the outlook for price developments and the risks to price stability.

FIGURE 10. DISTRIBUTION OF THE 4-QUARTER CONDITIONAL INFLATION RATE FORECASTS BASED ON PARAMETER UNCERTAINTY FOR CONDITIONAL FORECAST 2

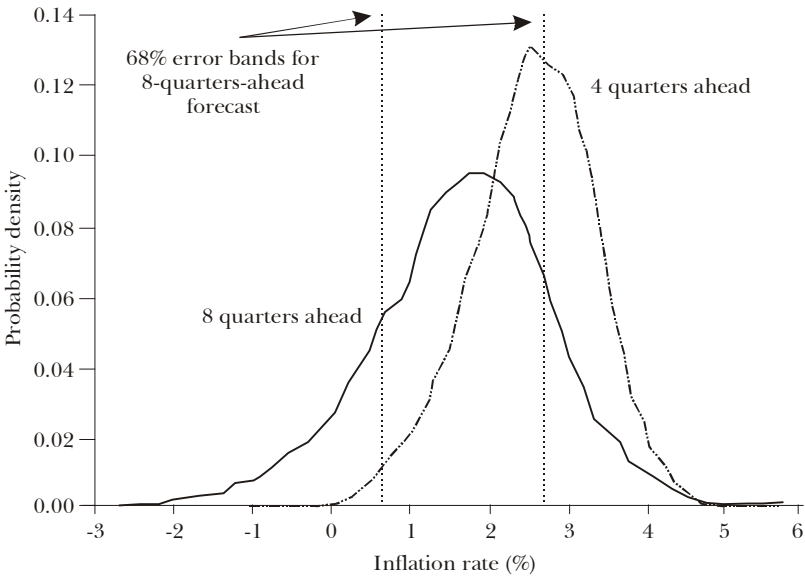
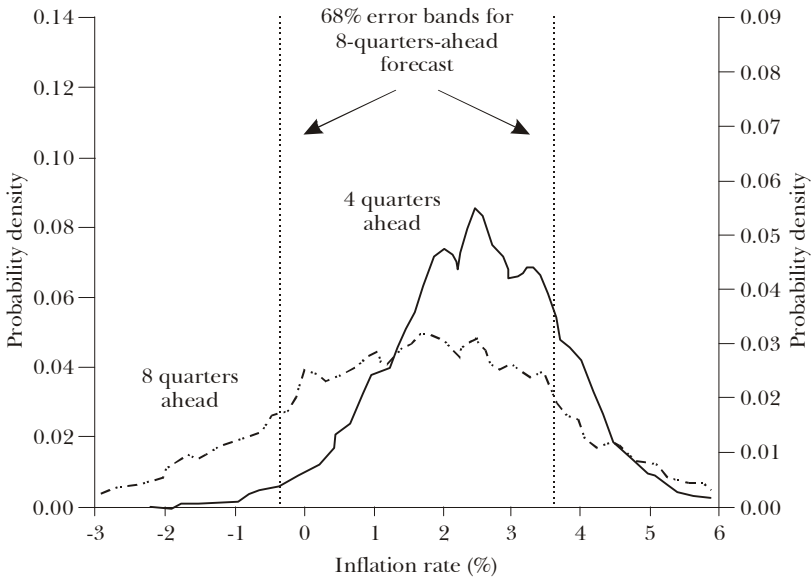


FIGURE 11. DISTRIBUTION OF THE 4-QUARTER CONDITIONAL INFLATION RATE FORECASTS BASED ON PARAMETER UNCERTAINTY FOR CONDITIONAL FORECAST 2



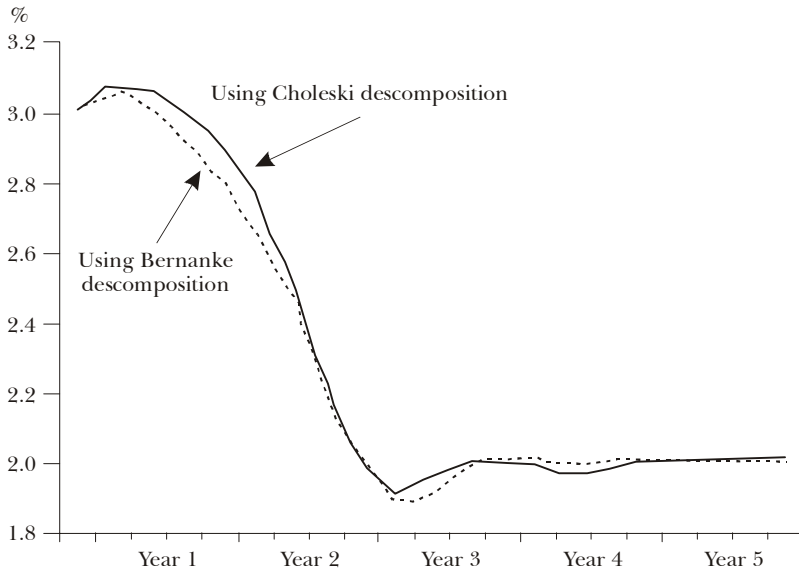
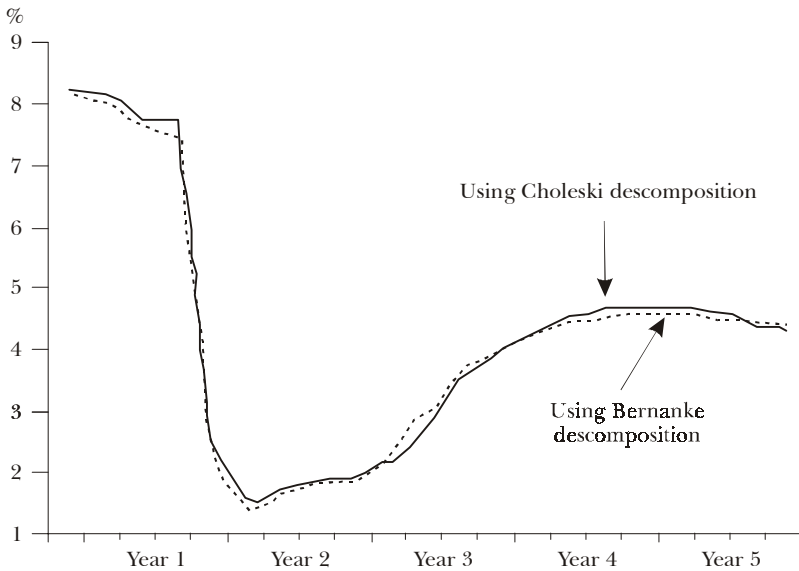
target range can be calculated without using a reference range for money growth. Figure 9 shows the conditional inflation forecast and two possible 68 per cent confidence intervals (about 1 standard deviation) when the interest rate is set as in conditional forecast 2 to achieve 2 per cent inflation in eight quarters. The confidence intervals were calculated from a bias-corrected bootstrap technique proposed by Kilian (1998) and discussed in Sims and Zha (1995).²¹ The distribution of inflation forecasts shown by the inner bands is based on uncertainty about the model's parameters. The distribution shown by the outer bands is based on uncertainty about both the model's parameters and possible future exogenous shocks.

The complete distributions for the 4-quarter inflation forecast four and eight quarters ahead are plotted in Figures 10 and 11. The vertical lines represent the 68 per cent error bands for the 8-quarters-ahead forecast as shown at the end of year 2 in Figure 9. From distributions such as these we can calculate various probabilities that may interest policy-makers. The probabilities that inflation will be within the 1 to 3 per cent official inflation-control target range or within a tighter range of 1.5 per cent to 2.5 per cent are given in Table 1. Similar distribution functions can be computed for each of the forecast variables. For instance, monitoring ranges for the money-growth rate or the interest rate can be computed that are consistent with achieving the target inflation rate.

TABLE 1. INFLATION PROBABILITIES FROM CONDITIONAL FORECAST 2 WITH PARAMETER AND FUTURE SHOCK UNCERTAINTY

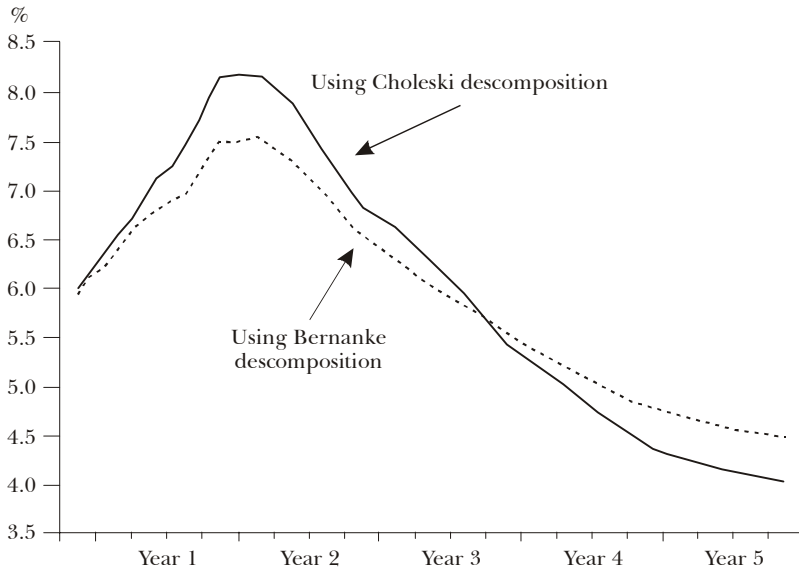
<i>Date</i>	<i>Probability of inflation between 1 and 3 per cent</i>	<i>Probability of inflation between 1.5 and 2.5 per cent</i>
Year 1Q1	50%	8%
Year 1Q2	55%	24%
Year 1Q3	58%	30%
Year 1Q4	52%	27%
Year 2Q4	37%	19%
Year 3Q4	32%	17%

²¹ This technique requires one bootstrap to first obtain an estimate of the bias in the model's coefficients. Bias-corrected coefficients are calculated and used for a second bootstrap simulation to generate the error bands. We computed 5,000 bootstrap samples at each stage

FIGURE 12. INFLATION FORECASTS UNDER ALTERNATIVE DESCOMPOSITIONS**FIGURE 13. MONEY-GROWTH FORECASTS UNDER ALTERNATIVE DESCOMPOSITIONS**

In summary, our model can generate the point forecasts and their associated probabilities for any number of starting-point assumptions and/or policy scenarios, providing significant information about possible outcomes and desirable policy scenarios.

FIGURE 14. OVERNIGHT RATE FORECASTS UNDER ALTERNATIVE DECOMPOSITIONS



6. FUTURE WORK

Decompositions other than the Choleski could have been used to identify monetary policy shocks. The estimate of the response of money growth to an interest rate shock has varied over time, and thus it may be appropriate to include an overidentifying restriction in the decomposition of shocks (cf. Bernanke 1986 or Sims 1986). Such a restriction would change the contemporaneous response of money growth to a variation in interest rates from the average response estimated over history with the Choleski decomposition. When one examines recent data, money's response to an interest rate shock appears to have increased. (The greater contemporaneous response of money growth to movements in interest rates might be explained by a change in how rapidly banks respond to policy-induced shocks to interest rates to alter the amount of liquidity they provide to agents in the economy.) The

average historical change in money growth for a 100-basis-point change in the overnight rate has been about 0.6 per cent. Using a Bernanke decomposition in another version of the model used below, this response has been increased to 1 per cent.²²

For the conditional forecast in which policy responds to push inflation to 2 per cent in eight quarters (conditional forecast 2), the inflation and money-growth rates are essentially the same using either the Bernanke or Choleski decomposition. However, the size of the interest rate decrease needed is smaller in the Bernanke case than in the Choleski case. Money growth does relatively more to move inflation towards its target, leaving less work to be done via the interest rate channel.

Our future research will also examine more-sophisticated alternative monetary policy identification techniques, such as those employed for Canada by Fung and Kasumovich (1998) and Fung and Yuan (2000). Varying this aspect of the model will perform a robustness check of its predictions. The Bank is also investigating definitions of transactions money as well as the identification of desired money supply for financial institutions.

CONCLUSION

The M1 VECM has predicted inflation reasonably well over history and still appears to be a good forecasting model, especially in light of modifications like using adjusted M1, identifying policy shocks, and deriving probabilities for inflation outcomes.

Forecasts from the VECM can augment the information coming from other models used at the Bank. They can provide alternative views of what could happen in the economy and give some information about the “balance of risks.” Multiple models could be especially helpful to policy-makers during times of extreme uncertainty and/or structural shifts, but even in relatively stable times, advice from different models helps to balance risks about the outlook for the future.²³

²² The 1 per cent estimate of the contemporaneous response of money to a 100-basis-point change in the overnight rate is within 2 standard deviation of the estimate of the money-response parameter.

²³ See, for example, Engert and Selody (1998) and Berk (1997). Different models are used to entertain a possible shock, such as a change in policy or a real-side shock, and evaluate its impact on the forecasts of relevant variables.

Different models that yield similar predictions would tend to lessen policy-makers' uncertainty regarding possible outcomes, *ceteris paribus*, making policy judgments somewhat easier. However, relying on multiple models has the greatest value when a model relying on one set of variables and assumptions forecasts one outcome and another model with a different set of variables and assumptions forecasts another—perhaps quite different—outcome. In any event, advice based on multiple models should give policy-makers more information and hence allow them to achieve their desired goals. As Alan Blinder (1998, 12) advises, “Use a wide variety of models and don’t ever trust any one of them too much.”

Appendix

DETAILS OF THE ADJUSTED-M1 VECM

Step 1: Estimating long-run money demand and the money gap

The Johansen-Juselius methodology is used to test for the existence of a unique long-run cointegrating relationship between money, inflation, output, and interest rates (non-seasonally adjusted data). The model is an error-correction model because deviations of money demanded from money supplied (the money gap) are assumed to be corrected in the long run. The model has the form

$$(A1) \quad \Delta X_t = \Gamma(L) \Delta X_t + DZ_t + \alpha\beta' [X_{t-1}, D80a_{t-1}],$$

where

$$X_t = [MI_t, CPI_t, Y_t, RONf_t]$$

$RONf_t$ = level of “policy-free” overnight interest

$$\text{rate} = RON_t - \varepsilon_t$$

ε_t is the residual from the interest rate equation (A8)

MI_t = log level of adjusted M1

Y_t = log level of real output

CPI_t = log level of the consumer price index

Z_t = [constant, 3 seasonal dummies, output gap_{t-1}, $\Delta \log(\text{exchange rate})$ from t to $t-3$, $\Delta USCP90_t$ rate, $D80b^* \Delta NPN_t$, $D80a_t$]

Such an approach may also help in assessing the uncertainty associated with particular shocks.

output gap_{*t-1*} = Y_t – Bank of Canada's estimate of potential output from QPM

$USCP90$ = U.S. 90-day commercial paper rate

$D80b = 0$ for 1979Q4 and before, and 1 thereafter

NPN_t = non-personal notice deposits

$D80a_t = 0$ for 1979Q4 and before, and 1 for 1983Q1 and after. Increases linearly from 0 to 1 from 1980Q1 to 1982Q4.

$\Gamma(L)$ = matrix of parameters for a fourth-order lag process

Equation (A1) is estimated from 1956Q1 to 1998Q4.

The money gap is calculated as

$$(A2) \quad mgap_t = c + M1_t - CPI_t - \beta_{yt}Y_t + \beta_{rt}RONf_t + \beta_{d81t}D80a_t$$

where

c = long-run constant to ensure the gap converges to 0 in steady state

$\beta_{yt}, \beta_{rt}, \beta_{d81t}$ = Johansen estimates of the long-run parameters

Some additional variables need to be calculated before step 3, the fore-casting step.

Step 2: The interest rate gap

The interest rate gap, $RGAP_t$, is estimated from the auxiliary equation

$$(A3) \quad R_t = k + aUSR_t$$

where

$R_t = RON_t$, - expected inflation_{*t*}

$USR_t = USCP90_t$, - expected U.S. inflation_{*t*}

Expected, $E[inflation_t]$ = actual inflation from $t-1$ to t

Expected U.S. inflation_{*t*} = actual U.S. inflation from $t-1$ to t

Therefore the real interest rate gap is $R_t - (k + aUSR_t)$. To obtain a nominal interest rate gap, an expected-inflation gap is added. The resulting nominal interest rate gap is

$$(A4) \quad RGAP_t = R_t - (k + aUSR_t) + E[inflation_t] - inflation_{ss}$$

where expected inflation is defined as above, and steady-state inflation is assumed to be the average inflation rate for the previous 10 years. In 1993Q1 the steady-state inflation rate shifts to 2 per cent and stays at that level.

Step 3: The forecasting model*Equation 1: M1*

$$(A5) \quad \Delta M1_t = \Gamma_1(L) \begin{bmatrix} \Delta M1_t \\ \Delta CPI_t \\ \Delta Y_t \\ \Delta RON_t \end{bmatrix} + D_1 Z_t + \alpha_1 MGAP_{t-1}$$

where

$Z_t = [\text{constant, output } gap_{t-1}, \Delta \log(\text{exchange rate}) \text{ from } t \text{ to } t-3, \Delta USCP90_t \text{ rate, } D80b * \Delta NPN_t, MONPOL_{t-1}]$

$MONPOL_{t-1} = 0$ for 1987Q4 and before, the 4-quarter inflation rate less target inflation thereafter. Target inflation is 3 per cent from 1988Q1 to 1992Q4, then declines to 2 per cent in 1995Q4 and stays at that level.

$MGAP_{t-1}$ = the money gap derived above in step 1

Equation 2: Price

$$(A6) \quad \Delta API_t = \Gamma_2(L) \begin{bmatrix} \Delta M1_t \\ \Delta CPI_t \\ \Delta Y_t \\ \Delta RON_t \end{bmatrix} + D_1 Z_t + \alpha_1 MGAP_{t-1}$$

where

$Z_t = [\text{constant, output } gap_{t-1}, \Delta \log(\text{exchange rate}) \text{ from } t \text{ to } t-3, \Delta USCP90_t \text{ rate, } D80b * \Delta NPN_t, D80a, DPOLICY]$

$DPOLICY = 0$ for 1992Q4 and before, increases to 1 in 1999Q4 and after

$MGAP_{t-1}$ = the money gap derived in step 1

The $DPOLICY$ shift dummy is introduced as a permanent shift dummy in this price equation to represent a shift to a new lower steady-state inflation rate. The equation is restricted in such a manner that it yields a steady-state inflation rate of 2 per cent.

Equation 3: Output

$$(A7) \quad \Delta Y_t = \Gamma_3(L) \begin{bmatrix} \Delta M1_t - \Delta CPI_t \\ \Delta Y_t \\ spread_t \end{bmatrix} + D_1 Z_t + \alpha_1 MGAP_{t-1}$$

where

$spread_t$ = overnight rate – 10-year-and-over bond rate from QPM
 Z_t = [constant, output gap_{t-1} , $\Delta USCP90_t$ rate, $D80b*\Delta NPN_t$, $D91$,
 $D89$]

$D91$ = 0 for 1990Q4 and before and 1 thereafter

$D89$ = 0 prior to 1989Q1, 1 between 1989Q1 and 1996Q2, and
 0 thereafter

The equation was restricted so that the steady-state output growth rate is 2.3 per cent and so that the coefficients on prices have the opposite sign but same magnitude as those on money (real money growth, rather than nominal money growth is used in the equation).

Equation 4: The overnight rate

$$(A8) \quad \Delta RON_t = \Gamma_4(L)[\Delta M1_t \Delta CPI_t \Delta Y_t \Delta RON_t] + D_2 Z_t + \alpha_2 MGAP_{t-1} + \gamma_1 RGAP_{t-1} + \gamma_2 UIP_{t-1}$$

where

Z_t = [constant, output gap_{t-1} , $\Delta \log(\text{exchange rate})$ at t , $\Delta USCP90_t$,
 rate from t to $t - 3$, $D80b*\Delta NPN_t$, $MONPOL_{t-1}$]

$RGAP_{t-1}$ = the interest rate gap derived above in step 2

UIP_{t-1} = deviation from uncovered interest rate parity when
 UIP is defined as

$$(A9) \quad UIP_t = RON_t (usc90_t + 400(lforex_{t+1} + lforex_t)) + k + (a - 1) USR_t$$

where a and k are from equation (A4) above and

$lforex$ = log level of Can\$/US\$ exchange rate.

Equation 5: Relative purchasing power parity

$$(A10) \quad RPPP_t = \Gamma_3(L)[\Delta M1_t \Delta Y_t \Delta RON_t RPPP_t] + D_2 Z_t + \gamma_2 RGAP_{t-1}$$

where

$RPPP_t = \Delta SPOT - \Delta CPI + \Delta USCPI$

Z_t = [constant, output gap_{t-1} , $\Delta USCP90_t$ rate from t to $t - 2$,
 $D60Q1$, $D73*RPPP_{t-1}$, $\Delta \log com$ from t to $t - 2$]

$D60(Q1)$ = one-period dummy with a value of 1 in 1960Q1

$D73$ = a permanent shift dummy with a value of 1 from
 1973Q1 and 0 before

$\log com$ = log level of commodity prices

$SPOT$ = log level of spot Can\$/US\$ exchange rate

Equation 6: The change in non-personal notice deposits

An AR(4) with constant shift dummies $D80a$, $D87Q3$, where $D87Q3 = 1$ from 1987Q3 and 0 before.

Equation 7: The U.S. inflation rate

An unrestricted AR(4) on the quarter-over-quarter U.S. inflation rate.

Equation 8: The U.S. 90-day real rate

An AR(2) on the U.S. 90-day real rate with constant shift dummies for 1973Q1 to 1979Q4 and 1981Q1 to 1986Q1.0

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Patricia Correa

Public debt, public debt markets and monetary policy in Colombia

I. INTRODUCTION AND MACROECONOMIC OVERVIEW

The purpose of this paper is to examine the main macro- and micro-interrelationships between public debt policy and monetary policy in Colombia during 1995-1999, from the perspective of a central banker. Emphasis will be given to the financial developments of the last two years, a period in which Colombia's capital markets have experienced significant upheaval.

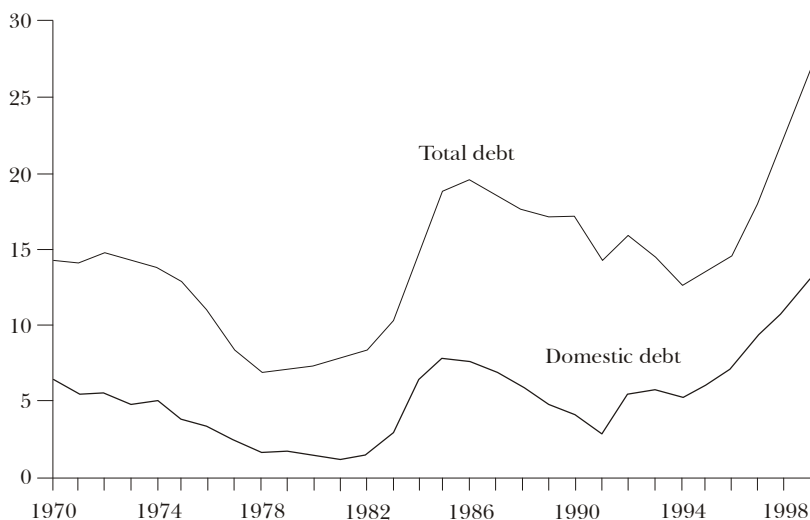
Over the last decade, the public sector, as well as the private sector, have accumulated a significant stock of debt (both foreign and domestic). Between 1990 and 1999, the central government

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debt/GDP ratio grew 57.9%, and between 1994 and 1999, it grew 212% (Graph 1). In this last period, as the result of an explicit strategy of the Ministry of Finance to develop a domestic public debt market and reduce dependency on foreign markets, the stock of domestic central government debt grew faster, showing an increase of 257% as proportion of GDP (foreign debt grew 125%). Though government debt in Colombia is still relatively low compared to that of many industrialized and developing economies (27 % of GDP in the case of central government and around 35% of GDP for the total public sector), there is a consensus that further accumulation of fiscal deficits is no longer sustainable.

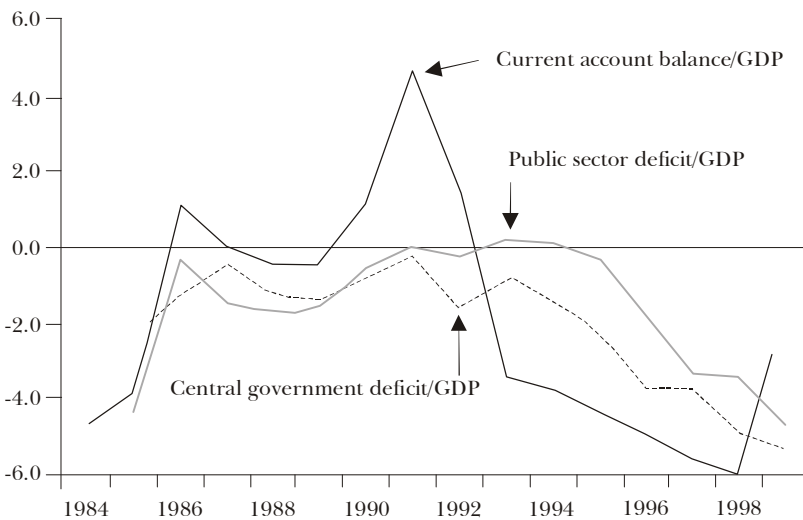
This debt accumulation posed serious policy dilemmas to monetary and exchange authorities in the last decade. Given the increase in capital inflows, in domestic demand and in asset prices that took place until 1995, macroeconomic adjustment and inflation reduction were hard to achieve and almost all the burden of adjustment fell upon monetary policy. Meanwhile, the fiscal deficit, together with the external deficit, continued to grow (Graphs 2 and 3). In the midst of a severe domestic political crisis that had international implications (Colombia was “decertified” by the US for being considered as a country that did not fully cooperate in the fight against drugs), the declining trend in domestic savings continued to take place during 1996-97, in great part due to the

GRAPH 1. CENTRAL GOVERNMENT DEBT, 1970-99 (% of GDP)



public sector; in this period, economic growth started to slow down and asset quality started to deteriorate in the financial sector. Before the emergence of the Asian crisis, monetary policy was loosened somewhat (judging by the behaviour of interest rates), while the markets started to perceive that the exchange rate policy was inconsistent with the fiscal policy, all of which created a highly uncertain and volatile financial environment. At the end of 1997, the nominal exchange rate hit the weak side of the crawling band which defined the exchange rate control system.

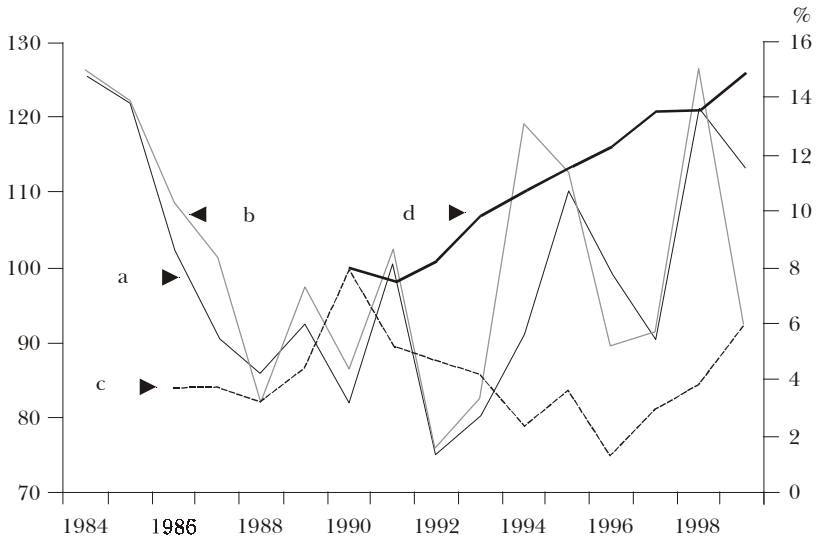
GRAPH 2. CURRENT ACCOUNT AND FISCAL BALANCES, 1984-99 (% of GDP)



During these years, given the Constitutional mandate of the central bank to control price increases, the Colombian Central Bank (CB) did not fall into the temptation of wiping out public debt through inflation. In fact, inflation did fall 14 points between 1990 and 1997. But it did so in a very stubborn and gradual fashion (Graphs 4 and 5), due to the ineffectiveness of the macroeconomic policy mix to halt debt accumulation and growing imbalances. By 1997 Colombia's inflation record had long ceased to be impressive, as the average level of inflation between those two years was 23.5%, substantially higher than in most countries in Latin America and the emerging world.

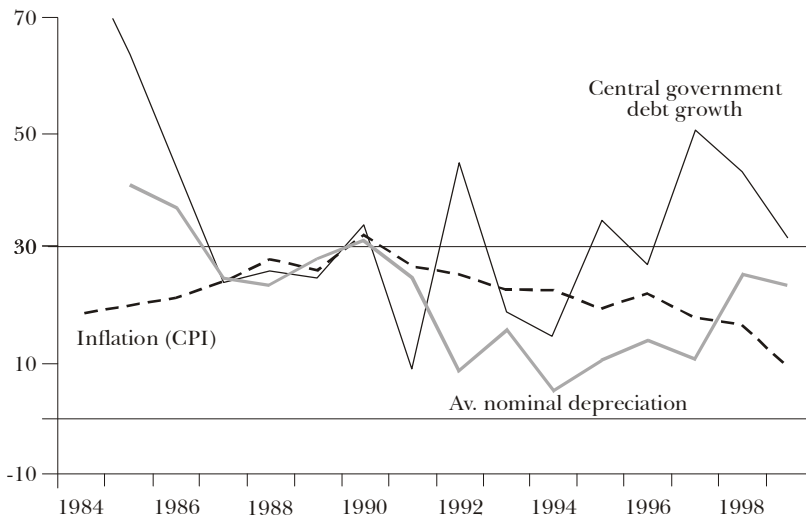
Then came what some have baptized the two "annus horribilus": 1998 and 1999. Colombia, as many other countries in the region, was heavily affected by spillovers from the global market

GRAPH 3. REAL INTEREST RATES, REAL EXCHANGE RATE AND REAL WAGES, 1984-99



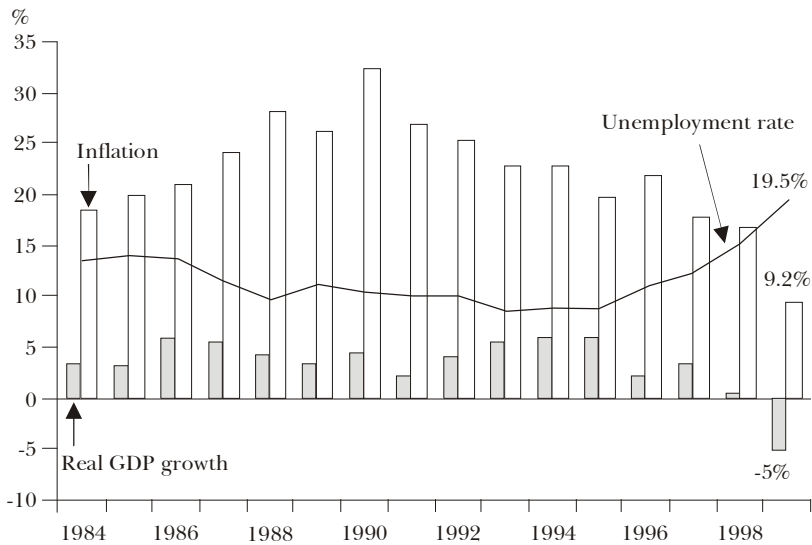
a) Real interest rates, Av. 90 day deposits (right axis); b) Real interest rate (December); c) Real exchange rate index, 1990 = 100; d) Real wage index, 1990 = 100.

GRAPH 4. INFLATION, EXCHANGE RATE DEPRECIATION AND PUBLIC DEBT GROWTH, 1984-99



turmoil in 1998 and the adverse terms of trade shock of that year. The effects of these shocks and of their policy response were more traumatic than in other countries, given the high levels of indebtedness, fragility of the domestic financial sector and macro-economic vulnerabilities just mentioned. In 1998, the current account deficit peaked to 5.9% of GDP, the central government fiscal deficit reached 4.9% of GDP (Graph 2) and real interest rates reached unprecedented levels: more than 15% for the 90 day deposit rate (Graph 3). The policy response to the shocks was a strong monetary tightening at the beginning (May-September 1998), followed by a substantial nominal exchange rate depreciation (September, 1998), monetary loosening (October 1998 to present date) and exchange rate liberalization (September 1999); fiscal balances continued to deteriorate.

GRAPH 5. REAL GDP GROWTH, UNEMPLOYMENT AND INFLATION, 1984-99



The adjustment was painful: in 1999 economic growth was negative (-5.0%), for the first time in Colombia since the years of the great depression, inflation came down in one year from 16.7% to 9.2% and the external gap shrank to 1.3% of GDP (Graph 5). Given the fact that the central government public sector deficit was 5.3%, it was private sector balances which were mostly hurt. The recession and the financial asset crisis that followed generated a credit crunch from which only the govern-

ment Treasury seems to have benefitted, as low risk government securities have gained a substantial share in the assets portfolio of the shranked financial sector. At present (first week of January 2000) the government is placing three year fixed rate bonds at record low annual interest rates: 10.5% nominal (1.3% real).

According to many analysts, the defense, or attempt to defend, the exchange rate regime (a crawling band system) by the central bank should be fully blamed for the substantial increase in real interest rates and the liquidity and credit crunch that took place in 1998-99. It is not the purpose here to discuss the validity of this argument. We will argue, however, that public debt and public debt market underdevelopment played an important role in making the 1998-99 external and financial crisis more costly than what would otherwise have been.

On one hand, had Colombia accumulated less public (and private) debt, the economy would have not been so vulnerable to the 1998 shocks; most probably, inflation and real exchange rate appreciation had been lower and net savings and growth would have been higher. On the other, as we will show below, the hike in money market interest rates was in some months much higher than what was desired by the authorities due to imperfections in the capital market; monetary transmission mechanisms failed to work properly, and the implementation of open market operations against public securities was severely constrained due to segmentation and lack of depth and liquidity in the public debt market. In contrast with industrialized countries that started to use indirect market monetary policy instruments when public securities markets were already developed, Colombia started to use these instruments without having the market, and in the middle of one of the most turbulent financial periods ever experienced. In other words, Colombia has suffered the weight of the old familiar truth: "public debt is bad, but public debt markets are good".

Monetary policy, in turn, has had important effects on public securities markets. Over the past decade, monetary authorities have increasingly relied on indirect instruments for monetary control purposes, and particularly on open market operations (OMOs). As from the beginning of 1998, OMOs have been carried out mainly against public paper. A 1992 law, moreover, obliged the CB to operate in the market using exclusively public debt paper as from January 1999 onwards. This has undoubtedly contributed to increase liquidity in the market, though not without problems and drawbacks for the future development of the

market. As we will explain in detail below, due to an understandable fear of promoting further public debt growth through the secondary purchase of public securities, monetary authorities restricted the use of certain public securities for OMOs; unfortunately, these measures ended up contributing to segmentate and distort the securities market while they had very little, or nill, effect on the fiscal deficit.

The CB has also played an important role in modernizing the market through the provision and administration of an electronic trading system, SEN, which started to operate in November, 1998. Though the SEN project faced many problems in its initial stages and its operation was delayed several months, in its short life it has contributed enormously to increase transparency in the market and has helped to create benchmark prices. The CB is also the main custodian of public securities, and payments and settlement of these securities are managed electronically by the CB under a delivery versus payment system.

The Ministry of Finance (MoF), on the other hand, has made substantial efforts in the last four years to improve the primary market for TES-B through a program of regular auctions, pre-announcing the type of instruments to be issued and the corresponding amounts. These primary auctions are administered by the CB, under MoF guidelines. Additionally, at the end of 1997, just before the financial crisis exploded, the government appointed a group of, roughly, 20 financial institutions as official market makers (officially designated primary bond-dealers and potential candidates for primary dealers) with the stated objective of improving liquidity in the government securities market. This program is also co-administered by the CB. Unfortunately, however, due to an unfavourable economic environment and lack of a truly comprehensive program of market development, all these efforts have not been very successful in improving market liquidity.

The Colombian experience of the last years is yet another example of how important it is for monetary policy effectiveness to have enough depth and liquidity in the public debt market, and how important it is to have CB authorities aware of this fact and promoting market development. It is also an interesting case study to understand how difficult it is to achieve this awareness and commitment when there is macroeconomic vulnerability, highly volatile markets and many institutional and legal restrictions.

The challenges that lie ahead are enormous, both in terms of macroeconomic adjustment and capital market rationalization

and modernization. As is well known, at the end of last year Colombia signed an Extended Fund Facility Agreement with the IMF. The macroeconomic adjustment program contemplated under this agreement foresees a substantial and permanent reduction in the Colombian non-financial public sector deficit; debt ratios should therefore stabilize at current levels and reduce gradually after year 2003. If everything works out well, real growth should resume to 3% in year 2000 and gradually increase to 5% in 2002, while inflation is supposed to drop to 6% in two years.

One of the main economic¹ risks of the whole program is the future performance of the financial sector, which continues to be extremely vulnerable. If bank's assets continue to deteriorate at present rates (which are higher than what was foreseen initially), fiscal or monetary targets might not be easily accomplished. On one hand, Fogafin, the Colombian Deposit Insurance Fund which is a decentralized public agency responsible for financial sector rescue programs,² could face budget problems or will have to issue more debt. If an inflationary adjustment is to be avoided and the financial strength and credibility in this Fund is to be maintained, new debt issues by Fogafin must be backed somehow by Central Government resources. Apart from mining the credibility in the economic adjustment program, this would inevitably continue to crowd out private credit resources for the private real sector, delaying economic growth. On the other hand, financial sector vulnerability could constraint monetary policy and induce unsustainable low interest rates, which in turn could generate further exchange rate depreciation and/or inflation. If this negative scenario does not occur and private balances recover, anyway, it is very unlikely that domestic borrowing will continue to be as cheap for the government as it has been in the last weeks.

To sum up, though there is consensus that the right steps have been taken to put the house in order, there is still uncertainty and vulnerability in financial markets and this might keep real interest rates volatile and at higher than desired levels. As Dornbusch³ would have put it: more unpleasant monetarist and fiscal arithmetic may have to be done.

¹ Of course, political and legal risks are equally, or more, important to guarantee future stability. If the latter continue to be a source of investment risk, it will be very difficult to achieve fiscal and overall macroeconomic adjustment.

² Different from last resort liquidity facilities, which are, of course, a CB responsibilities.

³ See Dornbusch (1997).

The other big medium-term priority and challenge is to develop a long term development vision of capital and public debt markets. Of course, a necessary condition for this development to occur is macroeconomic stability: fiscal reform, stable inflation and (sustainable) low interest rates. But it also requires coordinated policy actions and changes in the regulatory and institutional framework; a joint effort between the CB, MoF, Securities Superintendency, Banking Superintendency and Fogafin, among other institutions. As some members of an IMF mission recently put it, capital market underdevelopment “limits the scope for a rapid recovery and constitutes an important indirect source of systemic risk”.

The rest of this paper is structured as follows. Section II briefly reviews the main institutional arrangements in Colombia under which public debt and monetary policies are designed, coordinated and implemented. Section III provides an overview of the development of the domestic market for public securities in Colombia. Section IV examines the aforementioned dilemmas and contradictions of monetary and fiscal policies from a microeconomic perspective, offering some concrete examples of how public securities- market underdevelopment have hindered monetary policy effectiveness. Section V concludes with some policy recommendations.

II. INSTITUTIONAL ARRANGEMENTS

In order to understand the interactions between public debt- and monetary policy in Colombia, it is useful to know some basic facts about the institutional framework and political economy environment under which these policies are designed. We believe the following are the most important:

- *“Independent” Central Bank (CB)*. The Political Constitution of 1991 created an “autonomous” Central Bank (CB) subject to its own legal regime, with responsibility for maintaining the purchasing power of the currency. The CB Board is responsible for monetary, exchange rate and financial policies in Colombia. It should design such policies in coordination with the government, and the functions assigned to the CB should be carried out in coordination with general economic policy (mainly, the macroeconomic program approved by the National Council on Economic and Social Policy, CONPES). The Central

Bank Law of 1992 states explicitly that exchange policy must be determined in agreement with the Minister of Finance. In the event of failure to reach agreement, the constitutional responsibility to maintain the purchasing power of the currency shall prevail.

- *(However) The Minister of Finance is a member of and chairs the Board of Directors of the CB.* This Board comprises other six members: the General Manager of the CB and five members who serve in that capacity alone and are appointed by the President of the Republic for renewable four-year terms, with replacements of two of them every four years. The General Manager is appointed by the Board for a four year term. The presence of the Minister is required for a quorum.
- *CB direct lending to the government* requires unanimous approval from all Board members; at present (and since 1992) the CB cannot purchase public debt instruments in the primary market. Voluntary purchases of government securities in the secondary market (indirect lending) are permitted, such as outright operations, repurchase agreements and the acquisition of government paper as collateral for rediscount credit facilities to the financial sector. *CB earnings* or profits (net of reserves to cover future losses) belong to the nation and any fiscal year losses must be covered with resources from the national budget⁴. The Political Constitution of 1991 also prohibits direct lending to private individuals (other than liquidity support to financial institutions and the intermediation of external credit).
- *Open market operations with public securities.* Law 51 of 1990 gave authority to the CB to place government securities (-TESA - acquired by the CB before 1991) in the market for monetary control purposes. The resources thereby acquired could not be transferred to the government. In the Central Bank Law of 1992 (Law 31 of 1992) the authority to operate in the market with government securities was kept and an additional mandate was incorporated: as from January, 1999, all CB open market operations (both outright purchases and/or sales and repurchase agreements) should be carried out *exclusively with government securities*.

⁴ Before 1992, the effect of a nominal depreciation on the value of foreign assets was monetization, as this adjustment was transferred by the CB to the government. This was for yeras, an important source of government financing.

- *CB approval of public indebtedness.* By the initiative of Congress, the CB Board must formally express its opinion on the macroeconomic effects of new foreign and domestic public indebtedness contemplated in each annual budget bill proposed by the government to Congress. The CB, however, has no direct power to veto such proposal; it only has potential indirect power to the extent that it is able to Congress agrees with.
- *Public debt issues require prior approval from the CB Board.* The aforementioned Law of 1992 gives the CB authority to regulate capital markets and public debt issues. More specifically, it establishes that the CB is responsible for "...determining the financial conditions under which public entities shall issue or buy securities... with the aim of insuring that these operations take place at market prices. If those conditions are not met, the corresponding securities can not be issued or placed".⁵ In practice, CB intervention in public debt policy has gone as far as prohibiting -or not approving- the issue of short term (less than one year maturity) public debt bonds or bills.
- *MoF is responsible for main debt management functions (Department of Public Credit).* The Ministry of Finance (MoF) is responsible for functions such as planning: projection of fiscal requirements and formulation of debt program frequency, volume, issuance by instrument, etc.; short-term management of primary market including definition of issuance volumes and borrowing and auctions calendar; definitions of guidelines for the operation of primary auctions by the CB; direct placements of debt via special arrangements (captive buyers) with other public entities; active debt public management; and, in coordination with the CB, management of primary dealers (and candidates for primary dealers).
- *The CB is fiscal agent of the government* and in that capacity it makes payments, including servicing of principal and interest payments to public bond holders, and receives payments. The Treasury has two deposit accounts in the CB: one to manage payments of public debt securities and the other to manage other cash operations. There are no formal arrangements between the Treasury and the CB to manage government cash balances, but the Treasurer and CB staff meet on a weekly or bi-weekly basis (*Comité de Tesorería*) to share information and

⁵ Almost literal translation of Article 16, section "c" of Law 31 of 1992.

sometimes coordinate cash balances movements in order to avoid sharp fluctuations in the monetary base. At present the Treasury does not have access to remunerated deposits at the CB and cannot purchase (neither outrightly nor temporarily) securities from the CB.

- *The CB is custodian and administers public securities' payments and settlement.* The CB is also the main custodian of public securities, and payments and settlement of these securities are managed electronically by the CB under a delivery versus payment system.

III. RECENT DEVELOPMENTS IN THE GOVERNMENT DEBT MARKET IN COLOMBIA

Colombian capital markets, as in many developing economies, continue to be highly illiquid and have a very limited investor base; this is particularly so in the case of stocks and private securities, where size is even lower than in other emerging economies. The private real sector is therefore highly dependent on traditional credit financing by financial intermediaries and there is little risk spreading through portfolio and debt diversification in the economy in general.

In this environment, short term fixed income trading, dominated by financial intermediaries (particularly banks), is the most important and sector of Colombian capital markets. Due to high and variable inflation rates for a lengthy period, the bond market is concentrated on the short end of the yield curve.

Given the impressive growth of domestic government debt over the last decade (Graph 1), government securities have gained a substantial share in the domestic bond market. The reasons for this growth are two-fold: a) On one hand, as mentioned earlier, the central government deficit started to soar since 1992 to reach record highs of more than 5% in 1999 (Graph 2), b) On the other, since 1993,⁶ the MoF has developed a debt strategy consisting of reducing the former concentration on foreign obligations and promoting domestic noninflationary financing through domestic debt issues. In 1991, foreign debt accounted for almost 80% of total government debt; since 1994, that share has dropped down to a 52%-50% range.

⁶ The first auction ever of Treasury fix-rate bonds took place in February 12, 1993.

The public debt market consists mainly of bonds or notes issued by the Treasury, denominated TES-B. Up to date, primary government securities issues by the MoF have been guided by the objective of satisfying the government's financing needs, not by monetary objectives. The CB operates only in the secondary market and in the past (until early 1998) issued its own paper for monetary control purposes.

TABLE 1. COMPOSITION OF PUBLIC DEBT BOND MARKET (end of 1999)

	<i>Trillions of pesos</i>	<i>Share in subtotal (%)</i>	<i>Share in total (%)</i>
<i>Central government debt</i>			
TES-A	0.37	1.8	1.4
TES-B	19.28	94.0	74.3
Bonos seguridad	0.41	2.0	1.6
Bonos Ley 160	0.09	0.4	0.3
Bonos educativos	0.03	0.2	0.1
Bonos agrarios	0.00	0.0	0.0
Valor constante	0.07	0.4	0.3
Bonos cesantía	0.04	0.2	0.2
Bonos solidaridad	0.20	1.0	0.8
Subtotal	20.51	100.0	79.0
<i>Other decentralized public agencies debt</i>			
Bonos Fogafin	3.51	64.4	13.5
TDA	1.93	35.4	7.4
Bonos forestales	0.01	0.2	0.0
Subtotal	5.45	100.0	21.0
<i>Total</i>	<i>25.96</i>		

FUENTE: DCV-Banco de la República.

Apart from the MoF, decentralized government agencies such as the agricultural development bank, Finagro, and more recently, Fogafin, the Deposit Insurance Fund, are important issuers of public paper (Títulos de Desarrollo Agropecuario-TDAs and Bonos Fogafin, respectively). In 1995, the outstanding stock of TES-B amounted to around \$2.3 billion, slightly more than 50% of the total central government debt. At current prices, today that stock is valued at \$19,300 billion (it has grown in *real* terms at an average annual rate of around 22% since 1994) and represents 94% of total central government bond market, as shown in Table 1.

All these bonds that compose the public bond capitalization are very heterogeneous. Some of them, such as the TDAs issued by Finagro, are forced investments by banks and other financial intermediaries. The Bonos Fogafín are a wide range of instruments (mostly floaters, tied to the benchmark 90day deposit rate DTF, and whose maturity ranges from less than a year to 10 years) issued last year to finance debtor relief programs and capitalization programs as part as a comprehensive financial rescue package designed by the government. As we will explain in detail below, a great part of central government securities, including most of TES-B, are also placed through non-market mechanisms.

Despite the financial liberalization reforms of the early 1990s and government attempts to promote market development, overall, the Colombian market for public securities is extremely thin and segmented; bonds are not liquid and in many cases that liquidity is provided only by the central bank (that is particularly true in the case of the recently issued Fogafin bonds and some TES-B). Public debt instruments are placed within captive buyers such as banks (in the case of forced investments) pension funds or decentralized public entities (such as ISS, the Social Security Institute, and Ecopetrol, the public oil company) which can be enforced to invest in government bonds (today, 65% of the outstanding stock of TES-B is in the hands of the non-financial public sector). In many cases, placements continue to be at below market rates, though this practice has diminished substantially in the last years.

As mentioned in the introduction, since 1994, the MoF has made significant efforts to improve the primary market for TES-B through a program of regular auctions, pre-announcing the type of instruments to be issued and the corresponding amounts. At the end of 1996, despite this being a very dynamic year for primary auctions, only 12.1% of the stock of TES-B was issued through this mechanism. Today that share is 20%; in 1997, 1998 and 1999, auction placements increased at annual rates of 173%, 45% and 33%, respectively. There has been progress also in standardizing instruments to insure fungibility, but recent issues of Fogafin Bonds and TES-B to rescue fragile financial institutions through debt relief and capitalization programs⁷ have significantly hindered that effort. For example, most Fogafin Bond in-

⁷ Fogafin has given loans to financial institutions to bring the risk weighted capital adequacy ratio up to 10%, through direct placement of bonds with these institutions.

terest payments float quarterly (tied to DTF), unlike floater TES which are indexed to inflation⁸ and they are not backed by full faith and credit by the government. At present, almost only the CB accept Fogafin Bonds as collateral for repo and rediscount credits, so there is no secondary market for these bonds.

In November, 1997, the MoF launched a "Primary Dealer" system to promote liquidity in the TES-B market. Under this system, a group of financial agents is chosen with the stated objective of fostering growth in the primary and secondary market for these securities; these dealers have obligations to the government and enjoy some privileges which enhance their own private incentive to develop the market. Currently, there are 11 officially designated primary dealers (mostly banks) and 9 candidates for primary dealership, all of which we will call here "market makers". Minimum capital requirements⁹ and minimum risk ratings (more than BBB- or BBB for D&P and Bank Watch) have to met in order to be a market maker. The CB evaluates each market maker's performance, following specific guidelines given by the MoF; at the end of the year each agent gets a specific mark or rating. In this evaluation, activity in the secondary market is given more weight than primary trading in this evaluation. If a minimum rating is not achieved, the agent will cease to be a market maker, or a designated primary dealer might lose its franchise and be replaced by a candidate. It is believed that this system puts more pressure on dealers to enhance liquidity in the market.

The most important privileges enjoyed by market makers are the following: exclusive right to bid or participate in primary TES auctions; exclusive access to market maker meetings with MoF and CB staff; and exclusive access to the first trading "floor" in the electronic trading system SEN. Only designated primary dealers have exclusive access to second rounds of TES auctions. Their main obligations are: be very active bidding for sale and purchase in the first SEN trading floor and produce information and documents to their clients on market developments.

During the financial turmoil of 1998, both the perceived com-

⁸ One of the reasons for choosing DTF indexed debt was to be able to match liabilities in savings and loans which are indexed to DTF and help reduce the interest gap in these institutions. regarded as cheaper than inflation indexed debt (7.7% vrs. 9% real rates, respectively), and that was the reason for having chosen it (why doesn't the gov.issue DTF inxed debt as well?).

⁹ Stock Brokers: \$5 billion; banks: \$25 billion; Financial Corporations: \$15 billion.

mitment of the government to develop the market and the efficiency of primary dealers to develop demand came into jeopardy.

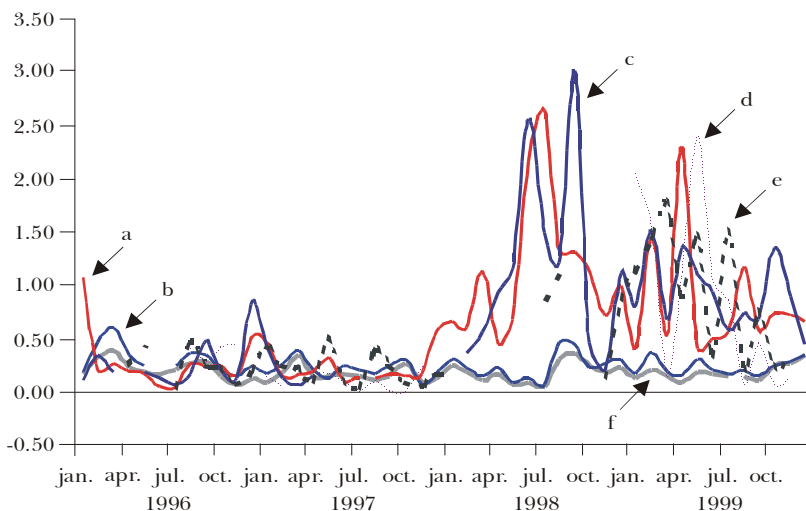
TABLE 2. YIELD VOLATILITIES (AVERAGE STANDARD DAILY DEVIATIONS), JANUARY 1996-JANUARY 1999

1 year treasury bills secondary market	1.09
2 year treasury notes secondary market	1.44
1 year TES primary market	5.45
2 year TES primary market	4.88
1 year TES secondary market	5.71
2 year TES secondary market	5.49

The reasons for less credibility in the government's commitment to the program are the following:

- As can be seen in Graph 6 and Table 2, volatility in the Colombian public securities market has been extremely high, compared both to previous levels and to that of developed markets such as the US Treasury Bill market. Given the sharp rise in interest rates during 1998, on several occasions the government

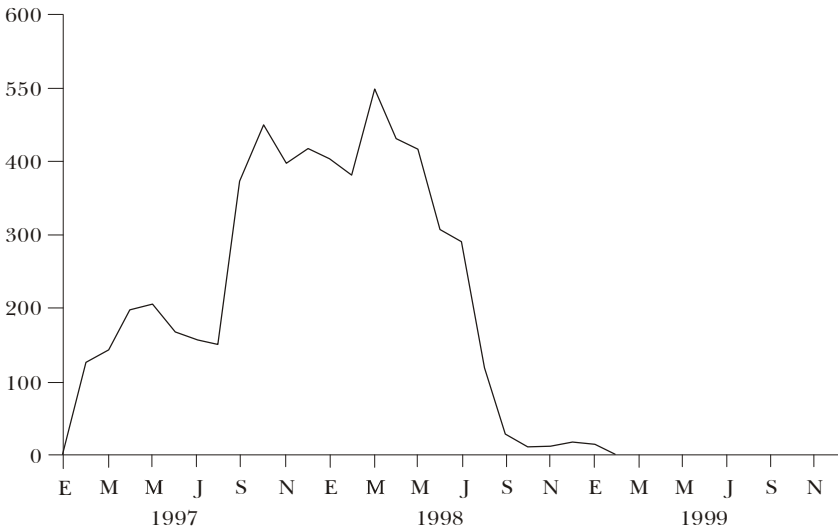
GRAPH 6. YIELD VOLATILITIES (AVERAGE STANDARD DAILY DEVIATIONS), JANUARY 1996-JANUARY 1999



a) 1 year TES- secondary market; b) US 2 year Treasury notes; c) 2 year TES- secondary market; d) 2 year TES- primary rates; e) 1 year TES- primary rates; f) 2 year TES- secondary rates.

elected to reject the bids presented by market makers in the primary auctions, declaring the options void. This response, of course, undermined credibility in the government's commitment to be in the market both in the good and the bad times. According to many analysts, this fact helped to fuel capital outflows from international institutional investors who were already under the contagion effects of the international financial crisis and whose Colombia country risk perception was already at record highs given the magnitude of the twin external and fiscal deficits. As is shown clearly in Graph 7, the foreign investor base in the TES market that was created during 1995-97 disappeared in a couple of months. This capital outflow was undoubtedly one of the causes of the attack against the peso and CB reserves during 1998.

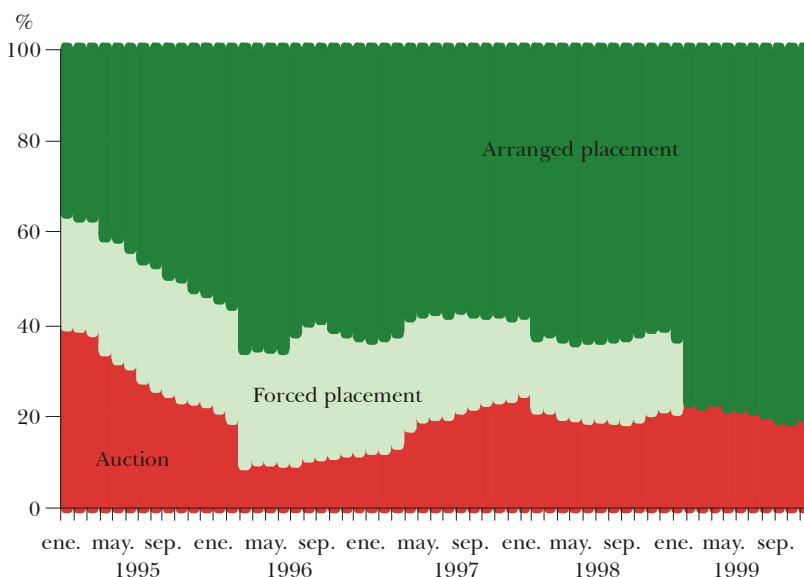
GRAPH 7. FOREIGN FUNDS INVESTMENT IN TES-B, 1997-99 (billions of pesos)



Despite growth in auction amounts and promises to reduce non-transparent operations with captive buyers in late 1997, the government continues, increasingly, to operate a parallel and captive market to distribute directly significant quantities of their securities. More than 80% of the total outstanding debt in TES-B has been placed through these special arrangements, and this share is expected to increase in 2000

(Graph 8).¹⁰ As mentioned above, some public sector companies are required to invest their excess liquidity in government securities through direct transaction with the Treasury (inversiones forzadas); these investments can not be traded in the secondary market. The Social Security Institute (ISS) is also obliged to invest its resources in such securities, but has the option of buying them in either the secondary market or directly from the Treasury (inversiones convenidas). Since 1997, these investments are supposed to be placed at “near to market” prices: more specifically, at the rate of the last primary auction.

GRAPH 8. COMPOSITION OF STOCK OF TES-B, 1995-99

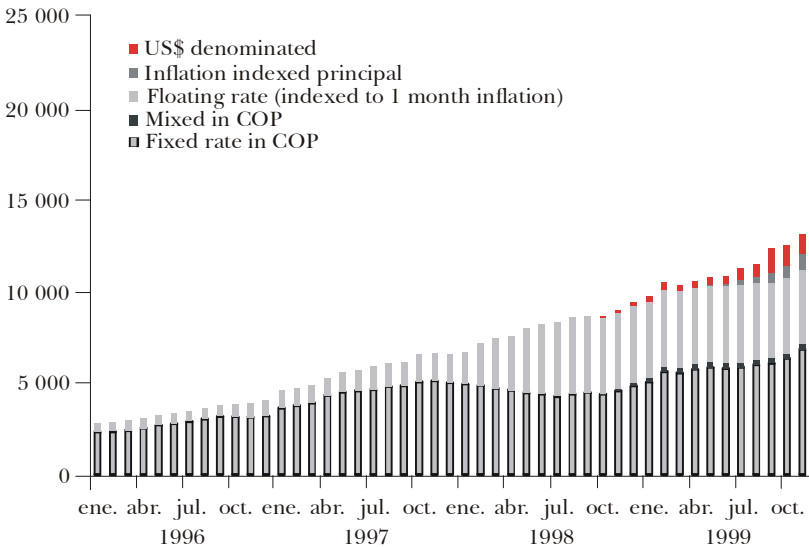


- Many market makers and analysts believe the government has been ambiguous with respect to its intention to extend the yield curve and, in particular its commitment to use fixed income bonds for this purpose. As can be seen in Graphs 9-11 the range of instruments issued by the MoF has broadened significantly over the last three years, and the structure of the market by type of instrument has been quite unstable. In 1996

¹⁰ At the end of 1996, 12.2% of total outstanding TES-B was placed by auction (\$724.1 billion) and the rest was placed via special arrangements by the Treasurer with the ISS (4.3%), Garantía TAN (3.1%) and “Sustitución DSI” (0.3%).

there were basically three types of instruments in the secondary market: fix rate bonds for shorter maturities (1, 2 and 3 year maturities); a 6 year maturity floater tied to monthly inflation¹¹ and a 15 year maturity yearly floater bought by the ISS (through arranged placements).¹² In the second half of 1998, just after the exchange rate band was depreciated 9%, the government introduced US dollar denominated bonds;¹³ in 1999, it stopped issuing the 7 year floaters and opened a new issue of indexed bonds denominated in units of constant real value called UVRs.¹⁴ At present it issues 1,2 and 3 year fixed bonds, 5

GRAPH 9. STOCK OF TES-B BY TYPE OF INSTRUMENT, 1996-99 (billions of pesos)



and 7 year inflation indexed bonds and dollar indexed bonds. The rationale for these changes in structure and the use of this diverse range has proven very confusing. Market participants view the introduction of these instruments as opportunistic be-

¹¹ The first auction of 6 year floater bonds took place in June 14, 1995.

¹² These bonds were issued in 1994 and in 1998. Each august the MoF reports the rate of this annual floater. Currently the yield of these bonds is annual consumer price inflation plus 1.28 points.

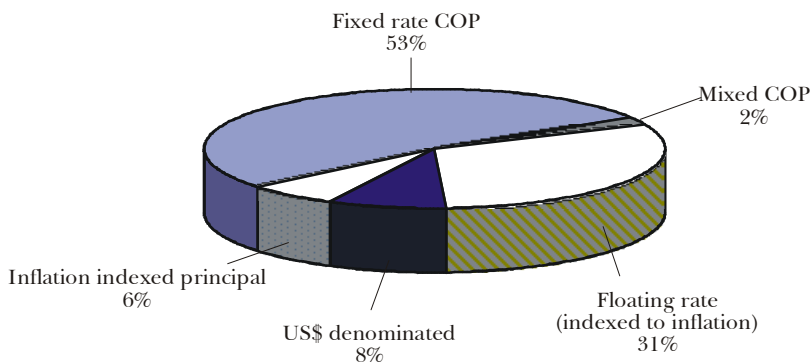
¹³ The first US dollar TES auction took place in October 29th, 1998.

¹⁴ The first auction of UVR denominated bonds took place in May 25th, 1999.

haviour by the MoF, with the sole purpose of mobilizing more (and cheaper) funding to the growing fiscal deficit.

It was this same view what determined that the CB Board did not accept a proposal by the MoF to issue treasury bills of less than one year- maturities in early 1998, when real interest rates started to rise. The Director of the Ministry's Public Debt Department had argued that it was important to issue these bills to complete the short end of the yield curve and to facilitate cash management by the Treasurer. The CB authorities, however, perceived that approving these new issues would only help increase the deficit and the vulnerability of public finances, and no market development considerations were taken into account in that opportunity.

GRAPH 10. COMPOSITION BY TYPE OF INSTRUMENT, NOVEMBER 1999

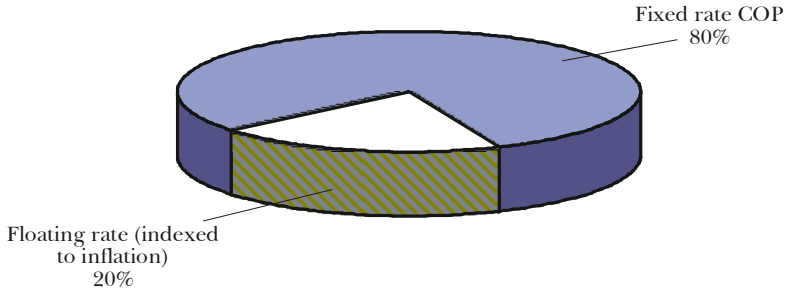


Market makers complain the government has been very inconsistent in its issuance of short term (1 year) TES in the past, of which there is not enough stock at present. Many of the past 1 year notes have been replaced by 2 or 3 year maturities, extending average maturity and causing a vacuum of short term issues. Inconsistent issue size and maturities affect the market via uneven future liquidity of those same series of bonds.

Authorities, on the other hand, have the perception that market makers, even controlling for the effect of a very unstable macroeconomic environment, have not made enough efforts to promote liquidity. Currently, around 75% of the portfolio in the hands of financial intermediaries is held for trading (Graph 12) and it has to be marked to market. Most trading has taken place in the repo market, a substantial part of which takes place with the central bank. Once the economy stabilizes and authorities

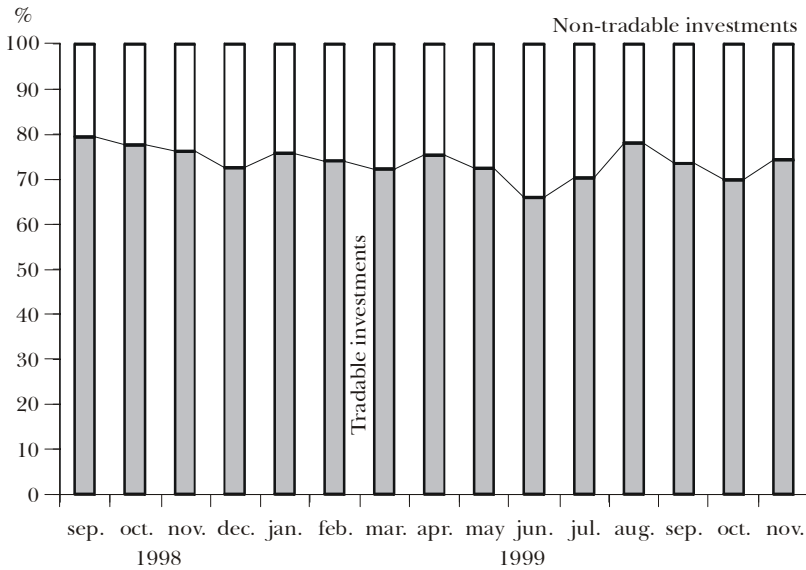
strengthen their commitment to a comprehensive plan to develop the market, it would be advisable to review the whole market maker program. More strict and accurate parameters to evaluate market-making performance should be introduced, as well as more effective positive incentives to be a market maker.

GRAPH 11. COMPOSITION BY TYPE OF INSTRUMENT, DECEMBER 1996

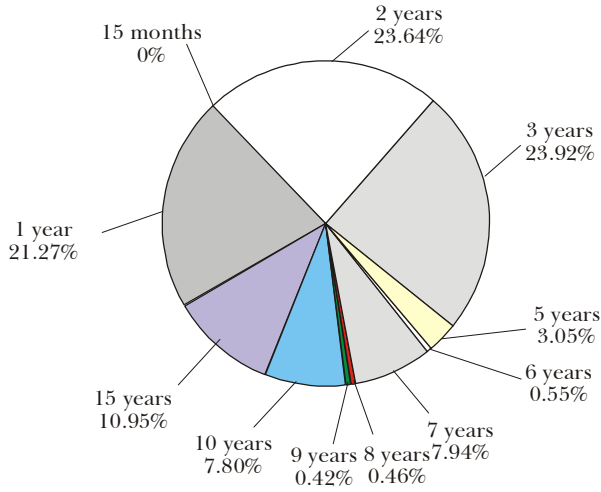


Though demand for longer term indexed bonds has increased in the last years (Graphs 13-14), the term structure of TES-B placed by auctions shows that demand continues to be concentrated in short term maturities (1, 2 and 3 years). Once markets

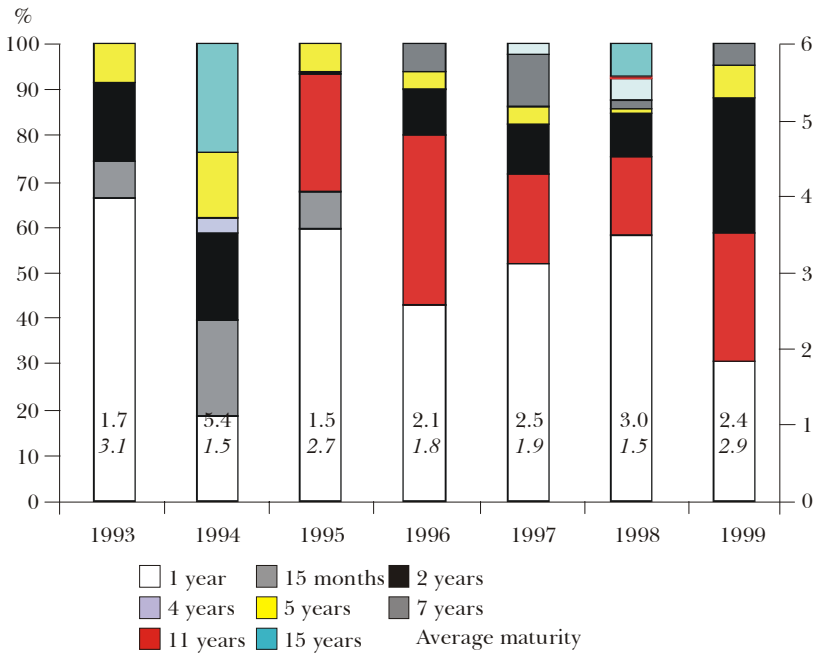
GRAPH 12. MARKETABLE AND NON-MARKETABLE SHARES IN TOTAL STOCK OF TES-B IN THE HANDS OF FINANCIAL INTERMEDIARIES, 1998-99



GRAPH 13. STOCK OF TES-A AND B BY (ORIGINAL) MATURITY, DECEMBER 1999



GRAPH 14. COMPOSITION OF PRIMARY TES ISSUES BY MATURITY, 1993-99



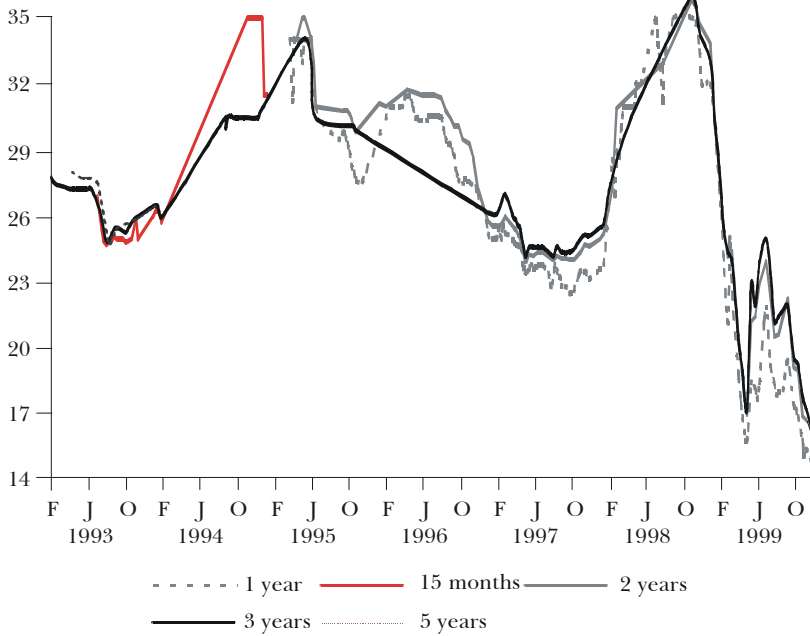
calmed slightly in 1999, the MoF was able to increase the average maturity of new bond issues from 1.5 years in 1998 to 2.9 years. Over the last decades, high and unstable inflation rates have been the main obstacle to develop long-term financial savings in Colombia. As mentioned earlier, at present inflation is at its lowest levels in decades. If price changes continue to be at one-digit levels, it is the right moment to start developing a long-term capital market.

Most probably, the government will continue to issue indexed bonds to capture long term savings, particularly if inflation expectations continue to be higher than actual inflation, as has happened in the last months. This has the potential advantage of introducing the right stimulus for government to diminish pressure on the CB to inflate the economy and reduce the debt burden. However, many would argue, I believe correctly, that strengthening a constituency of inflation-averse investors in fixed rate long term bonds in some cases is more effective to reduce the temptation to inflate the economy. Additionally, competition with the financial private sector issuing long term indexed financial products will be tough. In order to solve the interest and maturity gap problem currently affecting the Colombian savings and loans system, the same government is promoting a new housing financing system, similar to the Chilean, based on the issue of long term indexed bonds.

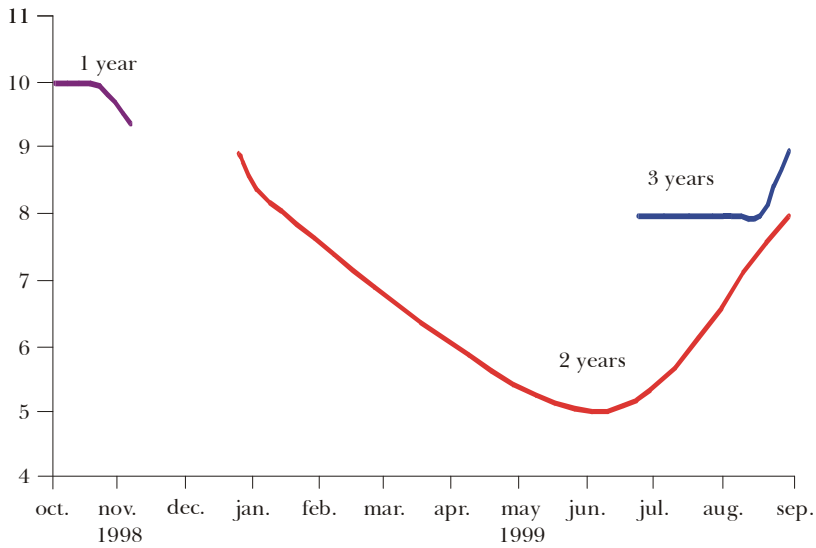
From a different perspective, it would be very useful to issue longer term fix rate bonds to extend the yield curve; at present there are no nominal long term reference or benchmark rates in Colombia. Market makers argue that indexed instruments are not attractive to the market due to the fact that uncertain cash-flows for long maturities require traders and investors to assign the most conservative estimates of coupon and principal cashflow when calculating their VaR values. Additionally, due to seasonal changes in monthly inflation, there are sharp cycles in prices and traded volume, with investors “piling in” during perceived months of high inflation and “piling out” in the months of lean inflation after the first quarter of the year. All this makes the market for these securities very illiquid.

To sum up, there is evidently a trade-off between indexed and fixed rate bonds, and perhaps it would be desirable to have both in sufficient amounts as to make their markets relatively liquid. If there is a good combination of floaters and fixed rates for equal maturities in the market, this has the advantage of being able to better monitor inflation expectations in the economy. It is inter-

GRAPH 15. FIXED RATE TES YIELDS (PRIMARY AUCTIONS RESULTS), 1993-99



GRAPH 16. YIELDS OF US\$ DOLLAR DENOMINATED TES (PRIMARY AUCTIONS), 1998-99



esting to note that the spread between the 1 year- note and the 2 and three year- notes has been relatively large throughout 1999 (Graph 15), indicating that despite the drop in inflation, agents continued to expect higher interest rates in the future. If the MoF decides to issue a fix-rate 5 year bond in 2000, it would be a nice way to test credibility in the inflation targets programmed for 2000-2005.

At this stage, it is not clear whether the government will continue to issue dollar indexed bonds, and/or in what amounts. Judging by the behaviour of the two-year- dollar indexed primary yields in 1999 (Graph 16), peso devaluation expectations have decreased since the peso started to float in late September. It is important to point out that there are regulations that distort demand for this type of instrument. On one hand, since 1998, but particularly since August 1999 when the peso was under a second speculative attack which ended in the elimination of the crawling band exchange rate system and the introduction of a floating regime, the CB restricted the dollar credit cash position that banks can have. Due to this restriction, in order to be able to hedge uncovered debit positions, banks have demanded dollar indexed TES. Another piece of regulation which creates (in a way, artificial) incentives to demand these TES is preferential treatment in terms of capital requirements for derivatives that are covered with dollar indexed TES (if they are covered with other dollar denominated asset they do not have this treatment).

In order to have more liquid, transparent and efficient public bond markets in the future, both the MoF and the CB must design a comprehensive market development plan with a clear long-term vision. This vision has to be communicated and transmitted to other regulatory public agencies which directly or indirectly effect the market such as the Banking Superintendency and the Securities Superintendency, among others. Among regulatory issues that need urgent reform, we could mention the following:

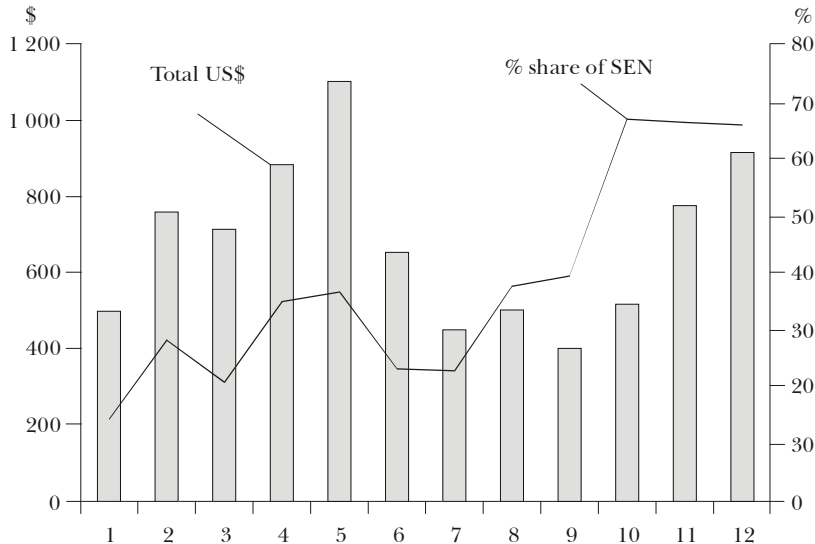
- Securities lending, which was prohibited in Colombia until March, 1999, is still subject to many restrictions (particularly regarding accounting principles).
- Though in 1998 the CB led a reform to eliminate quantitative restrictions on gross amounts of short repo operations, there are still some restrictions on the repo market. For example, securities used as collateral backing any repo contract can not be used by the temporary holder to do other operations and they

are held frozen in the respective account administered by the custodian (the CB).

- Institutional investors, in particular pension funds, are subject to portfolio investment regulations that currently distort prices and hinder the development of this demand sector.¹⁵ As stressed by a recent IMF mission, the regulatory structure governing mutual funds should be rationalized, guaranteeing more competition among financial institutions offering mutual funds, among other aspects.

Before entering to examine the way the CB has operated in the market, this section will end with a positive note regarding recent developments in trading infrastructure. As mentioned in the introduction, in November 1998, the CB put in operation an electronic trading system, SEN. By October 1999, more than 60% of electronic trading was done through SEN (Graph 17). This system, which is centralized and administered by the CB, has substantially improved transparency and efficiency in the secondary market for TES-B. Before, most trading took place through the stockmarket system where prices are severely distorted (among other

GRAPH 17. VOLUME OF TES TRADE IN ELECTRONIC SYSTEMS



¹⁵ The majority are fixed income funds, invested in securities that mature in one year or less.

reasons, because in most cases it is impossible to separate yields from fee rates paid to the broker).

IV. MONETARY POLICY AND PUBLIC DEBT MARKETS DEVELOPMENT

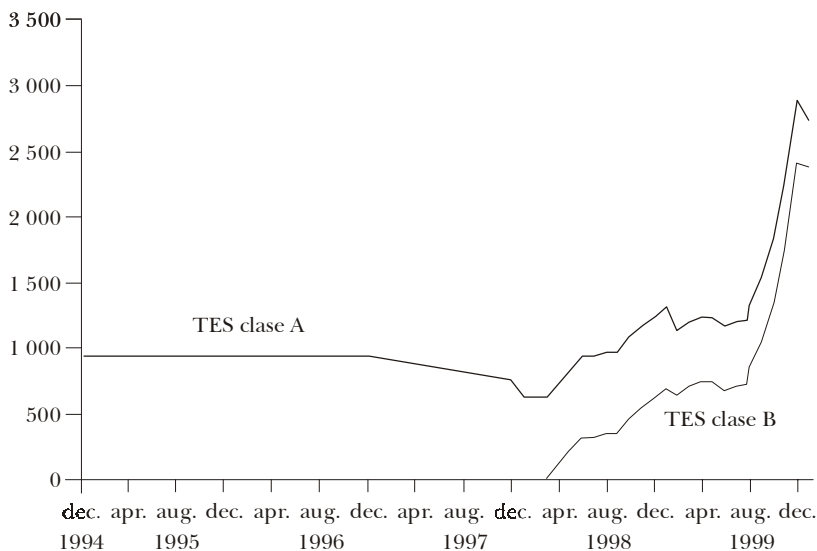
Like in many other countries, OMOs have become the CB's main instrument for altering the stock of money. Though traditionally monetary reserve requirements have been a key tool of monetary control in Colombia, in recent years, however, the level of reserve requirements has been reduced from an average of 27% in 1992-94 to 4.5% at the end of 1999. Reserve requirements were kept relatively high compared to other countries in the region during most of the 1990s. During the 1998 crisis these reserves were substantially diminished as a means to provide liquidity to the banks and help prevent a systemic payments crisis.¹⁶ Nowadays, CB authorities rely almost exclusively on OMOs to control liquidity in the markets and on a rediscount credit window to provide lender of last resort facilities.

Since the 1980s, the CB started to develop several techniques and instruments of indirect monetary policy. As is often the case, when the CB initiated the transition to use mainly indirect monetary policy instruments in the early 1990s, there was excess liquidity in the financial system and open market operations were used almost exclusively for contractionary purposes. This excess liquidity was inherited by policies during direct control policies and fueled by the significant accumulation of foreign assets during the period of foreign capital inflows (1990-1995). Up to 1997, the CB chose to issue its own securities for monetary control purposes (called *Títulos de Participación*, TP) rather than use government securities. The reason for this was two-fold: on one hand, the 1991 Constitution gave autonomy to the CB and the idea of implementing monetary policy through primary government issues was simply not viable. On the other, secondary markets of public securities were extremely thin and segmented to be able to implement OMOs with government paper. Additionally, since the CB was traditionally a net debtor of the financial system, it needed to build enough stock of public securities to insure that it could issue all the amounts needed to achieve monetary objectives. The

¹⁶ A substantial portion of liquidity demand during the second half of 1998 was provided through the reduction in these requirements.

CB held in its portfolio only less than one trillion pesos in the form of TES-A acquired in the early 1990s through a special arrangement with the government (Graph 18), which was certainly not enough to meet contractionary needs (Graph 19). Though the CB could have mixed the use of TPs and TES-A for OMOs, it never sold its TES-A (definitely or on a temporary basis) and the secondary market for these securities was unexistent by the end of 1997.

GRAPH 18. CB PORTFOLIO OF TES A AND B, 1994-99 (billions of pesos)

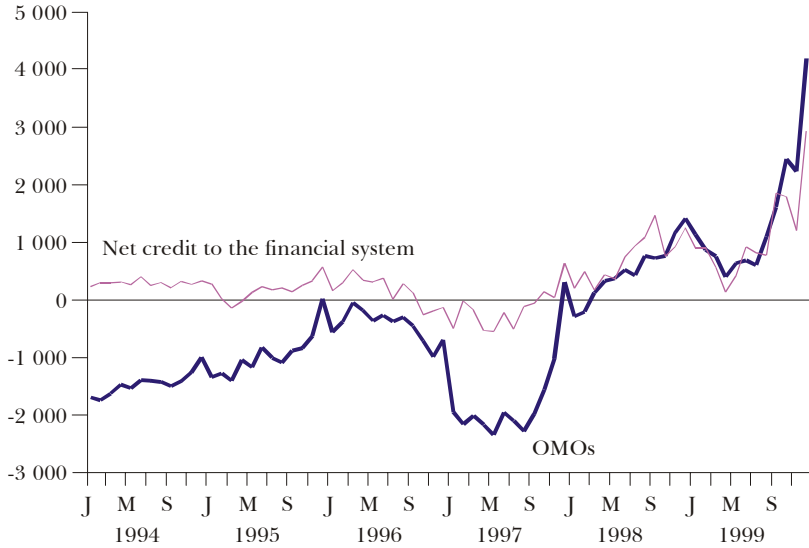


At the end of 1995, the stock of TPs (CB paper) reduced significantly as well as the need for contractionary OMOs (see Graph 19). According to some analysts (CB staff and external consultants, see Mas (1996)), there seemed to be an opportunity to buy public securities in the secondary market for future OMOs. CB authorities and staff were increasingly aware of the need to prepare for 1999, a year in which the CB would have to operate exclusively trading government securities, as mandated by a 1993 law. However, the CB did not dare to take this step at this stage and preferred to keep using TPs, while it continued to prepare its staff only “mentally” or “intellectually” to this future challenge.¹⁷ Simultaneously, the banking operations area of the

¹⁷ The CB sought for technical assistance from the Central Bank of Spain during this period, as the Spanish experience of Monetary Policy based on gov-

CB started to seriously consider the possibility of providing directly an electronic securities trading system and centralizing its administration.

GRAPH 19. STOCK OF CENTRAL BANK OMOs AND CREDIT TO THE FINANCIAL SYSTEM, 1994-99 (billions of pesos)



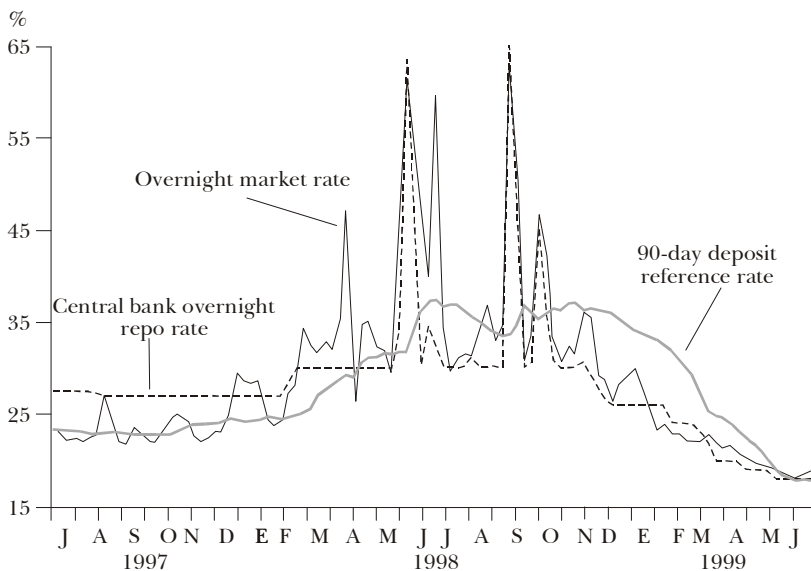
In late 1997 the stock of TPs depleted completely and at the onset of the 1998 events, the CB became, for the first time in recent history, a net creditor to the interbank money market, as is clearly shown in Graph 19. Back then, the CB had a standing facility for overnight liquidity needs. It was ready to provide all the resources needed or demanded at a constant rate of 28% nominal, called the CB Repo rate (Graph 20), against a set of eligible paper (basically Central Bank TPs, TES-B and Finagros's TDAs). Soon the CB authorities were shocked and surprised to observe that overnight interbank interest rates were well above the CB Repo rate and that volatility in that market had started to increase after two years of great stability. The demand for liquidity was growing and the CB was not able to satisfy it against its will. Why?, because there was not enough stock of eligible paper in the market.

In February 1998 the peso experienced the first of four specu-

ernment security transactions was viewed as a very successful one. So did the MoF to develop its domestic debt management strategy.

lative attacks until the peso was left to float in September 1999. In that month, in contrast with what was done in Chile, the CB authorities chose not to produce a liquidity shock. They decided instead to increase the Repo rate to 30%, willing to provide all the liquidity that was needed at that rate, while leaving the exchange rate regime unmodified. For the better or the worse, the inter-bank rate soared, followed by longer maturity rates. The CB was losing control over monetary policy, not only due to exchange rate fixing, but because money markets and transmission mechanisms were failing to work. To solve the securities' stock constraints, the CB had to partially implement monetary policy through collateralized credit auctions using private sector claims as collateral as had done Mexico.

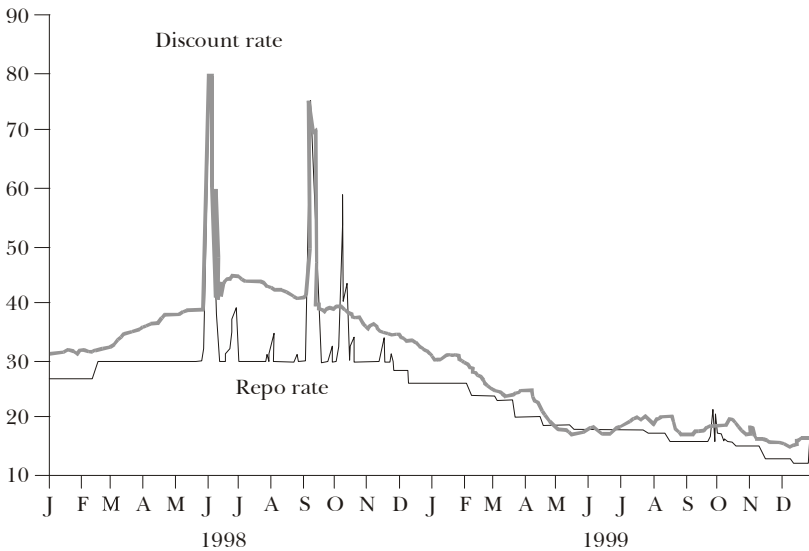
GRAPH 20. OVERNIGHT MARKET INTEREST RATE, CENTRAL BANK OVERNIGHT, REPO RATE AND 90-DAY DEPOSIT REFERENCE RATE (WEEKLY SERIES), 1997-99



In addition to the lack of sufficient stock of government paper, the available securities to obtain liquidity from the CB were being discounted at very high rates by the CB (Graph 21). The reason was, once again, related to public debt market underdevelopment: there were no reference secondary market rates to be used to discount this paper. In the past, the CB had created the following ad-hoc formula to calculate the discount rate for TES and other securities: when there were no reference prices in the sec-

ondary market, the CB would use the higher rate between the effective Repo rate and DTF plus 7 points (DTF is the average 90 day deposit rate) to rediscount public bonds. As is shown in Graph 21, this formula proved to be too restrictive.¹⁸ When the second speculative attack took place just before the presidential elections in May 1998, the CB decided to ration liquidity and auctioned overnight facilities. As a result, the Repo rate reached record highs (of more than 80% in one day of June). That meant not only that central bank resources were extremely expensive, but that almost twice the face value of collateral had to be put to obtain the rationed amount of liquidity, given the discount rate for repo operations.¹⁹ In other words, there was monetary over-adjustment due to factors that were, at that moment, not foreseen nor entirely under the control of the CB authorities and staff. In August 1999, discount rates were adjusted to more reasonable levels.

GRAPH 21. DISCOUNT RATE (1 YEAR MATURITY TES) AND OVERNIGHT CENTRAL BANK REPO RATE, 1998-99



¹⁸ Tying the discount rate to DTF had also the following disadvantage: when there is flight for quality and risk aversion, the spread between the rates charged by different institutions increases substantially, increasing the average 90 day deposit rate.

¹⁹ Matters became worse as the CB started to manage payments under Real Time Gross Settlement system in July, which of course increased the demand for liquidity even further.

In September 1998, after a very short period of dropping interesting rates, the Russian crisis hit again the already distressed market and the exchange rate band was depreciated 9%. This marked the beginning of a significantly calmer period in monetary markets, but certainly less calmed on the financial and last resort facility side, given the problems that started to arise on the asset side of financial intermediaries. Monetary policy was substantially loosened both through reserve requirement reductions and substantial expansion and cheapening of Repo operations and rates. The CB Repo rate has fallen systematically until present date, with the sole exception of a couple of days when the fourth speculative attack took place in the middle of 1999 and the peso was floated.

The repo market has been extremely dynamic over the last year, particularly due to CB OMOs.²⁰ Today, the CB absorbs or provides overnight and short term liquidity exclusively through repo or reverse repo auctions and standing facilities. It conducts daily, weekly and bi-weekly repo auctions using a uniform-price method against public securities (mainly TES-B, but securities issued by Fogafin and Finagro, among other public entities, are accepted). To meet end-of-day needs of the banks, there are standing facilities against accepted collateral at a "Lombard" rate; access to these facilities is limited only by the amount of collateral available. Reverse repos are also carried out on a daily basis (at present, only through an end-of-day standing facility).

Apart from Repos, the CB has been involved since 1998 in outright purchases of government securities (only TES-B) in the secondary market. This is done on a weekly basis (every Friday) via a uniform price auction, and sporadically (basically, when there are attractive opportunities) via transactions through the electronic transaction system SEN. All financial intermediaries that trade with the CB in ordinary Repo operations have access to the auctions ("agentes colocadores de Omas"); they are not restricted to market makers. As shown in Graphs 19 and 21, in six months the CB has more than doubled its stock of TES-B. This, of course, has also helped to provide liquidity in the government securities market.

The implementation of outright purchases, however, has proved to be difficult and with many contradictions. Firstly, given

²⁰ The interbank repo market was, however, hurt by a financial transactions tax of 0.2% that was levied for some months in 1999 due to a Constitutional Court ruling.

the mandate to operate exclusively with government securities as from January 1999, and the fact that the CB was ill prepared for that event, it had to start building its stock of TES-B at a time when it was supposed to be following a contractionary policy to defend the exchange rate band. The first auctions therefore generated confusion and uncertainty about the true objectives of monetary policy during the first half of 1998.

Secondly, as mentioned earlier, until very recently the CB did not want to purchase paper that had been originally placed by non-market methods (*convenidas y forzosas*). This helped to segmentate some fix rate issues which were otherwise absolutely fungible. The electronic system administered by the CB labels each issue and coupon with a specific code indicating whether their primary placement took place at an auction or not. In this way, the CB could identify “eligible” securities to purchase. Though the CB recently eliminated the restriction to buy “*convenidas*”, the label continues to exist in the system and those securities are still being “punished” by the market with greater discount rates.

Thirdly, despite the fact that CB staff has tried to identify *ex ante* the most liquid issues and has tried not to dry up the market for some of them through its purchases, it has not been possible to avoid this effect. On one hand, the lack of periodic reliable information and a well designed data base makes the task of identifying suitable issues to buy makes life difficult for the operations desk. On the other, in order to meet the monetary objectives set by the CB Board, the CB operations desk had the mandate to auction substantial amounts of liquidity during the second half of 1999. As a result, the CB is today the main single holder of some security issues. Hence, CB operations have had the mixed and contradictory effect of providing liquidity to the securities market, while at the same time is shrinking the already small stock of available public debt in the secondary market. Otherwise, prices at CB auctions have yet not been too far from secondary market quotes.

V. CONCLUSIONS

This paper ends with not very original conclusions. The following list of policy recommendations could have been drawn from any paper on the same subject on any emerging economy in the process of adjusting its macroeconomy after a financial crisis:

1. Continuous public debt accumulation is bad. In the case of Colombia, it has been a true obstacle to achieve macroeconomic stability since the beginning of the 1990s. To achieve sustainable high growth rates public sector deficits must be phased out. Colombian authorities are committed to a comprehensive macroeconomic adjustment program under an EFF IMF agreement which foresees a substantial reduction in public debt accumulation. However, to achieve the desired targets, present asset losses in the financial system must halt and more stable political and legal conditions must prevail. Otherwise, more debt accumulation and/or more inflation will be inevitable, and more unpleasant monetarist and fiscal arithmetic will have to be done.
2. Capital market underdevelopment played an important role in making the 1998-99 crisis more costly than it otherwise would have been. It reduced monetary policy effectiveness and helped make interest rates more volatile.
3. Apart from macroeconomic stability, capital market development requires coordinated actions by economic authorities to guarantee a suitable regulatory and institutional framework. In the case of the market for public securities in particular, it also requires a clear and transparent debt management strategy and coordinated actions with monetary policy. At present, Colombian authorities lack a comprehensive vision or strategy in this area. The aftermath of a financial crisis could be a good opportunity to think these issues over and design a strategy with the commitment of all public agencies that affect the market directly or indirectly, including the Central Bank. Among the specific issues that must be tackled we could mention the following:
 - there are regulatory restrictions that help to segmentate the market and reduce liquidity
 - there are too many types of public debt instruments in the market, they are not fungible and most of their issues and/or series are very small and illiquid
 - there is no complete yield curve and benchmark rates and no perceived serious commitment to develop them among market participants
 - the primary dealer system may need adjustments and a more credible commitment by both issuers and market makers

- the government should phase out arranged placements and increase market-based issuing systems
- to the extent that SEN (the electronic system) continues to grow, yields negotiated in that market should become benchmarks for valuation and trading; the CB should be the first one to take this step.

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Leathan Patrick Baptiste

Management of international reserves in Trinidad and Tobago, 1964-1996

1. INTRODUCTION

The practice of managing international reserves do vary widely among Central Banks in particular and international financial institutions in general. The more developed Central Banks have been known to employ elaborate and highly technical methods and systems as quantitative forecasting and simulation of alternative portfolio decision-making to inform their managers on how to manage their reserves. The less sophisticated Central Banks in the main tend to rely on simpler methods as the mechanical re-depositing of short-term placements through external brokers who are highly recommended to do the job for them. The art of reserves management has for some considerable length of time been considered confidential and secretive. To a considerable degree, this situation still obtains in most Central Banks. In the 1990's, this level of confidentiality and secrecy has given way to transparency in many Central Banks e.g. the Reserve Bank of New Zealand that has traded transparency and greater disclosure of information for its independence in its concordat with its Ministry of Finance. This situation has not yet arrived in the English speaking Caribbean.

1.1 Reserve management-a complex technical task

Managing reserves in today's environment is a very complex technical task that in the main requires a wide range of skills (e.g. knowledge of international finance and economics, international banking) and a sophisticated organization. The economic impact of this exercise (reserve management) can extend beyond a Central Bank's balance sheet. For example, at the policy level, the Central Bank is expected to determine the *optimum* level of reserves and their currency composition. These decisions have implications for monetary, foreign exchange and external debt policies. One only has to recall the reserve position of Trinidad and Tobago in the 1980's and 1990's to realize these connections. *In making these policy decisions, the Central Bank should consult with fiscal authorities (Ministry of Finance) and review its policy choices as economic circumstances change.* At the operational level, the Central Bank's task can be even more demanding. *It involves overseeing the work of the reserve management team and managing the resources supporting the investments and administrative process.*

1.2 Purpose for holding reserves

It has been suggested that Caribbean Central Banks' sole motive for holding reserves is *the transaction motive*. The experts also advise that the precautionary and wealth motives are subsumed by consideration of liquidity. I believe that because of the small size of the Caribbean states this may be an appropriate assessment. However, Naameh¹ advises us that "*some Central Banks spell out the purposes for which the reserves are held. Examples are:*

- (a) To defend the external value of the currency.
- (b) To meet payment obligations as they fall due.
- (c) To boost investor confidence.
- (d) To service external debt and enhance creditworthiness.
- (e) To finance imports in future years (i.e. where the level of reserves exceed present need)
- (f) To provide a legal backing for the domestic currency.
- (g) To provide for a rainy day."

¹ Michael Naameh – Practical Issues in Reserve Management [p. 7, para. (i)].

Making clear what the purposes are, helps the reserve team to structure and manage the reserve portfolio accordingly. For example, the first three (3) purposes listed above stress the need for liquidity (what proportion of the assets should be accessible overnight, within a week or one month). The fourth calls for some liquidity matching in structuring the portfolio (i.e. most feasible when the liabilities do not substantially exceed the reserves) and the last three argue for maximizing the real purchasing power of the reserve assets. *"In all cases, security of assets. is of course paramount. Thus. there may be a case of splitting the portfolio into different tranches or using derivative instruments to reduce the trade-off between higher yield and liquidity."*

In this paper, I propose to examine the movements of the stock of international reserves in Trinidad and Tobago between 1964 and 1995 to determine:

- (a) the purposes why the reserves were held and
- (b) the overall management of the reserves in the period under review.

Forde and John² in their paper on 'management of international reserves' in a similar time span, observed that in the four decades that spanned the period 1964-1995, the level of international reserves in Trinidad and Tobago varied from USD³100 million in the 1960's to USD3,200 million in the 1970's (almost twenty months of import adequacy) to around USD400 million in recent times (or just under three months import cover). They also advised us that although there was no official dating of business cycles, economic historians would confirm the following chronology:

- (a) the period of the 1950's represented an economic boom, as investments in the petroleum sector grew apace;
- (b) there was a period of growth and slowdown in the early and mid 1960's followed by the boom in the 1970's (1974 - 1982)
- (c) there was a recession in the 1980's (1983 - 1990)

² Management of International Reserves: Trinidad and Tobago - A Case Study by Penelope Forde & Joan John. Paper presented at the XXXI Meeting of Central Bank Technicians of the American Continent. Santiago, Chile, Nov 14-18, 1994. Published in *Money Affairs*, vol. VIII, n^o 1, January-June 1995, pp. 1-30.

³ USD - United States Dollar.

(d) the aftermath of the adjustment period in the 1990's.

This chronology provided five useful subperiods over which trends in reserve management were analyzed. In this regard they identified the following five subperiods as follows:

- (i) 1964 - 1967[early beginning]
- (ii) 1968 - 1973[a period of transition]
- (iii) 1974 - 1981[The Golden Age]
- (iv) 1982 - 1988[Economic recession]
- (v) 1989 - 1993[Economic Adjustment to Liberalization]

I proposed to use these subperiods to put forward my ideas on the purposes why the reserves were held and to examine the overall management of the reserves by the Central Bank and the Monetary Authorities as the *circumstances changed from period to period*.

Before beginning my examination of these sub-periods mentioned above, I would like to draw your attention to the important explanation of what is involved in reserves' management. Naameh⁴ explains that:

"the need to reconcile potentially conflicting objectives such as liquidity , higher yield and liability matching may lead a Central Bank to split the reserves' portfolio into two or more tranches, each having its own investment objectives, guidelines performance benchmark and risk tolerance. A liquidity tranche would for example hold cash, invest in very liquid short-term money market instruments as T - Bills and CD's and use repos. An income tranche, would hold longer-dated securities in different markets in the expectation of achieving higher real returns. Derivative instruments can also be used to reconcile conflicting objectives or manage different risks without the need to split the reserve portfolio."

I have used this quotation to introduce you to the language of reserves management and to inform you of the complexity of task of a reserve manager. In this exercise, the manager is mainly managing risk and sometimes performance benchmarks are used to test the performance of the portfolio manager. In our examination of reserve management in Trinidad and Tobago, the

⁴ Michael Naameh-Practical Issues in Reserves Management Crown Agents-Administration of International Reserves Seminar. Central Bank of the Bahamas and Centre for Latin American Monetary Studies Nov 25 - 27, 1996. Radisson Cable Beach Casino and Resort, Nassau, Bahamas.

chances are that the Central Bank in the period 1974 - 1981 and subsequent years had to *split its reserve' portfolio into many tranches to reconcile potentially conflicting objectives as liquidity, higher yield and liability matching* as the circumstances demanded.

There is also very little if any evidence that the Central Bank of Trinidad and Tobago used derivative instruments in the period to reduce the trade-off between higher yield and liquidity in the period of rapid accumulation of reserves or subsequently.

2. THE PERIOD 1964-1967 [EARLY BEGINNING]

I am particularly interested in the post colonial period because I observed that the experts had advised that the period of the 1950's (colonial period) represented an *economic boom as investment in the petroleum and petrochemical sectors grew apace*. My interest was heightened because the Central Bank of Trinidad and Tobago was actually established in 1964 and by 1966 had assumed all the functions and responsibilities of a fully fledged Central Bank. In fact, from a legal point-of-view, the records showed that all the remaining sectors of the Central Bank Act were proclaimed in 1966. The Central Bank of Trinidad and Tobago also made its first TTD⁵ note issue on the 14th December 1966. A new Central Bank was born and it was just taking its initial steps *into the wide world of Central Banking and International finance. Note that its initial functions were restricted to issue of currency and administrative operations. Frankly, one should not really refer to this as initial steps. One should recognize that this was a giant step since the Central Bank of Trinidad and Tobago was in fact a monopoly or monopolist in the issue of currency in Trinidad and Tobago.*

To fully understand and appreciate the work of the Central Bank in this period, I believe one has to not only analyze the management of the reserves but more importantly economic conditions that prevailed at the time and *the impact of the Central Bank of Trinidad and Tobago's policy-decisions for monetary, foreign exchange and external debt policies. For example, an examination of the underlying economic conditions in the period revealed that real GDP grew by roughly 4.2% p.a. in the 1960's compared with average growth rate of 8.5% in the 1950's. The evidence available is rather sketchy on the reasons why there was this decline.*

In this period, there *were disequilibria in the external account of the*

⁵ TTD - Trinidad and Tobago Dollar.

Balance of Payments i.e. the Balance of payments was in deficit for most of the period. There were marked deficits on the merchandise trade account due to adverse movements in Trinidad and Tobago's terms of trade. In fact the current account *deficits* averaged roughly 12 per cent of GDP over the period and ranged between *TTD 64.7 million and TTD156.7 million*. Forde and John⁶ reminded us that the *deficits were in fact financed by capital inflows throughout this period*. To cap it all, *gross international reserves fell to USD49.8 million in 1967 from USD75.6 million in 1964*. This represented a reversal of the trend in the previous period 1960 - 1963 when the reserves moved upward from USD177.5 million in 1960 to USD183.0 million in 1963.

2.1 The political economy and its external implications

The sub-period 1966 - 1967 may yet be considered a time when Trinidad and Tobago's economy experienced one of its sternest test in terms of reserve management, exchange rate policy, commercial and international trade policies and general Central Banking experience.

For starters (as the Americans will say) the TTD was linked to the £ sterling in a fixed relationship. The colonial heritage had led the experts to link their trade with £ sterling areas and adopt the £ sterling as the reserve or intervention currency in spite of the history of the Bretton World Agreement in the forties. The £ sterling by 1967 was devalued by 14.3% against the USD and other major currencies, but due to its commonwealth link and colonial past, the monetary authorities of Trinidad and Tobago decided to join the £ Sterling Area Agreement in 1967 because they felt it offered an element of stability monetarily and otherwise.

That is, the monetary authority agreed to maintain the existing fixed parity relationship with £ sterling in spite of the warning signs that the days of £ sterling as a reserve or intervention currency were numbered.

2.2 Certain serious concerns

The evidence also showed that one of the main concerns of the monetary authority in this period was the high proportion of £ sterling there was in the Trinidad and Tobago stock of reserve

⁶ See footnote 2.

currencies. This concern emanated from a number of emerging trends in the economy at the time e.g.:

- (i) the shift taking place in Trinidad and Tobago's pattern of trade to the USA from the £ sterling area as UK
- (ii) the emergence of non-sterling liabilities in Trinidad and Tobago's Banks
- (iii) rise in the demand for non-sterling foreign exchange mainly US Dollars
- (iv) the fact that nearly 50% of Trinidad and Tobago's external debt was in £ sterling in 1967 with the trend moving toward the dollar area.

In spite of these trends, the Trinidad and Tobago Monetary Authorities had to hold a large proportion of £ sterling in its foreign reserve portfolio to satisfy the conditionalities of the Sterling Area Agreement. *The agreement provided little if any flexibility for the monetary authorities in the management of the reserves. The decision to remain in the Sterling Area Agreement may have been driven by several factors and motives:*

- (i) the safety/security factor
- (ii) the transaction motive
- (iii) the liquidity motive

One is however tempted to settle on the safety and security factor.

2.3 Style of reserve management

It is extremely difficult to determine whether the Monetary Authorities had actually developed any style of reserve management in this period. The fact that the Central Bank of Trinidad and Tobago was only three years old, suggests that it really had not yet developed the expertise to manage reserves. Management may well have been done by the Ministry of Finance in those early days, especially when we know that there was no department or division in the Bank's organizational structure to manage the reserves. *It was only years later that the Central Bank of Trinidad and Tobago created its own foreign exchange division. A case was already made for the diversification of the foreign reserves portfolio in this period, but the monetary authorities chose to keep the portfolio largely in £ sterling.* The evidence confirmed that the monetary authorities were

basically risk averters. By the end of this period, it appeared as though the stage was set for the uncertainties of the 1970's that followed.

2.4 Purposes for holding reserves in this period

I will contend that the main purpose for holding reserves in this period under review was to meet payment obligations as they fell due. One is reluctant to suggest that the monetary authorities' decision to join the £ Sterling Area Agreement was to defend the external value of the TT Dollar or boost investor's confidence. However, taking into account the young age of the Central Bank of Trinidad and Tobago, it appeared that these two purposes were uppermost in their minds when the decision was made.

3. 1968 - 19 71 [PERIOD OF TRANSITION]

In analyzing this period, I will first attempt to capture the general economic conditions that prevailed and trace how they impacted on the Monetary Authorities' decisions in terms of reserve management. In reviewing this period, one is tempted to rename it a period of increased uncertainty because of the underlying deterioration in the general economic conditions at the time. Trinidad and Tobago was only in its sixth year of political independence at the start of the period and was really striving to create the conditions that would be favorable to industrial, financial and commercial growth. The economy in this period was primarily agricultural with its foreign exchange income coming from staple crops (cash) of sugar, coffee and cocoa. The main buyer of the cash crops was the UK, so the foreign exchange earned had to be £ sterling. The Authorities' plan was to effect a gradual change around to a mixed economy with a programme of industrialization by invitation (*a la* Arthur Lewis' economic thinking). However, the going was tough and this was clearly reflected in the movements in the stock of reserves. It fell from USD66.0 million in 1968 (year end) or roughly four months import cover to USD43.2 million in 1973 (year end) or roughly 2.3 months import cover. The stock of reserves averaged USD 59.0 million in the period. The decline in the stock of reserves was probably driven by:

- (a) the unfavorable macroeconomic conditions that prevailed in the period;

- (b) the decision to remain a member of the Sterling Area Agreement and;
- (c) the decline in prices of the staple cash crops in particular and commodities in general.

All signals had pointed to a change in Trinidad and Tobago's direction of trade, terms of trade and the emergence of US Dollar as the reserve currency. To emphasize the poor macroeconomic conditions, the GDP only advanced by 3.0% in the period under review compared with higher growth rate in the previous period. The terms of trade had worsened in spite of a brief increase in commodity prices after a period of low primary product prices in 1960. As suggested above, the dependence of the economy on the cash crops was declining as the earlier investments in the petroleum and petrochemical industry in the 1950's had begun to be realized in greater exports of petroleum and petrochemicals to the USA for USD foreign exchange. The general decline in economic activity was also reflected in the fact that the BOP's was generally in deficit with the current account deficit being financed by capital inflows.

Earlier, I alluded to the fact that Trinidad and Tobago was experiencing a *change in the direction of its trade*. For example, the UK share of exports and imports declined to 5 % and 11.3% respectively by 1973 while USA exports and imports had increased to 56.4 % and 16.3 per cent respectively.

3.1 Unemployment and social unrest

The level of unemployment rose in the 1968 - 1973 period compared with the earlier period as did the rate of inflation which averaged 6.8 per cent compared with 2.2 per cent in the previous period. The general adverse economic situation may have contributed to the social unrest that shook Trinidad and Tobago in the early 1970's. Unfortunately, the 1970's social unrest affected the economy very badly e.g. the loss of investors' confidence and the flight of capital that occurred.

3.2 In with flexible exchange rate and out with fix exchange rate

From an international perspective, the most important development in this period (1968 - 1973) probably was the movement away from a fixed exchange rate regime (as per Bretton Woods

Agreement) to a Flexible Exchange Rate regime. The US had closed its gold window (non-convertibility of USD into gold) by 1971; devalued its currency (the USD) and took measures to stop the flight of capital from the USA.

More importantly for Trinidad and Tobago, the Bretton Woods System of Fixed Exchange Rate ended in 1972 and by March 1973, the UK decided to float the £ sterling.

3.3 Increase in crude oil prices

Another major development in this period was the increase in the price of crude oil at the end of 1973. This price hike contributed to a marked increase in Trinidad and Tobago tax revenues due to the Trinidad and Tobago government's decision to receive its tax revenue for oil exports in US Dollars in 1973. This move not only ensured that the government will receive an increased supply of USD foreign exchange but more important there will be a return of investor's confidence in the Trinidad and Tobago economy.

3.4 That sterling area agreement

In view of the terms of the Sterling Area Agreement, and the longer-term increase of non-sterling debt, the Trinidad and Tobago authorities embarked on a policy of restricting the maturity of its £ sterling assets.⁷ "These developments resulted in some diversification of the portfolio and forced the Trinidad and Tobago monetary authorities to manage the MSP more closely. The very nature of the MSP however implied that its management was becoming quite burdensome, *for it meant that as the country's foreign reserves, grew. the amount of £ sterling held (in the Sterling Area Agreement) had to increase proportionally.* The lack of guaranteed accommodation in the UK capital market further exacerbated the situation. In this context, the country sought and obtained only a modest easing of the MSP over the period. In 1971 the proportion was relaxed to 72.0% and in 1974 to 64 %.

Other allowances were also secured for breaches in the proportion e.g. net proceeds of official borrowings in non-sterling were only included in the definition of official reserves after three months of receipt of the proceeds". *The Sterling Area Agreement proved to be a major constraint on the Monetary authorities ability to en-*

⁷ See footnote 2.

gage in meaningful reserves management. In reality it proved to be counter productive and inhibited the development of the country.

3.5 Management of international reserves

The Monetary authorities were generally passive in their approach to reserves management in this period. They were obviously concerned with the liquidity factor and opted for safety and security. Their failure to act on the information that the direction of trade was now shifting to the USA and that the main reserve currency required was the US Dollar probably contributed to the lack of any real action on their part.

3.6 The impact of an increase in crude prices in USD on the stock of international reserves

Prior to the decisions to receive oil tax revenue in USD, the stock of reserves was generally on the decline. However when crude oil prices increased the picture changed dramatically. The Investment Committee though still following a passive policy driven by the objectives for safety and security and liquidity realized that due to the increase flow of USD foreign exchange, its import cover had expanded to roughly twelve months. The degree of tolerance in the economy had therefore widened and recognizing this fact, it appeared that the Investment Committee decided to tranche the portfolio in such a way as to ensure an optimal balance between liquidity and other objectives as income.

The reserve managers were not actively managing the portfolio in this period of time. They continued to rely on external managers or brokers. It appears that the main responsibility of the Investment Committee at this time was to manage the portfolio in such a way as to minimize currency, exchange rate, credit and liquidity risks. It basically had to adjust the credit exposure, currency composition and duration within certain limits that did not necessarily relate to any *benchmark portfolio*.

4. 1974 - 1981 [THE SO-CALLED GOLDEN AGE]

This period began with the quadrupling of oil prices internationally; a situation that positively informed the coffers of the Central Government of Trinidad and Tobago. Because of this develop-

ment, there was a marked change around in the fortunes of Trinidad and Tobago in terms of:

- (i) foreign reserves accumulation;
- (ii) increase spending on capital projects by the Central Government (due to increased Government tax revenue)

The increased tax revenues pushed the fiscal accounts into surplus and as the Ministry of Finance monetized the increased holdings of foreign exchange. (USD) it also increased the level of government expenditures bar leaps and bounds There was a general increase in economic activities that in the end fueled the rate of inflation as too much money was simply chasing too few goods. The economy experienced demand-pull and wage-push inflation.

The inflation rate averaged 14.4% p.a. in the period 1974 - 1981 compared with 2.4% average in the 1960's. Real GDP also expanded by 6.2% p.a. and employment declined significantly in spite of the wage inflation that was prevalent. Foreign reserves also expanded significantly rising to USD 3202.5 million by 1981 from USD 34.0 million in 1973. The stock of reserves in the period 1974 - 1981 represented an average import cover of twelve months that from all comparison was impressive since it meant that the degree of tolerance in the economy had widened significantly.

4.1 The beginning of the marked increase in foreign debt

The latter part of this period also marked the rise of Trinidad and Tobago's external borrowing by the Central government, and state enterprises. *For example, external debt rose from USD 436.6 million in 1980 to USD 1061.7 million in 1986.* The oil boom (increase USD income flows) enhanced Trinidad and Tobago's ability to service its external debt in the late 1970's and early 1980's. Accumulated surplus (savings) plus foreign borrowings financed the various capital projects in this period. *Holding on to a prediction that crude oil prices will rise to USD 50 per barrel, the authorities were literally sucked into an expansionary programme designed to upgrade the infrastructure to facilitate an industrial based economy.* The reality was that the USD 50 per barrel of crude oil never materialized.

4.2 The infrastructure to manage the foreign reserves in the Central Bank of Trinidad and Tobago

In addressing this caption, one would like to touch on the issue

of centralization versus decentralization as it pertains to decision making in an environment of reserve management. The experts had advised that there is no universal solution to this issue and that in the final analysis Central Banks tend to fall somewhere between the two extremes of making all decisions through committees like its Investment Committee and then allowing individual members (in a reserve team) to effect the decision. To my mind, this aptly described the mechanism used by Caribbean Central Banks to manage their reserve portfolio. Given that they are very small in comparison to larger Central Banks, *the Central Banks in the Caribbean seemed to have relied on external brokers to effect the decisions of the Investment Committee.* The person or persons in the Foreign Investment divisions in the role of managers have very little, if any, independence in decision making. He or she is knowledgeable in trading and monitoring information on the various markets. However, this information is fed back to the investment committee for policy decisions even though they are given some discretionary powers (with a given margin of error) to execute certain decisions on their own.

In this period 1974 - 1981, the Central Bank recognizing that there was general accumulation of foreign exchange reserves decided to move with purpose to address the *problem of administrative processes in reserve management.* *The experts advised that the weaker and more disjointed the infrastructure with respect to reserve management, the less effective will be the reserve management effort and the greater the potential for error and losses. On the other hand, the more experienced the reserve management team and the more sophisticated are the controls and support systems in the Central Bank, the easier it will be to devolve decisions to individuals.*

So against a background of rising stock of reserves, the Central Bank of Trinidad and Tobago established a unit with the sole responsibility to monitor and manage the foreign reserve portfolio. The unit was known as the Foreign Exchange division. *The Board of Central Bank of Trinidad and Tobago also established an Investment Committee in 1974, to formulate policy on reserve management and guidelines for the operation of reserve management. The Board's primary concern was security, liquidity and management of exchange - rate risks.*

4.3 Autonomy to manage foreign reserves' portfolio

With the bitter experience of their ineffectiveness in the Sterling Area Agreement to manage their reserve portfolio as they would have preferred, it came as no surprise when the Central

Bank of Trinidad and Tobago for the first time decided to assume control of the management of its foreign reserve portfolio. With an infrastructure in place, the Central Bank of Trinidad and Tobago undertook to diversify the portfolio into various currencies in order to better manage its currency risks. *The Investment Committee in the period under review* was also mindful of the foreign currency liabilities of the Central government, so it took a policy decision to minimize exchange-rate risks by matching the currency composition of assets with the foreign liabilities.

Yet another way the Committee sought to manage exchange-rate risks was to *engage in forward transactions*. By the end of the period, Trinidad and Tobago's foreign reserve portfolio was held in all the major currencies. (a form of hedging)

Balances were also spread among the many top-rated institutions in the major financial centres and longer-term investments were held in government and government-guaranteed bonds (sovereign paper). The very size of the reserve portfolio demanded that the Board of Central Bank of Trinidad and Tobago had to give more attention to administrative and operational levels of reserve management.

One is at a loss in describing the style of reserve management in this period 1974 - 1981. Initially, (at the start of the period), I believe that the style was passive and gradually became moderately active as the accumulation of reserves gathered pace. There is no evidence that the Board of Central Bank of Trinidad and Tobago ever instituted a model portfolio or benchmark to measure the performance of the reserve management team or the Brokers in this period.

The evidence available suggests that even when the style was moderately active, the Central Bank of Trinidad and Tobago relied on external brokers to effect its decision. It was only later in the period 1982 - 1988 that the Central Bank of Trinidad and Tobago opted to manage its own portfolio with less assistance from foreign brokers.

5. 1982 -1988 ECONOMIC RECESSION

This period was characterized by a series of negatives rather than positives. However, one is reluctant to use the term economic recession. One rather view this period as one where there was a sharp contraction in the absorptive capacity of the economy as resources began to dry up. Once again, it was the economic picture

that really informed the overall actions of the Monetary Authorities in this period. The evidence showed that the terms of trade began to deteriorate markedly in this period e.g. net terms of trade fell from 121.1 [1974 = 100] to 81.0 between 1981 - 1986. This development was quickly translated into external disequilibria. This period also marked the beginning of eight (8) years of falling output which was reflected in a decline in GDP of an average of 3.0 per annum.

5.1 Stock of reserves - import cover

By 1983 the import cover (reserves) declined to an average of 9.9 months from 12 months earlier and by 1987 to an average of 0.8 months. This was a precipitous decline and reflected a mark reversal in the inflow of foreign exchange. In this period there was a corresponding increase in government borrowing. This new development forced the Central Bank of Trinidad and Tobago to effect a paradigm shift in reserve management policy i.e. *from asset management to liability management as the situation worsened and foreign borrowing increased.*

5.2 Demand management of scarce foreign exchange reserves

By having a fixed exchange rate relationship with the US Dollar, Trinidad and Tobago was actually defending the external value of its currency when it sought to carefully manage the use of its declining stock of reserves. In this period, the Central Bank introduced a foreign exchange allocation system where it sought to apportion the available stock of reserves among competing demanders. Importers and other demanders had to seek prior approval for release of foreign exchange from the infamous Exchange Control division. With supply of foreign exchange drying up, this policy was essential to ration the limited stock. The reality was that the economy was structurally imbalance and needed a policy change to address this imbalance with a view to improving the supply situation.

5.3 Supply measures

Faced with an accelerating decline in supply of foreign exchange, the Monetary Authorities made yet another policy shift i.e. the use of exchange rate as an instrument of monetary policy. By December 1985 the Monetary Authorities devalued the TT

Dollar against the USD but decided to introduce a two-tier⁸ exchange rate system i.e.

TTD3.60 = USD1.00 (general transaction)

TTD2.40 = USD1.00 (special/specific transaction)

This was more a policy of indecision, since it created more problems than it resolved. It was therefore no surprise when the Monetary Authorities unified the exchange rate TTD3.60 – USD1.00 in 1987. However, by 1988 as the supply situation worsened, the Monetary Authorities devalued yet again to TTD4.25 = USD1.00.

5.4 Use of credit facilities

To enhance the supply of foreign exchange, the Central Bank of Trinidad and Tobago and the Ministry of Finance initiated yet another policy change. On this occasion, they decided to use available credit facilities to increase the supply of foreign exchange. The Central Bank of Trinidad and Tobago accessed credit lines from Venezuela (FINEXPO), the Caribbean Development Bank (CDB), and Banco Latino Americano de Exportaciones (Bladex) in 1988.

The net outturn of this decision was that external debt grew from USD1292.0 million in 1982 to USD2395.7 million in 1988. One third of the external debt was denominated in yen. This had a significant impact on Trinidad and Tobago foreign exchange exposure and reserve management in the years ahead. Between 1978 - 1988, Trinidad and Tobago raised approximately 60,000 million yen in medium term bonds.

5.5 Reserve management - investment policy

The Central Bank of Trinidad and Tobago in this period, chose to manage its own portfolio rather than employ external managers as this was considered the preferred way to develop expertise in the financial markets of the world. The reserve managers entered into a number of currency and interest rate swap during this period in order to manage some of the exposures resulting from government's external borrowing.

⁸ Two-tier exchange rate policy normally benefits a Central Bank's bottom line.

The reserve manager also shortened the maturity profile of the portfolio(s) in the face of projected high debt servicing costs. Earlier, I alluded to the fact that the policy shift was from asset management to liabilities management. In this period, it was also observed that the Investment Committee remained committed to its early goals of diversification of the portfolio in the context of Trinidad and Tobago exchange rate exposures. The Committee was also concerned during this period with enhancing the earnings of the portfolio in the face of declining supply of foreign exchange. The evidence available does not show that this policy was followed for any period of time by the reserves managers. By the end of the period, gross foreign reserves fell to USD79.1 million (1988), a situation that prompted the government to take the necessary steps to seek assistance from the I.M.F. to reschedule its debt due between 1988 and 1992.

Through this period, the Investment Committee's paramount objective remained security and liquidity. The main purpose for holding reserves during this period had to be to service external debt and enhance credit worthiness. *The fact that consideration was given to seek I.M.F. assistance to reschedule the debt service payment due between 1988 and 1992 suggests that liabilities may have substantially exceed the reserves, hence the need for liquidity matching in structuring the portfolio. They probably did split the portfolio in various tranches to reconcile the conflicting objectives of liquidity, liability matchings and higher yield. The Managers certainly had the portfolio split up into liquidity tranche, Income tranche and probably an investment tranche. They did not use derivatives instruments to reconcile conflicting objectives.*

6. [1989 -1993 - FROM ECONOMIC ADJUSTMENT TO LIBERATIZATION]

The overall performance of the Trinidad and Tobago economy in this period 1989 - 1993 should be considered mixed. The economy went into a decline in the late 1980's which precipitated the government's move to seek assistance from the I.M.F. and the World Bank to halt the decline. Between 1989 - 1991, Trinidad and Tobago entered into two I.M.F. Standby - programmes and a structural adjustment loan with the World Bank.

In the first I.M.F. Standby Agreement, the country drew down SDR 85 million under the I.M.F. Compensatory Financing Facility (CFF) due to the collapse of oil prices in 1986. In 1989 it also drew down 99 million and in 1990 SDR 85 million. These loans

were obviously designed to arrest the decline in the balance of payment and create the leverage to adjust the domestic economy. Trinidad and Tobago had to meet several quarterly macroeconomic targets to satisfy I.M.F. conditionalities for the loans e.g. fiscal deficit, net international reserve, net domestic assets, net credit to public sector, a limit on draw down on new loans. These two adjustment programmes were the culmination of adjustment exercises which began with the Demas Task Force Report in the early 1990's.

6.1 The impact of the LM.F. programme

The impact of the I.M.F. Programme was immediate on the Balance of payments. For example there were immediate improvements in both the merchandise and current accounts as well as a reduction in the overall balance of payments deficit.

6.2 The gulf crisis

This crisis and the I.M.F. adjustment programme proved to be a God sent. The crises of 1990's helped Trinidad and Tobago to achieve its highest merchandise trade surplus ever and produced surpluses in the overall current account of the Balance of Payments. As a result there were major improvements in the overall Balance of Payments in 1989 and 1990. This improvement can be partly attributed to the increase in oil prices as a result of the Gulf Crisis.

The data available showed that Trinidad and Tobago foreign reserves actually registered an upward trend between 1989 - 1993 moving from USD378.0 million or 3.8 months import cover in 1989 to USD446.0 or 4.7 months import cover in 1993. In fact, the small deficit that was recorded on the current account in 1991 was turned into surpluses in 1992 and 1993. Trinidad and Tobago had a Balance of Payments surplus (overall) of USD1513 million in 1993, the first since 1981.

6.3 Impact of the adjustment programmes

Generally, it can be argued that the adjustment programmes contributed to a general improvement in the external reserves position of Trinidad and Tobago. However, this was clearly offset by the resumption of previously rescheduled foreign debt payments. Following the initial I.M.F. standby Agreements, there

were four rescheduling agreements signed between Trinidad and Tobago and its major creditors. The restructuring period commenced in September 1988 and the last one ended on September 1992. *As a result the debt bunching which probably would have happened in the 1988 - 1990 period, was pushed forward to 1992 - 1994 as a result of the rescheduling exercise.*

6.4 More short-term debt

Between 1992 - 1994, the evidence revealed that Trinidad and Tobago raised some USD375 million in Eurodollar loans while an informal adjustment programme was followed to meet certain targets. Trinidad and Tobago also accessed a World Bank Structural Adjustment loan that helped it to accelerate movements towards trade and financial liberalization in the economy.

6.5 What about the management of international reserves?

"The investment policy in the period 1989 - 1993 was driven by the heavy burden of debt servicing which affected all aspects of the reserve portfolio i.e. its currency composition and maturity profile, etc. One has to assume that the policy during this period was liability management rather than asset management.

However, the information available suggests that the earnings of the portfolio assumed greater importance in the 1989 - 1993 period simply because the Investment Committee and the reserve team were operating with relatively lower levels of reserves. The style of reserve management was moderately active in that consideration was given to a wide range of investment and hedging instruments available on the markets with a view to meeting liquidity objectives and enhancing yields.

6.6 Risk management

One is still not sure from the evidence available whether the Central Bank and its Investment Committee continued to independently manage the international reserves of Trinidad and Tobago in this period 1989 - 1993. *However, it was observed that in the environment of relatively low level of reserves and the need to service an expanding external debt, it became necessary for the Board and the Investment Committee to clearly define management's attitude to risk and indeed all other aspects of the Bank's investment policy. The Central Bank of Trinidad and Tobago updated its written statement of investment policy*

including a definition of an appropriate benchmark for the return on the portfolio. The available evidence does not confirm that the Central Bank actively used benchmarking to measure the performance of the investment managers. One is not disputing that the investment policy included a definition of an appropriate benchmark for the return on the portfolio, but there is no clear evidence that this practice was really effected. It would be instructive if Trinidad and Tobago can look at the exercise undertaken by the ECCB in 1995/1996 to improve its techniques of managing international reserves and measuring the performance of this investment managers by adopting the appropriate benchmarking approach.

In spite of all that was said and done, the evidence available in the period 1989- 1993, is that the Central Bank of Trinidad and Tobago remained a risk-averse institution and refrained from participating or using some of the more sophisticated products in the market as derivatives. What the Investment Committee and managers did was to hedge some of the interest rate exposures through swaps and the purchase of interest rate caps. It seems that during this period, the investment policy was driven by the objectives for safety and liquidity. The management of risk was clearly the primary concern of the Investment Committee in view of Trinidad and Tobago's external liabilities.

6.7 Floating of the exchange rate

Earlier on, I alluded to the fact that Trinidad and Tobago accessed a World Bank Structural Adjustment loan which assisted it to accelerate movements toward trade and financial liberalization. The evidence available showed that the old negative list was gradually abandoned and by April 1993 the Central Bank suspended all foreign exchange trading until April 13, 1993, to put in place a new set of exchange rate arrangements under which the value of the TTD would be determined by market forces. The Exchange Rate was now determined by the Interbank rate. Between 1993 and late 1996, the general opinion was that the Exchange Rate was managed by the Authorities (a managed float). In recent times, one can argue that the price of money (Exchange Rate) has been influenced by market forces, more so than in the past. *One expects that the Central Bank's main objective in this scenario is to target the inflation rate and effect monetary policy that will ensure that the rate of inflation is kept within single digit limits.*

The period 1993 - 1996, saw the level of reserve continue on an upward trend from USD678.9 (or 5.9 months import cover) to

USD930.3 million (1996) or 5.2 months import cover, averaging USD756.5 million per annum.

Unfortunately in this period, the exchange rate generally moved lower as market forces impacted on the scarce supply of foreign exchange.

7. CONCLUSION

The experts have advised us that small Central Banks as the Central Bank of Trinidad and Tobago normally face severe external constraints with persistent low reserves' levels which do not justify the introduction of sophisticated investment techniques and policies. They also suffer from a host of other constraints or limitations e.g. shortage of skilled personnel, lack of adequately developed capital markets, remoteness from the main financial centres of the world, over conservatism. All these constraints do work individually and collectively to hinder the development of effective and efficient reserve management team(s). In the sub-periods, just reviewed, we observed that the Central Bank of Trinidad and Tobago gradually developed the support structures to manage its reserves effectively. Unfortunately there was no evidence that the Investment Committee used performance benchmarks to measure the performance of its reserve management of over the years. It may be helpful if the Central Bank of Trinidad and Tobago would look at the recent examination of the ECCB reserve management policy and execution where the whole support structure was reorganized and benchmarking was introduced to measure performance. Central Bank of Trinidad and Tobago can also learn a great deal from Singapore where policy was put in place to develop the local capital market and encourage the expansion of a wide range of financial instruments to offer to savers. In the final analysis reserves management is driven by the Authorities overall macroeconomic stance as Singapore has shown. In this small island state, the policy was to generate a high level of savings (sometimes mandatory in public and private sectors) and use the surplus to drive its economic growth that was export led.

The net result was that as the economy grew overtime, it generated more and more foreign exchange incomes through a high volume of exports. This gave the Authorities the leverage to be more dynamic in their investment policies and management of reserves. The Singaporean Authorities did not subsume the pre-

cautionary and wealth motives by consideration of liquidity as their reserves accumulated overtime.

Appendix

TABLE 1. MOVEMENT OF INTERNATIONAL RESERVES

<i>Sub-period early beginning</i>	<i>Gross international reserves</i>		<i>Import cover months</i>	<i>Oil price US\$</i>
	<i>TT\$M</i>	<i>US\$M</i>		
1964	130.2	75.6	3.8	1.33
1965	99.2	57.7	2.8	1.33
1966	83	48.4	2.5	1.33
1967	87.3	49.8	2.8	1.33
Average	100.1	57.87	3.0	1.33

TABLE 2. PERIOD OF TRANSITION

1968	132.8	66.0	4.0	1.33
1969	126.5	62.9	3.2	1.28
1970	106.6	53.0	2.3	1.30
1971	156.3	79.7	2.7	1.65
1972	110.4	57.5	1.6	1.90
1973	67.1	34.2	1.0	2.70
Average	166.65	58.88	2.5	1.69

TABLE 3. THE GOLDEN YEARS

<i>Year</i>	<i>TT\$M</i>	<i>US\$M</i>	<i>Import cover</i>	<i>Oil price US\$</i>
1974	698.3	340.6	4.4	9.76
1975	1640.1	755.8	12.2	10.72
1976	2125.0	870.9	12.1	11.51
1977	3204.1	1335.0	16.3	12.40
1978	3950.8	1646.1	16.6	12.70
1979	4837.8	2015.7	15.9	17.26
1980	6336.7	2640.2	15.8	28.67
1981	7687.2	3202.5	19.5	32.50
Average	3810.9	1600.85	14.1	16.94

TABLE 4. ECONOMIC RECESSION

1982	7160.1	2983.3	12.9	33.47
1983	7998.4	2082.6	9.9	29.31
1984	2850.00	1187.5	7.4	28.47
1985	3579.9	994.4	11.5	28.00
1986	1184.5	329.0	4.1	14.87
1987	284.9	79.1	1.5	19.14
1988	865.3	203.6	2.5	15.95
Average	2989.01	1122.79	7.1143	19.36

TABLE 5. STRUCTURAL ADJUSTMENT AND LIBERALIZATION OF TRINIDAD AND TOBAGO (FOREIGN EXCHANGE MARKET)

<i>Sub-period</i>	<i>TT\$M</i>	<i>US\$M</i>	<i>Import cover</i>	<i>Oil price US\$</i>
1989	1606.5	378.0	3.8	19.50
1990	2472.6	581.8	6.3	24.12
1991	1868.7	439.7	3.6	21.62
1992	1343.4	316.1	3.2	20.57
1993	2601.9	446.0	4.7	18.45
1994	3,988.54	678.9	5.9	17.14*
1995	2,569.63	660.3	4.2	18.44
1996	5,571.85	930.3	5.2	22.20
Average	1978.62	432.32	4.32	20.26

* West Texas Intermediate.

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