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FISCAL POLICY
AND
THE EXTERNAL ACCOUNTS:
A NEW ZEALAND ANALYSIS

A Thesis
submitted in partial fulfilment
of the requirements for the Degree
of
Master of Agricultural Commerce
in the
University of Canterbury

by

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ABSTRACT

This thesis presents a New Zealand analysis, at the aggregate level, of the impact of fiscal policy on the external accounts. The theme of this research is to disclose a new method of formulating the balance of payments. There are seven chapters. The initial four chapters investigate and review: the background of the economic problem; approaches to balance of payments analysis; the state of New Zealand's balance of payments; and the impact of fiscal policy in New Zealand. The final three chapters: review previous analytical models; develop a simultaneous equation policy simulation model; and use the model to analyse the inter-relationships between Government expenditure, its consequent financing and impact upon both the private and the Government sectors' net current account position. The thesis highlights the impact of the Government's invisibles deficit, resulting from increased external borrowing, on the external current account. The major conclusion is that fiscal policy should not be used to insulate the economy from fluctuations in the external accounts, especially when financed by external borrowing.
KEYWORDS

Fiscal policy, Government debt interest payments, 'invisibles' account, money multiplier, private sector's demand for imports, policy simulation, real monetary disequilibrium.

************
"The crucial point is that whenever Government tries to do something it always involves some people spending other peoples money for the benefit of third groups. And nobody spends someone else's money as carefully as he spends his own."

Milton Friedman

"I place economy among the first and most important virtues, and public debt as the greatest of dangers....we must make our choice between economy and liberty, or profusion and servitude. If we can prevent the Government from wasting the labors of the people under the pretence of caring for them, they will be happy."

Thomas Jefferson
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CHAPTER 1

GENERAL INTRODUCTION

1.1 Background

New Zealand's balance of payments always receives special attention in contemporary economic policy. Such importance is placed, not because a balanced external account yields utility in itself, but because a chronic external deficit represents a constraint on the achievement of internal objectives, such as economic growth and employment. The fact that our current payments for imports have exceeded our current receipts for exports in all but three of the last twenty years has given rise to a string of policies designed to improve our position\(^1\). These policies have, in the main, acted as fiscal incentives designed to entice exporters to increase production or sell less on the domestic market, thereby expanding our export receipts.

---

1 New Zealand Statistics Department balance of payments figures, years ending March, are used for this calculation. These accrual figures should be distinguished from the Reserve Bank of New Zealand's overseas exchange transaction data which are derived using a cash flow basis.
The long-term decline in our terms of trade and high rates of internal inflation (leading amongst other things to reduced export competitiveness and increased imports) are the two usually cited causes of New Zealand's recent sluggish economic performance (Table 3.6 presents a summary of New Zealand's economic indicators). For example, Muldoon (1983) suggested that "we have experienced high levels of inflation and unemployment caused substantially by a serious decline in our terms of trade and consequent balance of payments difficulties" (p.1). However a decline in the terms of trade (see Muldoon, p.30-31) does not adequately explain continued disequilibrium in New Zealand's external current account. As a small country New Zealand must accept that export income is subject to variations. In the short-term there are two buffers to absorb any income change, viz. running down reserves of overseas funds held by the Reserve Bank, and borrowing overseas. The natural mechanism that adjusts a country's spending to its income - a general weakening of economic activity and thereby reduced spending on imports - has not fully occurred in New Zealand. Governments have persistently endeavoured to insulate the economy against downward fluctuations in activity in the interests of sustaining high levels of employment and production. This has usually been achieved by fiscal stimulus which, at least
since the first oil shocks in the early 1970's, has led
to large domestic budget deficits. In turn, this has
apparently exacerbated the external deficit.

All countries must eventually achieve balance in their
overseas accounts. A chronic balance of payments deficit
cannot be sustained indefinitely, although some
developing countries have certainly been able to carry
external deficits for many years due to rescheduling of
debt servicing payments and principal repayments. In the
case of a small developed country like New Zealand,
persistent current account deficits make financing more
difficult over time. In 1977 Low stated "(r)egular
official borrowing by a developed country, continuing in
relatively good times, will sooner or later be
questioned by the people from whom we borrow, and our
credit standing could suffer" (Taylor, 1977, p.64). The
1983 move by Standard and Poors which downgraded New
Zealand's credit rating from AAA to AA+ and the small
drop in New Zealand's credit rating reported in a survey
of international bankers in the International Investor¹,
are timely reminders of this. Continued increases in
external indebtedness (through "official" - Government

¹ See Appendix 8
and Reserve Bank - overseas borrowing or private overseas borrowing in New Zealand) will entail increasing debt servicing costs which themselves contribute to current account deficits. The general conclusion is that there are limits, albeit poorly defined, to which a small country can borrow overseas to sustain a chronic balance of payments deficit.

1.2 Purpose of Study

The aim of this research is to investigate, at the aggregate level, the impact of fiscal policy on the external current account balance. Other alternative approaches to balance of payments policy range from increasing protection to a major devaluation. Frameworks used in analyses include partial and general equilibrium models, and their theoretical bases cover classical, Keynesian and monetarist grounds. However, the theme of this study is to present a new method of formulating the balance of payments. The approach taken is to assess the balance of payments problem by examining the public and private sector contributions to New Zealand's balance of payments deficit. As Corden (1977) stated, "just assume for the purposes of discussing balance of
payments issues, that the private sector knows what it is doing and what is good for it as far as spending and savings decisions are concerned" (p.45). Then the spotlight is turned on to the deficit incurred by the public sector. Congdon (1982) remarks, "the central misunderstanding of traditional theories has been to regard the balance of payments problem as distinct from the problems of the budget deficit and Government debt sales" (p.1).

The main hypothesis is that Government deficit spending and its financing, impact directly and indirectly on the external current account. An important implication of the study is that previous policies, chiefly those providing fiscal incentives to exporters, have not, and could not have, effectively reduced the external constraint, because they have added to the fiscal deficit rather than reduced it.

1.3 Outline of Thesis

To facilitate the analysis of the main hypothesis, it is necessary to review and discuss the relevant theoretical
and empirical backgrounds of balance of payments and fiscal policy. In Chapter 2, alternative theoretical frameworks for discussing balance of payments analysis are presented. The following Chapter presents the empirical features of New Zealand's external condition. In addition, the economic problem is assessed, and the nature of the policy-makers' dilemma - choice between conflicting objectives - is discussed. In Chapter 4, the stabilization role and impact of fiscal policy is discussed. Both Chapters 3 and 4 provide the empirical background necessary to provide the basis for the 'fiscal approach to the balance of payments' used in the model presented in Chapter 6. In Chapter 5, previous analytical frameworks used to examine balance of payments policy are briefly reviewed. The results from these alternative qualitative and applied models are discussed. A small econometric model, designed for policy simulation, is formulated in Chapter 6. A significant departure from other frameworks used to analyse the external constraint is the formulation of an aggregate private import equation. The coefficients in the simultaneous equation model are initially estimated. In Chapter 7, an amended set of hypotheses are tested, the model is simulated, and conclusions are offered, along with areas for future research.
CHAPTER 2

A SKETCH OF THEORETICAL APPROACHES TO THE BALANCE OF PAYMENTS

There are several good discussions of the various approaches to balance of payments analysis, notably Deane (1982), Frenkel and Johnson (1976), Gawith (1977), IMF (1976), Johnson (1976, 1977), Michaely (1980) and Thirlwall (1980). Therefore in this chapter an introduction to current alternative theoretical approaches to balance of payments analysis are presented.

2.1 The Classical Automatic Mechanism and Purchasing Power Parity

The earliest view of international monetary theory advocated that, through import substitution and export promotion policies, a country could resolve any balance of payments deficit problem. The first rebuttal of this approach came from Hume\(^1\) using the price-specie-flow

---

1 David Hume was an 18th century economist. Reprints of his letters and essays can be found in Rotwien (1955)
mechanism. Hume claimed that an automatic adjustment would take place to correct a payments imbalance. His reasoning followed these lines: if a country was in external surplus then it would accumulate gold (external reserves), which would translate into an expansion of the domestic money supply, a rise in domestic prices and a reduction in the balance of payments surplus as imports became relatively cheaper and exports became relatively more expensive. Where a country had an external deficit, a loss of gold would lead to a contraction of the money supply, a fall in domestic prices and an improvement in the balance of payments as imports became relatively more expensive and exports became relatively cheaper.

The classical monetary theory assumed a system of fixed exchange rates, these rates being attached to a gold measure. However, as Thirlwall points out, "the classical approach to balance of payments adjustment contained no analysis" and this was "more relevant after 1931 when the gold standard collapsed" (p.67). Therefore the approach did not indicate appropriate exchange rate policy and was succeeded by the purchasing power parity (hereinafter PPP) theory of exchange rate determination. This theory was initially promoted by Cassel (1918) and
has been reviewed by Officer (1976).

The PPP theory has two versions. From Michaely, "(o)ne - earlier and more 'primative' - states that equilibrium exchange rates would be those that make price levels equal everywhere" (p.34). The assumptions required for this version are obviously quite restrictive. That is, we need to assume zero transportation costs and have all goods as tradables. The second version offers more. It essentially focuses on the maintenance of relative exchange rates, where any price level changes between countries are represented by "appropriate" changes in exchange rates.

The relative PPP theory has also been subject to criticism. There is a problem of finding a 'normal' base period "with the ideal being when absolute price parity existed" (Grimes, 1979, p.3), the task "being particularly difficult under a fixed exchange rate regime" (p.4). There are also good reasons why the exchange rate and its PPP might be different. Grimes outlines trade restrictions, speculation in the foreign exchange market, inflationary expectations and Government intervention in the foreign exchange market.
(to support a disequilibrium level of the exchange rate) as causes of divergence, these all restricting the relevance of the PPP theory.

It should also be noted that the PPP theory does not involve fiscal or monetary policy explicitly in the formulation of the approach. With respect to the monetary policy linkages via prices, Frenkel (1978) writes "(m)uch of the controversy concerning the usefulness of the PPP doctrine is due to the fact that the doctrine does not specify the precise mechanism by which exchange rates are linked to prices... as a result the doctrine has been subjected to different interpretations" (p. 169). Therefore the scope for PPP is in examining the prospects of exchange rate changes in dealing with the balance of payments problems, as opposed to analysing the effectiveness of alternative fiscal, monetary and exchange rate policy settings.

2.2 The Elasticity Approach and the Keynesian Multiplier

The development of the elasticities approach, which focuses on examining the responsiveness of the supply
of, and demand for, imports to exchange rate changes, was largely to produce a theory for balance of payments adjustment under flexible exchange rates. The analysis is carried out under a partial-equilibrium framework focusing on the price elasticities of demand for exports and supply of imports.

The Marshall-Lerner condition provides conditions for a "successful" devaluation. The condition rests on several restrictive assumptions. Firstly it is assumed that trade is initially balanced and that policy changes in the exchange rate are small. Secondly, as previously stated, the analysis is partial because only the effect of exchange-rate variations in the market for exports and imports is considered, all else is held constant (including the demand curves for exports and imports). Thirdly the Marshall-Lerner condition assumes that all the elasticities of supply of output are infinite, and finally the approach ignores the monetary effects that result from changes in the exchange rate.

On the weight of the above assumptions, the Marshall-Lerner formula derives the condition that a devaluation will improve the balance of payments on
current account if:

$$e_m + e_x > 1$$ \hspace{1cm} (2.1)

where

$$e_m = \text{ the price elasticity of demand for imports;}$$

and

$$e_x = \text{ the price elasticity of demand for exports}$$

Two problems with this approach have been noted. First the estimation of trade elasticities relies on consistent econometric results which, due to demand and supply shifts, may be biased. Orcutt (1950) discusses the sources of downward bias that may lead to elasticity pessimism. But in response to Orcutt's points Thirlwall states, "it can be concluded that while biases may exist in the aggregate price-elasticity estimates, they may go either way, depending on the data used and on the equation specification (p.97).

The second problem is that of the implied \textit{ceteris paribus} involved. The elasticity approach fails to
describe the impact a devaluation would have on internal economic activity, especially incomes, invisibles, capital movements and the consequent decisions to spend or invest. The common version of elasticity analysis holds output constant and therefore implicitly assumes that a devaluation would correct an imbalance of excess expenditure over income. According to Johnson (1976) "(t)he most natural assumption, though one that underlines the unreality of the necessary assumptions of the analysis, is that the proceeds of any increase in exports and the savings from any decrease in import expenditure (noting that a smaller quantity of imports might be outweighed by a higher domestic currency price) are simply added to domestic savings or more accurately reduce domestic dissaving" (p.449-450). Therefore the elasticities approach tends to neglect the multiplier effects or income effects of a devaluation. It should also be noted that the effectiveness of fiscal, monetary and income policies as instruments to improve a balance of payments imbalance cannot be gauged using the elasticities framework.

Due to the inadequacy of the elasticity theory, subsequent enhancements included the addition of a Keynesian multiplier. This approach allows "for the
implications of changes in expenditure on output, income, expenditure and again output for balance of payments equilibrium" (Johnson, p.450). To adapt the Marshall-Lerner condition for income effects, it is necessary to make imports and exports a function of income as well, lowering the effect of a devaluation on the balance of payments. For example, following Thirlwall's presentation

\begin{align*}
Y & \equiv A + (1 - s) Y + B/r \\
B & \equiv rX - M
\end{align*} (2.2) (2.3)

where

\begin{align*}
Y & = \text{nominal income} \\
A & = \text{autonomous nominal expenditure} \\
s & = \text{marginal propensity to save} \\
B & = \text{balance of payments measured in foreign currency} \\
r & = \text{exchange rate} \\
X & = \text{exports measured in domestic currency} \\
M & = \text{imports measured in foreign currency}
\end{align*}
Equation (2.3) can be differentiated with respect to a small change in the exchange rate. So that

\[
\frac{dB}{dr} = X + r \left( \frac{\partial X}{\partial r} - \frac{\partial M}{\partial r} \right) \tag{2.4}
\]

Rearranging the right hand side variables and expressing them in terms of elasticities (2.4) provides

\[
\frac{dB}{dr} = X(l - e_x - e_m) \tag{2.5}
\]

which forms the basis of (2.1), the Marshall-Lerner condition.

Incorporating the income effects involves adding the marginal propensity to import term, m, to equation (2.5). This gives

\[
\frac{dB}{dr} = X(l - e_x - e_m) - mY
\]

or

\[
\frac{dB}{dr} = X(l - e_x - e_m)dr - m(dY) \tag{2.6}
\]

Given that there is no change in nominal autonomous expenditure \(dA = 0\). Equation (2.2) provides

\[
dY = dB/sr
\]

Therefore (2.6) becomes

\[
\frac{s}{s + m} \cdot X(l - e_x - e_m)dr \tag{2.7}
\]

---

1 As long as: trade is initially balanced; and the domestic price of exports remains unchanged; and the foreign price of imports remains the same.
Clearly from (2.7) the sign of the Marshall-Lerner condition is unchanged but, because $0 < s/(s + m) < 1$, the magnitude of the change in dB will be smaller than when the expansionary effects are overlooked.

Johnson however, using a diagramatic approach states that "(t)he balance of payments will improve only if the multiplier effect of higher output on total domestic expenditure (domestic goods plus imports) is less than the increase in income itself" (p.450). Using Diagram 2.1 consider a country initially in equilibrium, with imports equal to exports and income equal to expenditure ($Y_0 = E_0$), at B.

![Diagram 2.1 - Simple Income-Expenditure Model](image)
Suppose the nation devalues to create a balance of payments surplus, and equation (2.1) holds. The devaluation will shift $D$ to $D'$ and through the multiplier will increase income to $Y_1$. If the new level of total domestic expenditure ($E$) lies above $E_1$ the devaluation will improve the balance of payments. But if the new $E$ lies below $E_1$ "the devaluation, by increasing imports more than exports will worsen the balance of payments" (p.451). Johnson's crucial requirement to improve the balance of payments, is for expenditures to rise less than output, "in other words, that the country must have a positive marginal propensity to save".

The approach still fails to "incorporate adequately capital flows and monetary effects, especially the consequences of second round domestic credit creation for the balance of payments" (Deane, p.8). Also, according to Johnson (1976), the Keynesian multiplier approach "assumes unemployed resources whose rate of utilization can vary without ulterior consequences as a result of devaluation" (p.451).

2.3 Keynesian Policy Analysis

A more sophisticated approach, Keynesian policy analysis, was originated by Meade (1951) and Tinbergen
(1952). It assumes that Governments use fiscal, monetary and exchange rate policies to satisfy objectives of full employment and balance of payments equilibrium, that is internal and external balance. Whitman (1970) has surveyed the body of internal-external balance literature, and Chapter 5 incorporates her analytical formulation of the approach.

The Meade-Tinbergen policy approach "inverts the traditional method of problem solving" (Whitman, p.2). By taking the desired levels of employment and the balance of payments the approach solves the described system for the corresponding values of policy variables. These policy variables may be, for example, a change in interest rates, indirect taxes or exchange controls. The process of adjustment involves combining a devaluation with deflationary policies in the correct proportion to obtain "full employment total (foreign plus domestic) demand for output while reducing total domestic demand for foreign and domestic goods below the level of total domestic output by fiscal or monetary restraint" (Johnson, p.451).

The Keynesian policy approach has the advantage over the
elasticity approach and the multiplier approach in explicitly stating that "if one is concerned about mass unemployment one should adopt the proper policy combination to eliminate it, rather than merely ask whether devaluation would help" (Johnson, 1977, p.258).

The approach acknowledges that an effective instrument of economic policy (for instance income tax rates) normally affects more than one target (say a reduction in a balance of payments deficit and a reduction in unemployment). Also the approach recognises that any one macroeconomic target may be affected by several policy changes.

A guide to the assignment of instruments to targets was provided by Mundell (1962). His criterion, termed the Principle of Effective Market Classification states that "a system works best if variables respond to the markets on which they exert the most influence" (Mundell, 1968, p.169). This development by Mundell has encouraged further work using the instruments to targets approach. As Whitman states, it "has led to the recognition of internal and external balance as explicit policy goals rather than equilibrium states automatically achieved", this "has emphasized the need to develop new policy
instruments or at least free the shackles on existing ones ..... and has encouraged the utilization of econometric estimation techniques as an important adjunct to the formulation of economic policy" (p.44). But Johnson concludes that the approach "disregards the role of domestic monetary policy in determining both whether a devaluation is necessary to correct a balance of payments deficit, and whether it will be successful in so doing" (p.259).

2.4 The Income-Absorption Approach

As a departure from arguments over the size of supply and demand elasticities, Alexander (1952) concentrated on the association between real expenditure and real income and on the relationships of both these to price levels. The approach he developed contributed to better discussion of the instruments-targets framework, and therefore like that approach, emphasises the inter-relationships between the balance of payments and other economic objectives.

The approach basically revolves around the familiar
national accounting identity,

\[ Y = C + I + G + X - M \]  \hspace{1cm} (2.8)

The balance of trade \( B \) equals exports \( X \) minus imports \( M \). Domestic expenditure \( E \) is equivalent to private consumption \( C \) plus private investment \( I \) and Government expenditure \( G \). Thus the identity

\[ B = X - M = Y - E \]  \hspace{1cm} (2.9)

implies that policies increasing national income \( Y \) will improve the balance of trade if domestic expenditure (also called absorption) rises by a smaller amount than national income. Therefore any balance of payments policy can be evaluated as to whether it raises \( Y \) relative to \( E \).

The examination of policy and response relationships is generally classified into two areas. First, those policies that raise income are termed expenditure-switching policies. Examples of these policies are a devaluation, import tariffs and restrictions, and export subsidies. Second, those policies that reduce absorption are called
expenditure-reducing policies. Examples include tighter monetary and fiscal policies.

The approach, whilst easy to understand, presents no more analysis than an identity. According to Deane, "it is necessary to go well beyond it (the identity) if the basic factors causing an external deficit or surplus are to be determined" (p.9). Therefore it is wrong to infer "that balance of payments deficits are necessarily caused by plans to spend in excess of plans to produce" (Thirlwall, p.106). For instance the balance of payments may be in deficit because of sectoral difficulties or a deterioration in competitiveness.

2.5 The Monetary Approach

The central theme of the monetary approach has been expressed by Frenkel and Johnson (1976) who suggested that "the balance of payments is a monetary phenomenon, representing a disequilibrium in the market for money" (p.262). Therefore, according to the theory, a balance of payments deficit is essentially caused by a net excess supply of money. Any imbalances in flows of money
will continue until monetary stocks are in equilibrium. It is the stock adjustment equilibriation of actual-to-desired real money balances that forms the mechanism for correcting a payments imbalance.

The initial, and most common, formulation of the monetary approach examines the overall balance of payments, both capital and current account balances, recognising that there are only two ways to alter the money supply. They are through changes in foreign reserves and by changes in domestic credit. In the case of an excess supply of money over domestic demand for money, interest rates would fall, leading to an outflow of capital and therefore a loss of reserves, giving an overall balance of payments deficit\(^1\). The stock disequilibrium is considered "transitory and must in time induce monetary consequences which will tend to adjust or 'self correct' the deficit" (Deane, p.9).

According to Johnson (1977) "any balance of payments policy must be conceived of as speeding up a process of adjustment ..... and that it must work by reducing or reversing the initial disequilibrium between the quantity of money demanded and supplied" (p.260).

\(^1\) This assumes flexible interest rates and internationally mobile capital.
Basically the approach assumes Friedman's stable demand for money function,

\[ Md = f(Y, r, P) \] (2.10)

where

- \( Md \) = the demand for money
- \( Y \) = real income
- \( r \) = the rate of interest
- \( P \) = general price level

and a money supply identity,

\[ Ms = R + D \] (2.11)

where

- \( Ms \) = the supply of money
- \( R \) = overseas assets backing the money supply
- \( D \) = domestic assets backing the money supply

In equilibrium

\[ Ms = Md \]
\[ R + D = Md \]
The overall balance of payments can be shown as

\[ \Delta R = \Delta Md - \Delta D \] (2.12)

In the case of New Zealand, a decrease in overseas reserves (an increase in the overall balance of payments deficit) could be explained by excess domestic money expansion over that demanded. To maintain a level of overseas reserves, a Government must borrow overseas or operate policies to balance the demand for money and the amount internally supplied - for example smaller budget deficits or more emphasis on internal financing of Government deficits. A devaluation effectively increases the nominal amount of money demanded, by increasing domestic prices and hence reducing the real value of the existing money stock. It should be noted, however, that any increase in domestic credit creation would offset the reduction of real balances of money.

The monetary approach to the balance of payments is often considered the best framework for examining the external sector. The approach has relevance to fiscal policy in that the macroeconomic impact of deficit financing can be considered by outlining the monetary
reactions. The budget deficit constitutes part of domestic credit creation and is therefore often considered a monetary variable; the demand for Government debt (for example KISS stocks) is itself a function of interest rates, thus importantly, monetary and fiscal policy initiatives exhibit mutual dependence - in New Zealand's case some argue that fiscal policy has played the dominant role whilst monetary policy has been merely accommodating. For instance, in Deane (et al) (1983) "the scope of monetary policy in the past has sometimes been severely inhibited by sizeable variations in the stance of fiscal policy" (p. 282).

The monetary approach should not be confused with monetarism, nor with global monetarism. The proponents of global monetarism make further assumptions which lead to conclusions that "fiscal and monetary stabilization policies are, at worst, undesirable and, at best, unnecessary" (Ball, 1982, p.85). Global monetarism assumes the independence of the rate of growth of real GDP and monetary variables. It also places complete emphasis on the importance of changes in the real stock of money, ignoring the effects of other asset portfolios. The relationship between the supply of world money and the supply of world output is said to
determine the world level of inflation. Therefore inflation becomes the world's problem. But the world's money supply is apportioned between nations through the mechanism of the balance of payments. "Those with an excessive share of world money will run deficits, and those who have insufficient will accumulate more through running surpluses" (Ball, p.87). Under fixed exchange rates, global monetarism suggests that the relationship between inflation and monetary policies provides the key to balance of payments problems in the long-run.

2.6 Summary

Chapter 2 has reviewed the main theoretical approaches to balance of payments policy analysis. Emphasis has been placed on the mechanisms through which corrective policy action is suggested under each approach. As Mundell (1968) has pointed out, when comparing the elasticity, absorption and the monetary approaches, "it is not meaningful to question the validity of the three approaches ..... they are all correct and assert identical propositions" (p.150-151). This chapter therefore has indicated the progression of the theoretical literature relevant to the analysis of balance of payments problems.
CHAPTER 3

A BRIEF OVERVIEW OF NEW ZEALAND BALANCE OF PAYMENTS SITUATION AND POLICY

The following discussion presents the main features of New Zealand's external condition: it assesses the economic problem and briefly discusses other objectives of economic policy.

3.1 Features of New Zealand's Balance of Payments Situation

In 1977 Mr. Hight, representing the Prime Minister, in a convention discussing New Zealand's balance of payments, introduced his contribution by saying "I don't think you'll find it a happy speech" (in Taylor, 1981, p.8). Indeed Graph 3.1 and Table 3.3 indicate that New Zealand's prosperity and trading strength, based on the efficient production of primary products, has been undermined.
Even though balance of payments policy has been accorded much emphasis in the policy debate, the external deficits have continued to, on average, worsen throughout the 1970's to date. Suggested "causes" of the continuing economic problem include: soaring fuel prices; stagnant farm production; difficulties in access to traditional markets; internal inflation; and adverse movements in terms of trade.
Is it important that we continue to trade?

The essence of the 'classical' theory\(^1\) regarding the importance of trade lies in the theory of comparative advantage. Briefly, the 'classical' theory states that each country concentrates on the production of those goods it can produce relatively more cheaply than other countries and exchanges the surplus against the surplus goods other countries produce relatively more cheaply. Because of the division of labour (internationally) it is possible to produce more of every commodity on a world-wide basis, with surplus production representing the gains from trade to be distributed amongst the trading partners. As Chacholiades states, "(t)he greatest classical achievement was to demonstrate that, even under the present circumstances where one country is more efficient than the other in every line of production, an international division of labour would also take place that could (potentially) increase the world output of every commodity" (p.20). The theory of comparative advantage, therefore, does not require each country to have an absolute advantage in the production of any goods. In terms of opportunity costs "where two countries are producing two different commodities, one country should specialize in the production of that

\(^1\) As opposed to the 'neoclassical' and 'modern' theories - see Chacholiades (1978)
commodity in which the country's opportunity cost is lower than the second country's opportunity cost" (p.23). The classical theory, whilst demonstrating that free trade is potentially the best policy, does not provide the reasons behind differences in comparative costs between countries. The "modern" theory attempts to explain differences in relative prices, and derives two testable propositions. First, a country will export that commodity (hence import the other), the production of which uses relatively intensively the country's relatively abundant factor. This proposition defines the 'cause' of international trade, and is known as the Heckscher-Ohlin theorem ¹. Second, the 'effect' of international trade is to equalize both relative and absolute factor prices - the Factor-Price-Equalization theorem ² - where, according to the Stolpher-Samuelson theorem ³, the real factor price increases as the relative price of the commodity, the production of which is relatively intensive in that factor, increases. However, the validity of all three propositions relies on certain restrictive assumptions which constrain the generality of the theorems regarding the causes and effects of international trade. This thesis does not address the importance of international trade; instead

¹ See Chacholiades (p. 206, 258).
² " " (p. 255-257).
³ " " (p. 487-491).
it is assumed that movements toward 'free' trade may allow a fuller utilisation of a country's natural resources.

3.1.1 Dependency

The New Zealand economy is said to be dependent on the rest of the world, (see Deane, Nicholl and Walsh, 1981, p.544) and (Chatterjee and Michelini, 1983, p.3). Thus we are, to a large extent, under the influence of other economies (of their purchases and sales, of their economic policies and financial relationships), without exhibiting a marked degree of reciprocal influence. Such dependence is highlighted by several factors:-

1. A high ratio of the value of external trade, imports and exports, to gross domestic product (GDP). These ratios are sometimes used to define the degree of openness of an economy, and are widely regarded as "important indicator(s) of the potential size of externally induced income and expenditure fluctuations.....because the more open an economy is, the larger will be the external sector income
fluctuations generated by given changes in the terms of trade" (Deane (et al), p.547). As recorded by Deane (et al), New Zealand's trade ratios have not changed significantly since the 1960's, whilst those of other countries have, on average, continually increased. Table 3.1 outlines the trade ratios for New Zealand's major trading partners, and the OECD average for the two periods 1960-62 and 1978-79. It should still be noted that, compared with the OECD average, bearing in mind the positive impact the EEC has had on that average and the United Kingdom's average, New Zealand remains relatively more open than other countries, and therefore more dependent upon trade.

<table>
<thead>
<tr>
<th>TABLE 3.1 Trade Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
</tr>
<tr>
<td>Australia</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>United Kingdom</td>
</tr>
<tr>
<td>United States</td>
</tr>
<tr>
<td>OECD Average</td>
</tr>
</tbody>
</table>

SOURCE: Deane (et al), 1981, Table 26.1
TABLE 3.2
Commodity composition of New Zealand's major imports and exports.

<table>
<thead>
<tr>
<th>IMPORTS</th>
<th>%</th>
<th>EXPORTS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery &amp; Transport Equipment</td>
<td>29.8</td>
<td>Meat</td>
<td>23.1</td>
</tr>
<tr>
<td>Manufactured Goods</td>
<td>20.2</td>
<td>Wool</td>
<td>18.1</td>
</tr>
<tr>
<td>Mineral Fuels</td>
<td>19.6</td>
<td>Dairy Products</td>
<td>15.5</td>
</tr>
<tr>
<td>Chemicals</td>
<td>12.5</td>
<td>Pulp and Paper</td>
<td>4.8</td>
</tr>
<tr>
<td>Food</td>
<td>4.2</td>
<td>Hides, Skins &amp; Pelts</td>
<td>3.5</td>
</tr>
<tr>
<td>Other inedible crude materials</td>
<td>4.2</td>
<td>Fruit and Vegetables</td>
<td>2.5</td>
</tr>
<tr>
<td>Beverages &amp; tobacco</td>
<td>0.9</td>
<td>Tallow</td>
<td>0.8</td>
</tr>
<tr>
<td>Other</td>
<td>8.4</td>
<td>Sausage casings</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>31.0</td>
</tr>
<tr>
<td>**100.0</td>
<td></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Based on 1980 NZ Stats. Dept. data.
2. New Zealand has a poor ability to substitute domestic production for imports. This occurs because a high proportion of New Zealand's imports comprise raw materials, components and capital equipment, therefore complementing rather than substituting for domestic production. Table 3.2 indicates the commodity composition of New Zealand's imports.

3. Table 3.2 also indicates that a substantial portion of our merchandise exports are pastoral products, which cannot be sold at home when export sales decline. Therefore New Zealand has a poor ability to absorb domestically, goods that are currently produced for export markets.

4. A composite indicator of export commodity concentration has been derived for New Zealand data by Deane (et al) (1981, p. 552). They take the sum of squares of the proportion each commodity classification represents of total exports. Of our major trading partners, only Japan had a greater degree of export commodity concentration. This fact supports the evidence Table 3.2 provides in suggesting that New Zealand is dependent for export receipt upon a small product range of exports.
TABLE 3.3
Recent trends in New Zealand’s external trade

<table>
<thead>
<tr>
<th>Year ending June</th>
<th>Export Prices (i)</th>
<th>Import Prices (i)</th>
<th>Terms of Trade (ii)</th>
<th>Trade Balance $m</th>
<th>Invisibles $m</th>
<th>Current A/C Balance (iii)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>1.9</td>
<td>4.1</td>
<td>87</td>
<td>276.0</td>
<td>-214.4</td>
<td>61.5</td>
</tr>
<tr>
<td>1971</td>
<td>2.8</td>
<td>6.3</td>
<td>84</td>
<td>168.3</td>
<td>-182.5</td>
<td>-14.3</td>
</tr>
<tr>
<td>1972</td>
<td>16.1</td>
<td>4.5</td>
<td>93</td>
<td>314.5</td>
<td>-184.2</td>
<td>130.3</td>
</tr>
<tr>
<td>1973</td>
<td>26.9</td>
<td>5.0</td>
<td>112</td>
<td>524.4</td>
<td>-199.4</td>
<td>325.0</td>
</tr>
<tr>
<td>1974</td>
<td>12.1</td>
<td>12.2</td>
<td>112</td>
<td>-101.2</td>
<td>-232.8</td>
<td>-339.9</td>
</tr>
<tr>
<td>1975</td>
<td>-8.6</td>
<td>32.1</td>
<td>78</td>
<td>-716.7</td>
<td>-350.1</td>
<td>-1066.8</td>
</tr>
<tr>
<td>1976</td>
<td>23.1</td>
<td>32.1</td>
<td>72</td>
<td>-236.5</td>
<td>-468.0</td>
<td>-704.4</td>
</tr>
<tr>
<td>1977</td>
<td>24.0</td>
<td>13.9</td>
<td>79</td>
<td>183.7</td>
<td>-714.2</td>
<td>-530.5</td>
</tr>
<tr>
<td>1978</td>
<td>4.7</td>
<td>5.8</td>
<td>78</td>
<td>422.2</td>
<td>-911.1</td>
<td>-488.9</td>
</tr>
<tr>
<td>1979</td>
<td>15.6</td>
<td>6.6</td>
<td>86</td>
<td>707.1</td>
<td>-1160.4</td>
<td>-453.3</td>
</tr>
<tr>
<td>1980</td>
<td>21.8</td>
<td>31.9</td>
<td>79</td>
<td>755.1</td>
<td>-1287.1</td>
<td>-530.0</td>
</tr>
<tr>
<td>1981</td>
<td>17.5</td>
<td>10.5</td>
<td>76</td>
<td>876.5</td>
<td>-1601.1</td>
<td>-724.5</td>
</tr>
<tr>
<td>1982</td>
<td>23.5</td>
<td>13.5</td>
<td>77</td>
<td>394.5</td>
<td>-1881.1</td>
<td>-1486.6</td>
</tr>
<tr>
<td>1983</td>
<td>7.9</td>
<td>4.1</td>
<td>73</td>
<td>1067.5</td>
<td>-2120.5</td>
<td>-1053.0</td>
</tr>
</tbody>
</table>

(i) Percentage change from previous year  
(ii) Index numbers, base year 1957=100  
(iii) Overseas exchange transactions, $m

3.1.2 Terms of trade

New Zealand's terms of trade display great variability (see Table 3.3). This is mainly because the types of products New Zealand produces for export diverge from the types of products it imports. During the 1970's, as indicated by Table 3.3, the price received for New Zealand exports changed dramatically. The coincidental increase of import prices, including the impact of the oil price rises, has caused severe fluctuations in New Zealand's terms of trade over the last ten years.

**TABLE 3.4**

Terms of trade volatility indicator

<table>
<thead>
<tr>
<th>Country</th>
<th>Standard deviation of the logarithm of the terms of trade 1961-1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td>0.12004</td>
</tr>
<tr>
<td>Australia</td>
<td>0.06550</td>
</tr>
<tr>
<td>Japan</td>
<td>0.14499</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.06512</td>
</tr>
<tr>
<td>United States</td>
<td>0.10672</td>
</tr>
<tr>
<td>OECD Average</td>
<td>0.05099</td>
</tr>
</tbody>
</table>

*SOURCE: Deane (et al), 1981, Table 26.4*
The standard deviations of the logarithms of the terms of trade indexes for our major trading partners (in Table 3.4) indicate how important external currency reserve management is for New Zealand. Compared with other countries, except Japan, New Zealand has experienced a volatile terms of trade. It should also be noted that not only has the nation experienced changeable external price indices, but that the terms of trade have been, on average, worsening over the last decade. These two factors are important, because traditionally countries like New Zealand have borrowed overseas to maintain an acceptable level of external currency reserves to purchase imports. However, given that a return to 1973-1974 terms of trade levels seems highly improbable, continued borrowing purely to sustain real incomes at the early 1970 level cannot continue. Further discussion regarding external reserves management will follow in section 3.1.5.

The possibility of a continuing downward trend in the terms of trade is indicated by Chatterjee and Michelini (p. 25-26). They outline three factors:
a. a continuing increase in the price of oil - based on OECD estimates

b. a possible increase in agricultural trade barriers compelling New Zealand to sell at lower prices in less favourable markets

c. a continuation of the world recession, preventing the price of agricultural products rising

Although the above factors may cast an exaggerated gloom, a general consensus exists regarding the improbability of a return to the peak terms of trade levels in the early 1970's, let alone those of 1950-51.

3.1.3. Trade account

An excellent account of New Zealand's pattern of trade and the trade account can be found in Deane (et al) (1981, p. 93-299). Therefore, in this section trends are outlined only briefly.

As Table 3.3 indicates, the trade balance (that is physical exports less physical imports) has been
negative in only three (1974-1976) of the last thirteen years. In 1974 imports by volume increased by 31.8%, the largest June year increase since 1955: this was matched by an 11.3% decrease in export volumes, the largest fall ever recorded. It is therefore well documented that New Zealand's balance of payments performed poorly in 1974. Yet in the following year the problem was compounded. As Table 3.3 indicates, export prices fell by 8.6%, and import prices rose by 32.1%. The combined price effect (a terms of trade fall) upon the trade account created the largest trade deficit New Zealand has experienced. In 1976 the terms of trade fall continued, but the economy imported 18.7% less by volume and export volumes increased by 17.8%, therefore the trade deficit was reduced. Since 1976, the merchandise trade balance has remained positive, increasing to one billion dollars in the year ending 1983. The focus of attention has since been placed upon the invisible transactions balance.

3.1.4 Invisibles account

As Table 3.3 indicates, the nominal level of the invisible trade deficit has increased tenfold over the
fourteen year period. Appendix 1 breaks down the invisibles deficit, and highlights the major contributing cause of the increase. During the fourteen year period 1970-1983, invisible receipts increased 12.4 times, and total invisible payments 11.0 times, also the invisibles deficit increased as a proportion of GDP from a low of 2.4% in 1973 to 6.9% in 1983. In 1970 invisible payments were 2.4 times as large as invisible receipts; this decreased to 2.1 times by 1983. In terms of bales of wool sold, in 1970 the invisibles deficit equated with 3.8 million 100kg. bales of wool, compared with 8.3 million 110kg. bales in 1983. Appendix 1 also shows the change in Government debt interest since 1974. This increased by a factor of 19.7, whilst invisible receipts and private invisible payments increased by 4.6 and 5.6 times respectively. If by 1992 the same trends continue, Government debt interest payments will account for 42% of total invisible payments, compared with 5% in 1974 and 17% in 1983. These calculations, whilst simplistic with the ceteris paribus assumption, highlight the alarming consequences of continued overseas borrowing to support either an external deficit or to finance a Government budget deficit.

1 This is based on a 1970 price of 56.48 cents per Kg. of greasy wool and a 1983 price of 255.70 cents per Kg. of greasy wool.
3.1.5 Capital account

Capital account transactions indicate changes in ownership of New Zealand's claims on non-residents, foreign assets, and indebtedness to non-residents, foreign liabilities. The nature of New Zealand's current account transactions; the high turnover of funds (relative to GDP); the existence of a deficit between receipts and payments; and the seasonal fluctuations that occur, indicate the need to maintain a cash reserve of overseas funds. The Reserve Bank holds foreign exchange to ensure "that the flow of payments for exports and imports and capital transactions proceed smoothly and without interruption" (Deane (et al), p.332). Appendix 2 gives a summary of New Zealand's official overseas reserves. According to Low, if the level of reserves "represents little more than two months imports" then this level is "enough to show that the country is vulnerable". He concludes, "in present circumstances (1977 levels) we cannot regard the present level of reserves as a buffer except in an extreme emergency" (in Taylor, 1981, p. 60). Indeed the 1982 level of reserves represented less than two months imports, compared with the extraordinary peak reserve level of over seven months imports in 1973. New
Zealand's reserves in June 1983, more than double those of June 1982, were still below the 1977 levels discussed by Low above. Therefore New Zealand must borrow overseas to finance any short-term (three months to six months) balance of payments deficit.

Figge (1967) outlines three reasons why a dependent economy may borrow externally.

It "may properly borrow for two reasons:

Short-term borrowing to overcome a temporary balance of payments difficulty caused, in New Zealand's case, by the instability of primary produce prices on the one hand, and the steady upward trend in the price of imported raw materials and manufactured goods on the other.

Long-term borrowing to provide for the development of new capital works and industries which in due course will increase productivity, reduce the dependence on imports and stimulate exports to a degree that will carry the increased costs of overseas debt servicing. If new borrowing does not do this, it becomes increasingly difficult to justify. When at the same time the control of New Zealand industry passes more and more into the hands of overseas groups, the chances of material benefits to the country decrease even more."

and

"There is a third reason why some countries borrow. To consume more by way of goods and services than the country is earning. In other words, living beyond one's means. A country can no more do this without a time of reckoning than a person can" (p.102-103).
TABLE 3.5

Total official overseas debt and the ratio of official overseas debt interest payments to export receipts

<table>
<thead>
<tr>
<th>Year ending June</th>
<th>Total Official Overseas Debt (i)</th>
<th>Ratio of Total Official Debt to GDP%</th>
<th>Official Debt Interest Payments (ii)</th>
<th>Debt interest as a percentage of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Exports</td>
</tr>
<tr>
<td>1937</td>
<td>13.4</td>
<td></td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>6.8</td>
<td></td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>606.7</td>
<td>11.8</td>
<td>34.5</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>591.8</td>
<td>10.1</td>
<td>33.0</td>
<td></td>
</tr>
<tr>
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<td>9.5</td>
<td>33.4</td>
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<tr>
<td>1973</td>
<td>564.0</td>
<td>7.1</td>
<td>37.1</td>
<td></td>
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<tr>
<td>1974</td>
<td>465.2</td>
<td>5.1</td>
<td>33.9</td>
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</tr>
<tr>
<td>1975</td>
<td>1081.2</td>
<td>10.8</td>
<td>61.3</td>
<td></td>
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<tr>
<td>1976</td>
<td>2163.5</td>
<td>18.8</td>
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<td>1977</td>
<td>2563.3</td>
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<tr>
<td>1978</td>
<td>3255.8</td>
<td>21.4</td>
<td>208.1</td>
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</tr>
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<td>1979</td>
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<td>1981</td>
<td>4809.0</td>
<td>19.9</td>
<td>349.6</td>
<td></td>
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<tr>
<td>1982</td>
<td>6776.9</td>
<td>23.7</td>
<td>519.4</td>
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</tr>
<tr>
<td>1983</td>
<td>7313.9</td>
<td>23.9</td>
<td>670.3</td>
<td></td>
</tr>
</tbody>
</table>

(i) Year ending March - Govt. and Reserve Bank
(ii) Year ending June

Given these reasons, should New Zealand reassess its borrowing programme? In 1964 the Monetary and Economic Council indicated "that there is insufficient public awareness of the extent of overseas borrowing... and of the increasing degree to which the maintenance of investment and consumption in New Zealand has come to depend on such borrowing" (in Figge, p. 103). A measure commonly used to assess the impact of official debt interest payments is to express these as a percentage of export receipts (or current receipts). This is done in Table 3.5.

The policy of external borrowing in 1975 and 1976, where total official overseas debt doubled each year and more than trebled over the two years as a percentage of GDP, is reflected in the increasing official debt interest payments. In 1974 only 1.9% of receipts were needed to cover debt interest payments - not far removed from the 1957 low of 1.2%. This figure increased to 9.2% in 1983 - close to the 1937 high of 10%. Another important factor in regard to official debt is the "average interest rate" paid on the debt. A crude measure of this is obtained by calculating official overseas debt interest payments as a percentage of total official overseas debt. In 1972 debt interest payments equalled
5.1% of total debt: by 1983 this had risen to 9.2%. Although this trend is influenced by international monetary conditions the crude "average interest rate" measure indicates the required social return on borrowing. This implies a higher present expenditure level, based on external borrowing, and a lower expenditure level at some time in the future, because capital repayments will be required.

Other capital account transactions include net private capital transactions and I.M.F. transactions. These flows are presented in Appendix 2. Since 1975, excepting 1979 when "easier domestic liquidity" and "narrowing interest rate differentials" (R.B.N.Z. Bulletin, Sept. 1975, p.330) allowed a refinancing of external loans internally, the private sector have been net importers of capital. In 1982 and 1983 the flows increased markedly. A warning regarding this increase states "in the longer term the present strong increase in investment flow presages an increase in future payments which will not be a problem provided that the current investment is made in economically viable assets which will yield a real return to the country" (RBNZ Bulletin, Sept. 1982, p.366). As the net private capital flow is based on private business decisions to invest, as
opposed to the public need to supply official overseas reserves or to finance Government budget deficits, the result of net private overseas borrowing does not provide a reason for national concern regarding any long-term effect. In the short run, however, the cash inflow may have two effects. First, it may disrupt domestic monetary policy (by creating an increase in the money supply), and second it may mask the real need to eventually finance all current account deficits. This second effect arises because unless New Zealand can sustain a positive net private capital inflow, then at some future date, given that the country still faces current account deficits, there will be a need for official borrowing to cover the current account deficits and the negative private capital outflow.

The scale of overseas debt repayments presently reaches a peak in 1988, with over $2.2 billion worth to repay in that year (see RBNZ Bulletin, Sept. 1983, p.395). Private sector debt only represents 13.7% of this debt and only 20.6% of the total outstanding surveyed overseas debt, which stood at $14.3 billion in March 1983.
3.2 The Economic Problem

As Graph 3.1 indicated, the current account deficit has on average continued to deteriorate since 1973. Is this an economic problem? The view held by Low in 1977 indicated his opinion, which usefully highlights the situation:

"In 'normal' times we could expect to receive a net private capital inflow of between $100 and $200 million a year. Government could without much trouble borrow say $200 million a year. This suggests that a current account deficit of between $300 and $400 million could be manageable and realistic year after year. This I regard as too simple a calculation, especially for the next few years ahead, my reasons being:

a. We are not in a normal position to start with

b. Our reserves are rather low relative to what we should have, if they are to be used as a buffer.

c. Our official interest cost (about $150 million a year) is now high enough to be a major influence on our "invisible" deficit. We would be wise to reduce it.

1 See Appendix 2 for a summary of official overseas reserves

2 Table 3.5 indicates the official interest costs between 1970 and 1983. In 1983 it amounted to $670.3 million.
d. There are some heavy loan maturities overseas in the next four years, and a good deal of refinancing will need to be done. While I do not expect any major problem, it would be easier to obtain the refinancing if we were not borrowing much new money at the same time.

e. Regular official borrowing by a developed country, continuing in relatively good times, will sooner or later be questioned by the people from whom we borrow, and our credit standing could suffer. (in Taylor, p.63-64).

Tucker, commenting on Low's paper, states that he would "discard the naive optimism" Low has "in favour of policy that recognises the harsh realities of New Zealand's economic plight". Tucker finds that "there can be little doubt that the level of spending on imports is the most fundamental problem associated with New Zealand's balance of payments" (in Taylor, p.69). Therefore policy aimed at enhancing exporters competitiveness may not be a very efficient method of dealing with the problem. Indeed, New Zealand's large

1 See R.B.N.Z. Bulletin, Sept. 1983 (p.395). This indicates that at least $1 billion is due for repayment each year between 1984 and 1990. In total over these seven years, more than $10 billion is due for repayment.

2 The 1983 move by Standard and Poors which downgraded New Zealand's credit rating from AAA to AA+ and the small drop in New Zealand's credit rating reported in a survey of International Bankers in the International Investor are timely reminders of this point that Low makes (see Appendix 8).
deficits on the current account "were at their worst (in 1975-1978) when our export competitiveness was at its peak. Clearly the problems of export uncompetitiveness were not at the root of the problem" (Grimes, 1979, p.16).

The absorption approach, as discussed in Chapter 2, indicates that a current account deficit reflects a situation where total domestic expenditure exceeds total domestic income. As Deane (et al) remark, the absorption approach "really masks what may be a rather complex interaction of several factors in contributing to a country's external difficulties during any one period" (p.16). Several of these difficulties have been discussed in Section 3.1, but incumbent on these problems are pressures resulting from monetary and fiscal policies. For example "in late 1977 through to mid-1978, despite a large external current account deficit, monetary and fiscal policies tended to be expansionary in order to lift the economy out of the recession and to ease the problem of rapidly rising unemployment. Not surprisingly, the demand for imports was greatly stimulated" (Deane (et al), p.18).
Although much blame for the rise in import payments is laid on the cost of oil, the "general expansion of economic activity from the second half of 1978 through 1979 was associated with a strong rise in non-oil imports" (p.18). Therefore, given that import payments are controllable through domestic demand management of expenditure, then that expenditure should be adjusted, to ensure that the volume of goods imported is changed to allow import payments to equal export receipts. The reason for concentrating on volumes is that New Zealand is too small to influence import prices.

The monetary approach to the balance of payments, also discussed in Chapter 2, identifies the influence on the problem (the current account deficit) as an excess supply of money. The excess supply of money stimulates expenditure on goods and services, the mechanism being a 'real balance effect'. This theory is discussed in more detail in Chapters 5 and 6. In New Zealand, Government transactions play an important role in determining the current account deficit. The supposition that the Government, finding itself with an excess supply of money, rearranges its portfolio by spending more on social infrastructure, defence equipment and so on seems implausible. Therefore, to correctly examine the cause of
the economic problem, aggregate expenditure and current account data needs to be divided into private and Government sectors. To date there has been no regular published source of New Zealand quarterly data identifying the two sectors contributions to the current account\(^1\) . Using data collected from the Reserve Bank, Graph 3.2 depicts the annual data for years ending June (Complete quarterly data used to derive Graph 3.2 is in Appendix 3).

Graph 3.2 gives an insight into the components of the current account balance. Rather than indicating a continuing downward trend in the net private sector balance, the graph depicts two periods of payments imbalance. These are between 1974 and 1978 and the June years 1981 and 1982. This suggests that the private sector, given appropriate demand management policy, can at least balance its contribution to the current account deficit.

---

\(^1\) See Appendix 4 for a comparison of two other sources.
GRAPH 3.2
Government and private sector contributions to the current account balance.

Net Govt. current account balance
Net Private sector current account balance
Current account balance

SOURCE: Appendix 3
It could be reasoned that during 1974-1978 and 1981-1982 the private sector was responding to 'easy' monetary and fiscal conditions which masked the real need for the private sector to purchase fewer imports as export receipts fell relative to import payments. Even if such reasoning cannot be validated, Graph 3.2 absolves the private sector from accusations that the root of New Zealand's balance of payments problem lies with the private sector's export production or spending on imports. Therefore, policies designed specifically to increase the output of the export sector, notably export incentive schemes and supplementary minimum payments, should be questioned as to their efficiency in dealing with the balance of payments problem. If indeed, with appropriate settings of monetary and fiscal policy, the private sector can balance its current account transactions, then the focus of the economic problem becomes the Government's current account balance.

3.3. Conflicting objectives

The balance of payments objective is often considered an intermediate objective in that a deficit is "seen as one of the major constraints on the ability to manoeuvre the
economy towards a higher rate of economic growth" (Deane et al., p. 15). In general most texts on economic policy outline four other major economic objectives, which are designed to improve the welfare of the nation. They are a desire for real growth in the economy, full utilization of resources (especially human), achievement of price stability and a notion of satisfying a distributional objective. Indicators of the first three objectives, and the balance of payments objective are presented in Table 3.6.

The notion that to increase national welfare we need only move toward the achievement of the targets of macroeconomic policy is fraught with difficulties. The most important problem is that more often than not, all the objectives cannot be achieved simultaneously; any movement toward one often results in a movement away from another, sometimes several quarters later. So the task of the policy maker is to assess the trade-offs among objectives, and decide which policy actions are most appropriate. As Table 3.6 indicates, New Zealand policy makers have needed to determine objective priorities, as unemployment, erratic rates of economic growth and inflation have compounded the 1974/1975 balance of payments difficulty.
### TABLE 3.6
Measures of economic objectives
Year ending March as a % of GDP

<table>
<thead>
<tr>
<th>Year</th>
<th>Current A/c Deficits</th>
<th>Unemployment</th>
<th>Real GDP</th>
<th>CPI Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>0.0</td>
<td>0.20</td>
<td>7.6</td>
<td>9.3</td>
</tr>
<tr>
<td>1975</td>
<td>10.7</td>
<td>0.18</td>
<td>1.5</td>
<td>11.9</td>
</tr>
<tr>
<td>1976</td>
<td>8.1</td>
<td>0.80</td>
<td>12.2</td>
<td>15.7</td>
</tr>
<tr>
<td>1977</td>
<td>5.2</td>
<td>0.98</td>
<td>-4.0</td>
<td>16.0</td>
</tr>
<tr>
<td>1978</td>
<td>3.7</td>
<td>1.73</td>
<td>-0.0</td>
<td>10.9</td>
</tr>
<tr>
<td>1979</td>
<td>2.7</td>
<td>0.80</td>
<td>0.0</td>
<td>15.7</td>
</tr>
<tr>
<td>1980</td>
<td>2.7</td>
<td>4.10</td>
<td>-0.8</td>
<td>15.5</td>
</tr>
<tr>
<td>1981</td>
<td>3.4</td>
<td>4.55</td>
<td>4.4</td>
<td>15.3</td>
</tr>
<tr>
<td>1982</td>
<td>5.7</td>
<td>5.58</td>
<td>-0.8</td>
<td>15.3</td>
</tr>
<tr>
<td>1983</td>
<td>5.2</td>
<td>6.53</td>
<td>-0.8</td>
<td>15.3</td>
</tr>
</tbody>
</table>

(i) Using ODT data.
(ii) Computed using general economic indicators, columns (8) and (9) of RBNZ Bulletin, Dec. 1983.
(iii) Year ending September, 1983.

3.4 Summary

This chapter has presented the scenario of New Zealand's balance of payments. It has discussed the trends in the important data aggregates and the economic problem, and suggested causes. The division of current account data into private and Government sector contributions has shown two factors important in the debate on appropriate policy action, namely the importance of appropriate demand management policy to guide the private sector's external activity, and the need to examine policies that will arrest the continuing dramatic rise in the net Government current account deficit (over 50% of which is debt interest payments). The chapter finally alluded to the dilemma which faces policy makers when choosing among competing objectives.
In Chapter 3, where an overview of New Zealand's balance of payments situation was given, it was suggested that demand management policy had important implications for the balance of payments deficit. In this chapter the contribution of fiscal policy to external balance and its channels of influence are examined, the stabilization role of fiscal policy is explained, the measurement of its impact (the multiplier and monetary effects) is discussed, and its character since 1972 is outlined.

4.1 Fiscal Policy and the Objective of Stabilization

The term fiscal policy refers to discretionary changes in the level, composition and timing of Government expenditures and revenues from taxation and other Government charges. From the national accounting identity, equation 2.8, Government expenditure,
constitutes an injection into the circular flow of income. The withdrawals from the flow are private sector saving, taxation and expenditure on imports. Therefore, as Deane and Smith (1980) point out, "the immediate purpose of Government spending on, for example, schools and hospitals may be to provide education and health care; but this expenditure also promotes further rounds of economic activity in the sense that it represents income to the builders of the schools and hospitals, who in turn spend their money on materials and labour; and so a chain of income expenditure effects is created" (p.1). In general, a fiscal deficit, an excess of Government expenditure over taxation and other revenue, is considered expansionary, ceteris paribus. Higher Government spending, which is not financed by higher taxes or Government charges will increase aggregate demand, ceteris paribus. This might stimulate higher domestic real output, thus increasing employment and lifting the economy from recession. But an increase in Government spending "might also stimulate the demand for imports and worsen the balance of payments" (Deane, Nicholl and Smith, 1983, p.268).

Some of the main problems in using fiscal policy to stabilize a cyclical trend stem from the fact that
policy action is conducted in a dynamic setting. Because of the existence of unpredictable lag responses, some economists are of the opinion that discretionary stabilization of economies is mostly unsuccessful and can aggravate fluctuations that lead to the policy action. For example, if an expansionary policy does not take effect until the economy is being pulled out of a recession by other influences, the resulting "boom" could possibly be greater than that which would have existed in the absence of the expansionary policy, that is discretionary policy may be procyclical when it is intended to be anticyclical. Figure 4.1a graphically describes the notion.

In Figure 4.1a from 0 to t represents a desired full employment level. A decision to lift the economy out of the recession is made at t+1, the Government adopting an expansionary demand management policy. Yet at t+2 the recession turns itself, possibly through a global upturn in activity. Then the economy, which would have naturally returned to a desired level at t+3, is now over-employed. This example represents the results of only one deliberate attempt to fine tune the economy. The pattern of a continued series of stabilization policies that (because of recognition, decision,
FIGURE 4.1a
Effect of expansionary policy in a natural cyclical recession.

FIGURE 4.1b
Several periods of procyclical policy, compared with no discretionary policy and anticyclical policy.
implementation and effect lags) result in procyclical policy are depicted in Figure 4.1b. This Figure shows an assumed pattern of GDP with no discretionary fiscal policy, the pattern with procyclical fiscal policy and a trend line, which depicts the implementation of 'perfect' anticyclical fiscal policy. Of note is the extenuation of the variations in GDP when procyclical fiscal policy is imposed.

Economists who are against the use of discretionary policy or fine tuning are often of the monetarist or Chicago School persuasion and more recently, the 'new classical school'. Deane (1981) reviews the monetarist hypotheses. Monetarists hypothesise that inherent in market competition is an automatic adjustment mechanism that will give continuous equilibria. They hold that demand management policies, that is discretionary changes in monetary and fiscal policies targeted on macroeconomic stabilization at high levels of economic activity, "can only temporarily alter real outcomes" and therefore "under stable policies the economy will reach equilibrium....on its own" (p.14)\(^1\).

\(^1\) Limitations of space preclude a thorough review of monetarist models in this thesis. The reader is referred to Dornbusch and Fischer (1982) and Desai (1982).
Economists of the Keynesian tradition, on the other hand, suggest that demand management policies can have a significant effect on real output and labour employment whenever factors of production are not fully employed. Therefore, to them "some degree of fine tuning is possible and indeed necessary to ensure the maximum level of employment" (Deane, p.9).

New Zealand empirical studies of the effectiveness of stabilization policy emphasise a pattern of mostly pro-cyclical policy, that is Government spending has tended to increase when least needed. For example, Morgan and Haywood (1977) indicate that any discretionary fiscal expenditure had generally been pro-cyclical, and therefore "Government expenditure policy has generally been inconsistent with the domestic stabilization objective" (Deane, p.15).

The Reserve Bank econometric model has been used by Smith (1979) to simulate the effects of adopting a neutral Government expenditure stance, rather than procyclical. He found that a constant simulated growth rate of Government expenditure, at 7.5% per annum since 1974, reduced the four quarter running total of real
aggregate expenditure between 1975 and 1977. "The overall decline in the level of expenditure eases the demand for imports which results in a lower current account deficit" (p.36). Yet simulated unemployment worsened for the 1976/1977 period, although tracking back to the actual level in 1978. Another policy option was imposed on the model by Smith. It involved the same constant growth rate of Government expenditure, three devaluations of the exchange rate in March 1974, 1975 and 1976 of 10%, 11.4% and 5% respectively, and a tighter monetary policy through increasing the reserve asset ratios of the trading banks. His results show that "the level of real aggregate expenditure is substantially reduced through most of the period which inevitably results in a higher level of unemployment. On the other hand, the current account deficit has been reduced...." (p.42).

Deane and Smith (1980) assessed the trends in fiscal policy, examining the relationship of these to externally induced events. One of their conclusions is that "large swings in the budgetary outcome.....helped induce considerable uncertainty about the likely path of economic activity; at least seriously delayed adjustment to the overseas deficit; probably encouraged
rather than dampened inflation; and perhaps diverted attention from the pursuit of a more rational, phased adjustment to New Zealand's external difficulties. The "lesson therefore of this analysis is that we must endeavour in future to avoid such large swings in fiscal policy within such relatively short time horizons" (p.17).

4.2 The Theoretical Impact of Fiscal Policy

4.2.1 Measurement of the fiscal impact

The raw budget data and accompanying comment, as presented in the annual budget statement, is considered by many as inadequate "as a vehicle for promoting an improved understanding of fiscal policy" (Deane, p.8). Several New Zealand authors, notably Buckle and Snively (1979), Deane and Smith, (1980), Pope and Grindell (1974) and Deane (1981), have underlined the fact that the budget does not deal with the expected impact of fiscal policy on the nation, and therefore its effects on expenditure, employment, inflation and the balance of payments. In the New Zealand literature cited above,
several alternative simple measures of the impact of the budget have been constructed. This section discusses the development of a simple adjusted domestic budget deficit measure to determine the internal effects of fiscal policy, and section 4.2.3 presents an extension of that indicator to account for the monetary effects of fiscal policy.

Unfortunately, comparing between year differences in the Budget Table 2 deficit before borrowing data, shown in Table 4.1, may not be a precise or correct indicator of the intended or actual effect of fiscal policy. Furthermore, the estimated (forecast) budget deficit may not provide a true indicator of the impact of future fiscal policy. As pointed out by Buckle and Snively "we need to have some idea of what other exogenous influences the Government assumes will occur and their assumptions regarding the underlying behaviour of the economy which will cause an automatic change in the deficit" (p.13). For instance, a rise in unemployment would necessitate greater social welfare payments, whereas a rise in private incomes would create an increased taxation flow. Thus a change in aggregate economic activity, induced either by a discretionary change in fiscal instruments or a movement in variables
exogenous to the Government sector, may change the budget deficit.

Several techniques have been developed to overcome the inadequacy of using the raw budget deficit to assess the impact of fiscal policy. Some of these involve: scaling the deficit in relation to a defined full employment level of income\(^1\); standardising the deficit by separating the automatic and discretionary fiscal effects, summing the increase in discretionary policy changes; and weighting each component comprising the fiscal balance\(^2\). However each of these methods have limitations (discussed in Blinder and Solow (1974)) and "(i)n the end, the most appropriate measure of the budget impact depends on the state of knowledge about macroeconomic behaviour and the ability to isolate automatic fiscal effects from other economic effects" (Buckle and Snively, p.23).

---

1 For example, an economy operating at near full employment will respond less (in terms of additional production) to a fiscal stimulus than an economy operating at less than full employment. Therefore the impact of a Government deficit may vary according to how close an economy is to its 'capacity utilization constraint'. For further details on research for New Zealand see Deane and Smith (p.9) and Lumsden (1974, p.13).

2 For example the effect of a rise in expenditure may be different to that of a decrease in taxation.
TABLE 4.1

Government budget data: conventional format

<table>
<thead>
<tr>
<th>Years Ending June</th>
<th>Expenditure $m</th>
<th>Revenue $m</th>
<th>Government Deficit Before March</th>
<th>Borrowing $m</th>
<th>Government Deficit Year</th>
<th>March Expenditure $m</th>
<th>Annual % Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>1370.4</td>
<td>1285.7</td>
<td>84.7</td>
<td>76.8</td>
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<td></td>
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</tr>
<tr>
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<td>1645.5</td>
<td>1586.5</td>
<td>59.0</td>
<td>80.6</td>
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<td></td>
<td>20.0</td>
</tr>
<tr>
<td>1972</td>
<td>1962.0</td>
<td>1820.4</td>
<td>141.6</td>
<td>72.3</td>
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<td></td>
<td>42.2</td>
</tr>
<tr>
<td>1973</td>
<td>2283.4</td>
<td>2083.2</td>
<td>200.2</td>
<td>206.0</td>
<td></td>
<td></td>
<td>10.2</td>
</tr>
<tr>
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<td>11.0</td>
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<td>723.5</td>
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<td>33.3</td>
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<td>895.1</td>
<td>1001.7</td>
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<td></td>
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<td></td>
<td>19.4</td>
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<td>1978</td>
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<td>5012.6</td>
<td>831.6</td>
<td>694.4</td>
<td></td>
<td></td>
<td>19.8</td>
</tr>
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<td>1524.9</td>
<td></td>
<td></td>
<td>13.6</td>
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<tr>
<td>1982</td>
<td>11530.1</td>
<td>9722.4</td>
<td>1807.7</td>
<td>1818.3</td>
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<td>2091.9</td>
<td>1766.9</td>
<td></td>
<td></td>
<td>11.0</td>
</tr>
</tbody>
</table>

SOURCES: Government expenditure and revenue quarterly data from

* 1970-1978 - Buckle and Snively (p.42)
(except that their 1974 March quarter figure is incorrect)

Annual March data from Deane and Smith (p.23) and
Table 4.1 gives a summary of the conventional Government budget data in Table 2 format for years ended June (for convenience to match with OET data presented in Chapter 3) and years ended March. The two series of Government deficits before borrowing indicate a similar pattern of events, which will be discussed in section 4.3.

To obtain estimates of the Government's direct impact on aggregate domestic demand, both the Buckle-Snively and Deane-Smith papers exclude from the budget Table 2 data, the Government's transactions with the external sector. But as is indicated in Appendix 4, the data used by each pair to exclude these Government transactions differ. Because differences could not be reconciled, a third data set was compiled by the author, using data on file at the Reserve Bank of New Zealand. This data was presented in Graph 3.2 and is described in Appendix 3.

As Table 4.2 indicates, the internal effect of the budget deficit implies a much lesser impact of fiscal policy on the domestic economy than raw budget data. A further refinement would involve adjusting the internal budget deficit data for inflation. But, as Buckle and Snively point out, "unfortunately there is no existing
<table>
<thead>
<tr>
<th>$m</th>
<th>Government Deficit Before Borrowing</th>
<th>% Government OET GDP</th>
<th>Government's Internal Surplus (-) Before Borrowing</th>
<th>% Government's Internal Budget Deficit/ GDP</th>
</tr>
</thead>
<tbody>
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<td>1970</td>
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<td>1.6</td>
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<td>-53.0</td>
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<td>1972</td>
<td>141.6</td>
<td>2.0</td>
<td>121.0</td>
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<td>1973</td>
<td>200.2</td>
<td>2.4</td>
<td>135.8</td>
<td>64.4</td>
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<td>1974</td>
<td>205.1</td>
<td>2.2</td>
<td>140.7</td>
<td>64.4</td>
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<td>1975</td>
<td>723.5</td>
<td>7.0</td>
<td>264.6</td>
<td>458.9</td>
</tr>
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<td>895.1</td>
<td>4.5</td>
<td>339.6</td>
<td>555.5</td>
</tr>
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<td>1977</td>
<td>479.1</td>
<td>3.4</td>
<td>383.2</td>
<td>95.9</td>
</tr>
<tr>
<td>1978</td>
<td>831.6</td>
<td>5.3</td>
<td>465.7</td>
<td>365.9</td>
</tr>
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<td>9.1</td>
<td>582.3</td>
<td>968.9</td>
</tr>
<tr>
<td>1980</td>
<td>1243.0</td>
<td>5.8</td>
<td>681.7</td>
<td>561.3</td>
</tr>
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<td>1981</td>
<td>1552.6</td>
<td>6.4</td>
<td>715.6</td>
<td>387.0</td>
</tr>
<tr>
<td>1982</td>
<td>1807.7</td>
<td>6.3</td>
<td>892.2</td>
<td>915.5</td>
</tr>
<tr>
<td>1983</td>
<td>2091.9</td>
<td>6.9</td>
<td>1141.8</td>
<td>950.1</td>
</tr>
</tbody>
</table>

**Sources:** Table 4.1
Appendix 3
regularly published data acceptable for this procedure" (p.44). Therefore expressing the deficits as a percentage of GDP gives an indication of their aggregate influence. Using this measure, Table 4.2. shows that the effect of the internal budget deficit approximates half that implied by the unadjusted data. Nevertheless, in all cases except 1983 the direction of change in the percentage of GDP figures is the same. Buckle and Snively conclude that "the raw budget balance as measured by budget Table 2 adjusted for Government imports and exports provides as good a basis as any available to assess the budget's fiscal impact on aggregate demand" (p.44). But as Deane and Smith state "the difficulties in interpretation (of fiscal policy)..... arise not just by the complications brought to bear by a large and volatile external sector, but also from a lack of sophistication in the budget impact measures themselves" (p.8). Therefore it is necessary to discuss formally the impact of fiscal policy within a well structured model which describes the set of relationships involved. As Deane (1981) points out, "(t)he influence of the budget on the economy can only be satisfactorily described within the context of a well specified, comprehensive model of the economy as a whole" (p.8). Indeed the model to be presented in Chapter 6 intends to embody only the essential aggregate
relationships, the parsimony adding to the pedagogic power of the model. Comprehensive models are notoriously difficult to develop, being representations of a very complex world. However, in the following sections, a simplified model is suggested as a useful compromise between comprehensiveness and manageability. The model is further developed and estimated in Chapters 6 and 7.

4.2.2 The multiplier effects

As previously mentioned, any increase in national income following an increase in Government spending may be greater than the initial injection, because this induces a chain of increases in private income and expenditure. Higher Government expenditure "may also stimulate the demand for imports and thus worsen the balance of payments" (Deane and Smith, p.2). But import expenditure, like taxation, results in a leakage from the multiplier process. The theoretical fiscal multiplier can be developed using the following simple macroeconomic model. The model does not include any monetary effects (it is assumed that monetary disequilibria do not exert any influence on real variables).
A comparative static model

\[ Y = E + G + (X-M) \]  \hspace{1cm} (4.1)
\[ E = a + b(Y-T) \]  \hspace{1cm} (4.2)
\[ T = c + d(Y) \]  \hspace{1cm} (4.3)
\[ M = e + f(E) \]  \hspace{1cm} (4.4)

All the variables are in real terms. The notation and restrictions are:

- \( Y \) = national income
- \( E \) = private domestic expenditure, consumption and investment
- \( G \) = Government spending
- \( X \) = current account export receipts
- \( M \) = current account import payments
- \( T \) = taxation receipts

and

\[ 0 < b, d, f < 1 \]

Substituting (4.3) into (4.2) yields

\[ E = a + b(Y(1 - d) - c) \]  \hspace{1cm} (4.5)
(4.5) into (4.4) gives

\[ M = e + f(a + b(Y(1 - d) - c)) \]  \hspace{1cm} (4.6)

Then substituting (4.5) and (4.6) into (4.1) yields

\[ Y = a + b(Y(1-d)-c)+G+X-e-f(a+b(Y(1-d)-c)) \]  \hspace{1cm} (4.7)

Rearranging and taking the derivative of \( Y \) with respect to \( G \) gives

\[
\frac{dY}{dG} = \frac{1}{1 - (1 - f)b(1 - d)}
\]

The multiplier \( \frac{dY}{dG} \) is greater than one as all values of \( b, d \) and \( f \) satisfy the constraint

\[ 0 < (1 - f)b(1 - d) < 1 \]

since \( 0 < b, d, f < 1 \)

This form of aggregate multiplier analysis simplifies reality, because alternative forms of Government spending or taxation might have different multiplier effects. This is because those who receive the initial Government injection, or those who have their tax rate increased, may have different consumption and savings
patterns with dissimilar lags. For example, as Deane and Smith state "wage earners are normally thought to have a relatively high propensity to consume, and thus the impact of a dollar spent on higher wages for Government employees may be larger and quicker than a dollar spent on, say, a Government office block or a hydroelectric dam where the gestation periods can be very long, and where the recipients, business firms and corporations, may perhaps spend less and save more in relative terms than wage earners" (p.2).

4.2.3 Monetary impact

The multiplier effects of fiscal policy, reviewed above, also influence financial markets, which in turn may contribute through monetary aggregates to the impact of the budget deficit. The complete monetary impact of fiscal policy is difficult to assess merely be deriving a single measure. This is due to a diverse range of impinging factors including: the size of the budget deficit; the method used to finance it; the condition of the economy (including the 'mood' of the financial sector); the nature of monetary policy; and the proportion of available credit spent on imports (which
<table>
<thead>
<tr>
<th>$m Year ending June</th>
<th>Government's Internal Budget Deficit/ Surplus (-) Before Borrowing</th>
<th>Government's Net Internal Borrowing from Non M3 sector</th>
<th>Government's Budget Contribution to the M3 money base</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>-19.7</td>
<td>25.9</td>
<td>-45.6</td>
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<tr>
<td>1971</td>
<td>-53.0</td>
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<td>23.0</td>
<td>-2.4</td>
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<td>1973</td>
<td>64.4</td>
<td>183.6</td>
<td>-119.2</td>
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<td>1974</td>
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<tr>
<td>1976</td>
<td>555.5</td>
<td>-55.5</td>
<td>611.0</td>
</tr>
<tr>
<td>1977</td>
<td>95.9</td>
<td>307.8</td>
<td>-211.9</td>
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<tr>
<td>1978</td>
<td>365.9</td>
<td>259.2</td>
<td>106.7</td>
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<tr>
<td>1979</td>
<td>968.9</td>
<td>488.3</td>
<td>480.6</td>
</tr>
<tr>
<td>1980</td>
<td>561.3</td>
<td>288.3</td>
<td>273.0</td>
</tr>
<tr>
<td>1981</td>
<td>837.0</td>
<td>567.6</td>
<td>269.4</td>
</tr>
<tr>
<td>1982</td>
<td>915.5</td>
<td>820.5</td>
<td>95.2</td>
</tr>
<tr>
<td>1983</td>
<td>950.1</td>
<td>1911.6</td>
<td>-961.5</td>
</tr>
</tbody>
</table>

**SOURCES:** Table 4.2

Reserve Bank of New Zealand data base as at Jan. 1984 used for the Government's Net Internal Borrowing from Non-M3 sector' Variable used was GSP.
acts as a leakage from the money base). Nevertheless, in Table 4.3. a measure of the budget's direct contribution to the M3 definition of the money base is given.

The monetary impact of the budget deficit may therefore be opposite to the fiscal impact. The factor that determines the difference between monetary and fiscal impacts is the manner in which the deficit is financed, although the actual response of the economy to a monetary injection (or withdrawal) of funds by the Government will also depend upon other monetary changes in the economy. The source of these changes may include: private sector's overseas exchange transactions; Reserve Bank transactions with the private sector (mainly with marketing boards); and changes in lending to the private sector by M3 institutions.

The M3 monetary base comprises: cash holdings of banks, other M3 institutions and the non-financial private sector; Government stock and Treasury bills held by trading banks and other M3 institutions; and trading bank time deposits at the Reserve Bank. These are commonly called the 'uses' side of the monetary base. The internal budget deficit after borrowing from the
non-M3 sector comprises one 'source' of change in the monetary base. The other two 'sources' are Reserve Bank transactions with the private sector and private overseas exchange transactions.

It is possible to formally express changes in the money stock (M3) in terms of changes in the monetary base of M3 institutions (often called high-powered money, or H) using an algebraic formula that depends on two ratios, the public's currency to deposit ratio, and reserve to deposit ratios of M3 financial institutions. Defining

\[
\begin{align*}
M3 & \equiv C + D \\
H & \equiv C + BR \\
BR & = rD \\
C & = cD
\end{align*}
\]

(4.8) (4.9) (4.10) (4.11)

where

\[
\begin{align*}
C & = \text{currency held by the public} \\
D & = \text{total deposits} \\
BR & = \text{reserves of M3 financial institutions} \\
r & = \text{reserve to deposit ratio, } 0 < r < 1 \\
c & = \text{currency to deposit ratio, } 0 < c < 1
\end{align*}
\]
Dividing (4.8) by (4.9) yields

\[
\frac{M_3}{H} = \frac{C + D}{C + BR}
\]  

(4.12)

Using (4.8) and (4.9) in (4.12) yields

\[
\frac{M_3}{H} = \frac{(1 + c)D}{(c + r)D}
\]  

(4.13)

Then letting \((1 + c)/(c+r) = m\),

\[
\Delta M_3 = m(\Delta H)
\]  

(4.14)

where

\[
\Delta H = \text{monetary impact of budget + net private overseas transactions + Reserve Bank transactions with private sector}
\]

It is often argued that if \(m\) is relatively constant, then an increase in \(H\) would be accompanied by a multiple expansion of the money supply. For instance, Goodhart (1975), "a knowledge of movements in the high-powered money base should allow one to predict the movements in the money stock with some accuracy" (p.153). However, a cursory glance at New Zealand's annual data 1970-1982 (in Deane et al., 1983, p.275, columns (6) and (7)) reveals that the money multiplier has not been constant: its range of fluctuation was between -2.8 (1975) and 16.0 (1982), the standard deviation of the period (4.5) being larger than the mean (4.2).
Explanations for the instability follow at least three lines. First, the parameter $c$ in equation (4.11) can be hypothesised to be a function of interest rates. That is, the public desire to hold less (more) money, as interest rates rise (fall), in relation to bonds, shares and other assets. Second, $r$ could also be a function of interest rates, as banks could hold cash reserves at levels above those legally required and $r$ might be an influence on the size of such 'excess' reserves. Third, the supply of credit may be "constrained by monetary policy and other economic policies in various ways. For example, an increase in the trading banks' reserve asset ratios would reduce their margin of free reserves and should thereby influence the banks' lending policies" (Deane et al., 1983, p.176).

Evidence presented using New Zealand data has apparently shown "a close correlation, after allowing for time lags, between changes in the monetary base and the money stock and private sector credit" (Buckle and Snively, p. 80). These authors used the estimated equation in Appendix 5A to investigate the relationship.

Appendix 5A also contains two updated estimations of the
Buckle and Snively equation. It must be stressed, however, that the regression results presented in Appendix 5A provide no guide as to the behavioural responses involved in influencing growth patterns of the money supply. Therefore the Buckle and Snively equation provides only tentative evidence that there exists a relationship between percentage changes in the money base and the money supply. This evidence is somewhat weakened by the ordinary least squares (OLS) updated estimation of their equation: the coefficient of determination adjusted for degrees of freedom (R²) has decreased, indicating a poorer fit, the Durbin-Watson statistic (DW)¹ testing for autocorrelated error term disturbances has deteriorated. This suggests either that other factors are impinging on the growth in the money supply, or that the random error term is autocorrelated. The results of the first-order autoregression equation are more satisfactory, the DW-statistic indicating that we should tentatively fail to reject the null hypothesis of no autocorrelation.

¹ The Durbin Watson statistic is measured using the formula presented in Table 4.4, note (iii). For further reference see Koutsoyiannis,(p.212) and Chow, 1983, (p.85)
Some presentations of the monetary approach to the balance of payments directly test for the presence of a money multiplier as shown in equation (4.14) (see for example Bean, p. 327; Zecher, p. 287, and Genberg, p. 309 - all in Frenkel and Johnson, 1976). As Genberg states "(t)he multiplier is postulated to summarise the behaviour of the public and the commercial banks with respect to the composition of their assets. This is influenced by wealth and income levels and market rates of return on one hand, and policy variables of the central bank on the other" (p. 309).

Table 4.4 presents regression results for a money multiplier equation using New Zealand quarterly data. These results are not encouraging, as the Durbin Watson statistic falls outside the required upper and lower limits shown in the Table. For this reason, empirical analysis in later chapters uses a money supply identity, which effectively restricts the money multiplier to a value of one. This is a pragmatic compromise given the results in Table 4.4.
TABLE 4.4
Regression results for a New Zealand money multiplier

1. Ordinary least squares equation

\[ \Delta M3 = 0.799 \Delta M3 \text{B} \]
\[ (8.15) \]
\[ R^2 = 0.18 \]
\[ DW = 0.54 \]

2. First-order autoregressive equation

\[ \Delta M3 = 0.667 \Delta M3 \text{B} \]
\[ (16.95) \]
\[ R^2 = 0.84 \]
\[ DW = 2.76 \]
\[ \rho = 0.778 \]
\[ (9.76) \]

Notes: (i) t scores are in brackets. The critical value of the t-statistic for 56 degrees of freedom = 1.675 at the 95% confidence level.
(ii) \( R^2 \) = coefficient of determination adjusted for degrees of freedom.
(iii) DW = Durbin-Watson statistic

\[ DW = \frac{\sum_{t=2}^{n} (e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2} \]

The critical value of \( d_L \) and \( d_U \) at the 95% confidence level are 1.53 and 1.60 respectively. Therefore in equation 1. above DW < \( d_L \) so we reject the null hypothesis of no autocorrelation and accept that there is positive autocorrelation of the first order. Therefore assuming that the autocorrelation is due to mis-specification of the random error term a first-order autoregressive equation is estimated. However the results of the Durbin-Watson test are not encouraging, although the \( R^2 \) is much improved. As 4.0 - 1.53 = 2.47, which is lower than 2.76, we still reject the null hypothesis of no autocorrelation and conclude that the problem may be due to the exclusion of other variables, an incorrect mathematical form, or errors in measurement of the variables.

(iv) Data period 1969(S) - 1983(J).
(v) Data from Appendix 5B.
4.3 The Stance of New Zealand's Fiscal Policy

4.3.1 Brief history of fiscal policy in New Zealand

As a colony of Britain, New Zealand adopted some ideas and protocol that stem from British society. But as Hawke (1982) points out, "these particular ideas did not carry weight with colonial decision makers. The role of Government was worked out mostly in the light of local realities" (p.5). Hawke outlines general reasons for Government intervention in the developing years of New Zealand's economy. The reasons he gave were: creating diplomatic offices; providing a legal system; and exercising "the power to borrow on the security of the essentially coercive power to levy taxes to fund repayments and interest obligations. The last of these was much more important... than in England" (p.6). An interesting feature of these developing years was that the Government "engaged in building railways or in other forms of capital formation financed by the borrowing..... it was exceptional to New Zealand" (p.10). The list of activities which Hawke discusses underlines the early commitments the Government entered into in a fiscal sense. They include the Bank of New
Zealand, the Government Life Insurance Office, the Public Trust Office, the support given to Producer Boards, and transfer payments to maintain an extensive social welfare system.

Development of the idea that the Government's fiscal policy should also be concerned with balancing aggregate demand with the supply of goods and services available gained vogue in the late 1930's and 1940's. This quashed the older dictum of the need to 'balance the budget'. But as Hawke states, "by the 1970's there was growing regret that the discipline of having to balance the budget had been destroyed too completely; the surplus or deficit appropriate to any particular prevailing economic conditions was necessarily more ambiguous than equality of Government revenue and expenditure, and pressures for increased expenditure were greater than for increased taxation" (p.54). This last point of Hawke's, that of unequal pressure on expenditure and taxation, highlights the importance of regular critical revisions of public expenditure, and the need to enter into 'sunset clauses' for items of increased expenditure or reduced taxation that are especially introduced as instruments of demand management policy. To conclude this section on the historical perspective, it is
important to note that prior to the 1970's, the budget's internal influence (as measured by Table 4.2) fluctuated around zero. Additionally, "before the early 1970's, fiscal policy did not usually make a direct injection to demand in New Zealand" (Hawke, p.55).

4.3.2. A brief overview of the direction of fiscal policy since 1970

The following description of the path of fiscal policy uses only the three indicators presented in Graph 4.1. These measures express the budget deficit, the internal budget deficit, and the budget deficit's contribution to the monetary base, all relative to nominal gross domestic product.

The three measures in Graph 4.1 all suggested differing levels of relative impact upon the economy. In all June years, the unadjusted deficit indicates a larger impact than the adjusted internal deficit. Relatively, except in 1976 when the Government repaid more private sector debt than it incurred, the internal budget impact has been greater than the budget impact on the money base.
GRAPH 4.1
Measures of the impact of the Government's budget deficit.

SOURCE: Table 4.3
The graph highlights two other important features. First, since 1972 the unadjusted and adjusted deficits before borrowing have, on average, continued to rise as a proportion of nominal GDP. As is pointed out in the September 1983 Reserve Bank Bulletin "(t)his upward ratchetting of deficit levels has important longer term consequences, with each increasing addition to the level of public debt involving accelerating debt service charges, which increases the difficulties policy makers face in containing or reducing future deficit levels" (p.385). Of course, if deficit Government spending is on capital development which will provide income enough to service the debt and capital repayments, there is little concern although there may be some crowding-out of private sector investment. However, as debt interest payments contribute more to the budget deficit, the process of reducing the deficit becomes more difficult; the deficit may become "self-reinforcing, with increasingly adverse effects on monetary growth, prices, interest rates, the external accounts and private sector activity" (p.385).

The second feature of Graph 4.1 is the large
fluctuations in the impact of fiscal policy since 1972. The large apparent "swings" in the direction of fiscal policy are emphasized by all three indicators, showing expansionary periods in 1975, 1976, 1978 and 1979 and contractionary periods in 1977 and 1980. Many commentators discussing the impact of fiscal policy have attributed these peaks and troughs as cyclical in nature, centering on three year cycles which match those of the parliamentary term. Whilst it is difficult to attribute the reasoning behind fiscal policy and its outcome to any particular policy response, it is likely that the 1974/1975 budget deficit was at least as much a response to an anticipated slump in economic activity following the first oil shock and the subsequent 1974 balance of payments deficit as it was electioneering. In fact Deane and Smith state "the Government endeavoured to insulate the domestic economy from the full impact of the massive turnaround in the balance of payments by adopting an expansionary fiscal stance" (p.4). There can be little doubt that the expansion in expenditure was a deliberate fiscal action, since on a June year basis, Government expenditure rose by 51.2% in 1974/75 (see Table 4.1).

The first dramatic contractionary period in the 1970's
is recorded in 1977. In this year, following the persistent current account deficits and worsening rates of domestic inflation (see Table 3.6), Government expenditure grew by only 6.0% in nominal terms, whereas revenue increased by 19.4%. As a result, the March and June year budget deficits were halved. The contractionary monetary impact of the deficit was due to more private funds flowing into Government stock; this followed the "removal of interest rate controls and upgrading of the competitiveness of Government's own securities" (Deane and Smith, p.16).

In 1978 the economy moved into a severe recession. Although the increase in discretionary Government spending "was less than $300 million" the rise in automatic spending "was two-thirds of the overall change" (p.10). The 1978 impact of the internal deficit, shown in Graph 4.1, was less than either the 1975 or 1976 effects; the monetary impact was also relatively neutral. In 1979 the Government delivered an expansionary budget deficit before borrowing; this followed possible concern over "rising unemployment, a deepening recession and a prospective election" (p.6). However, the monetary impact of the 1979 deficit was less than it had been for the 1975 or 1976 deficits,
indicating the continuing use of private Government debt sales to finance the growing deficits.

Since 1979 the relative impact of the Government's deficit on the domestic economy (the internal deficit) has remained between 2.5% and 3.5% of GDP. This level, whilst high compared with pre-1972 levels, is low relative to the levels indicated by the unadjusted data, a fact due to the increasing size of the Government's current account deficit. The impact of the deficit on the monetary base shows the influence of the marketing of Government stocks - New Zealand Government Savings Stock, Inflation Adjusted Bonds, Kiwi Saving Stock and various tap issues. Although not reflected in the data, the late 1983 move to tender Government stock will also contribute to restraint of the monetary impact of the Government deficits.

4.4 A Comparison and Summary

It is interesting to briefly compare the stance of New Zealand's fiscal policy over the last decade with that of Sweden. Faced similarly with the international
recession in 1974-1975 and a fall in their terms of trade following the oil shock, the Swedish Government also adopted the policy of 'bridging the gap'. According to Jonung (1983), an author who has published several articles on Swedish monetary and stabilisation policy, the strategy of bridging the gap "involved a highly expansive fiscal policy, whereby domestic demand was supposed to tide Sweden over the slack period of demand abroad" (p.27). As was the case in New Zealand, the continuing international recession frustrated this stabilisation policy and stimulated inflation rather than demand, therefore Sweden's international competitiveness deteriorated. Jonung states that "domestic fiscal policy was unduly expansive and contributed to the deficits on the current account during the period 1973-1980", postponing "measures for restoring external balance" (p.27). Concluding from the lessons of the 1970's, Jonung claims that in "the Swedish system (that of a mixed economy where the framing of fiscal policy is largely influenced by marginal votes) there is a danger that fiscal policy actually becomes a source of disturbances and instability" (p.32). He suggests, to improve the prospects of using fiscal policy for stabilisation purposes, that "central Government expenditures should roughly match Government revenues. In this way there
would be a direct link between public expenditures and their financing, this counteracting the present system's tendencies to postpone the issue of costs" (p.32).

This chapter has briefly reviewed the role of fiscal policy, measures of its impact and the stance taken by the Government over the last decade. The objective of this Chapter and Chapter 3 was to provide background into movements in the major aggregates, thereby previewing the theoretical review of the next Chapter and model development in Chapter 6.
A REVIEW OF ANALYTICAL FRAMEWORKS

Past analyses of balance of payments policy have mainly concentrated on three methodologies; the elasticity approach; the absorption approach; and the monetary approach, all previously reviewed in Chapter 2. The following review emphasizes qualitative and applied models that provide the basis for the fiscal approach used in the model outlined in Chapter 6.

Support for the fiscal approach was provided by Milne (1976) who examined a form of the Keynesian identity for a large number of countries. Her paper reviewed the development of the Cambridge New School, the debate developing in letters and articles written in The Times. Writers of the Cambridge New School "advanced support for the existence of a causal relationship between the level of the budget deficit and the balance of payments on current account" (Milne, p.2). The New School debate also emphasized the monetary consequences of budget deficit financing. For example "...... an excessive
budget deficit . . . . would require as a monetary counterweight a rise in interest rates so draconian as to produce unacceptable contradictions in policy . . . ." and "(h)ence an excessive budget deficit is always accompanied by a rapid increase in the money supply . . . ." (Nield, 1974). Although, as Milne states, "the Cambridge model is not set out in explicit mathematical terms, which makes it difficult to appraise as a set of logical propositions following from a precise set of assumptions" (p.3). It is clear that the central hypothesis is that the current account balance depends mainly on the Government budget deficit.

From the elementary identity

\[ C + S + T = Y = C + I + G + (X - M) \]

where \( T = \) taxation,

we can derive three goods markets; foreign, private and public. It follows that
(M - X) ≡ (I - S) + (G - T)

If the private sector balance (I - S) is small and predictable, then

\[ (M - X) = \alpha + \beta(G - T) + \mu \]

In this framework an autonomous increase in Government spending would result in increased imports with "no multiplied effect on domestic income" (p.5). The approach outlined by Milne, whilst yielding a testable empirical relationship between Government deficits and the trade balance, does not imply causality. Furthermore the approach is deficient in that while focusing on credit creation and the balance of payments, linkages between these are not made explicit. In practice, when part of a fiscal deficit is 'monetised', both fiscal and monetary policy are being employed - the degree of accommodation in monetary policy being determined by the degree of monetisation of the deficit. Therefore increases in the Government deficit after non-M3 borrowing may be one of the major factors causing
increases in the domestic money supply which, according to the monetary approach, is likely to result in a worsening of the balance of payments.

To the extent that monetary causes of balance of payments disequilibria are the result of fiscal deficits, longrun balance of payments equilibria may only be obtained through coordination of monetary and fiscal policies. This highlights the interdependence of the two policies.

Whitman's (1970) survey article of the internal-external balance literature followed Meade's (1951) and Tinbergen's (1952) requirement that we set out a system of equations that represent the structural relationships between target levels and policy variables in an economy. Many models have been formulated to yield policy multipliers, for example Flemming (1962), Johnson (1966), and Mundell (1962). The common features of these internal-external balance models are described in the following system, which is adapted from Whitman's presentation.

(i) Assumptions

* Monetary authorities sterilize the impact of balance of payments deficits on the money supply\(^1\)

\(^1\) Sterilisation basically means that monetary policy will offset the monetary impact.
(i) Assumptions continued ...

* The foreign interest rate is constant
* A zero marginal tax rate
* Fixed exchange rates
* (Not explicitly stated by Whitman, but implied by equation (5.3) is the assumption that the money supply will accommodate any change in the demand for money).

(ii) The Model

\[ Y = E + CUB + G \] (5.1)
\[ B = CUB + K \] (5.2)
\[ M = L \] (5.3)
\[ E = f_1(Y, i) \] (5.4)
\[ CUB = f_2(Y) \] (5.5)
\[ K = f_3(i) \] (5.6)
\[ L = f_4(Y, i) \] (5.7)

(iii) Notation and Restrictions

\[ Y = \text{national income} \]
\[ E = \text{private domestic expenditure} \]
\[ CUB = \text{trade balance} \]
\[ G = \text{Government deficit spending} \]
\[ K = \text{net capital inflow} \]
\[ B = \text{balance of payments} \]
\[ M = \text{money supply} \]
\[ L = \text{money stock held by public} \]
\[ i = \text{rate of interest} \]

\[ 0 < \partial E / \partial Y < 1; \quad \partial E / \partial i < 0; \]
\[ \partial CUB / \partial Y < 0; \quad -\partial E / \partial Y < \partial CUB / \partial Y; \]
\[ 0 < \partial K / \partial i; \]
\[ 0 < \partial L / \partial Y < 1; \quad \partial L / \partial i < 0. \]
The system can be totally differentiated, rearranged and written in matrix form, to obtain:

\[
\begin{bmatrix}
(1-\frac{\partial E}{\partial Y}-\frac{\partial \text{CUB}}{\partial Y}) & \frac{-\partial E}{\partial i} & 0 \\
-\frac{\partial \text{CUB}}{\partial Y} & \frac{-\partial K}{\partial i} & 1 \\
\frac{\partial L}{\partial Y} & \frac{\partial L}{\partial i} & 0 \\
\end{bmatrix}
\begin{bmatrix}
\frac{\partial Y}{\partial i} \\
\frac{\partial Y}{\partial i} \\
\frac{\partial L}{\partial i} \\
\end{bmatrix}
= 
\begin{bmatrix}
\frac{dG}{dY} \\
\frac{dG}{dY} \\
\frac{dB}{dM} \\
\end{bmatrix}
\]

The three equation system has two policy variables, \(dG\) and \(dM\), and three dependent target variables, \(dY\), \(di\) and \(dB\). The traditional policy multipliers for the change in the balance of payments target due to changes in Government deficit spending and the money stock are

\[
\frac{dB}{dG} = \delta K/\delta i \frac{\partial L/\partial Y - \partial \text{CUB}/\partial Y * \partial L/\partial i}{\Delta} < 0
\]

and

\[
\frac{dB}{dM} = \delta K/\delta i \frac{(1-\frac{\partial E}{\partial Y}-\frac{\partial \text{CUB}}{\partial Y})-\frac{\partial E}{\partial i} * \frac{\partial \text{CUB}}{\partial Y}}{\Delta} < 0
\]

where

\[
\Delta = -\frac{\partial L}{\partial i} (1-\frac{\partial E}{\partial Y}-\frac{\partial \text{CUB}}{\partial Y})-\frac{\partial E}{\partial i} * \frac{\partial L}{\partial Y} > 0
\]
Therefore an increase in the money supply will worsen the balance of payments; however an increase in Government deficit spending may improve or worsen the balance of payments. This depends upon which of the two conflicting forces dominates: the negative effect of the increase in income on the trade balance or the increase in capital inflow caused by a rise in the interest rate. (Interest rates will rise when the money stock remains fixed with rising expenditure on goods and services). When net capital inflows are interest inelastic, the balance of payments will worsen with increases in Government deficit spending as

\[ \frac{\partial K}{\partial \pi} = \frac{\partial L}{\partial Y} < \frac{\partial CUB}{\partial Y} \cdot \frac{\partial L}{\partial \pi} \]

Focusing on the balance of payments current account, Vines (1976) developed a simple analytical model to explore the New Cambridge School debate and examine optimal policy settings for external and internal balance. His model is a simple Keynesian model of an open economy and is adapted here to highlight budgetary effects.
(i) Assumptions

* The terms of trade are unaffected by a devaluation

* A devaluation has no effect on the internal price level of home produced goods

* Government expenditure is the only instrument of budgetary policy

(ii) The Model

\[ Y = E + G + X - M \] \hspace{1cm} (5.8)

\[ B = X - M \] \hspace{1cm} (5.9)

\[ E = e_0 + e (Y - T) \] \hspace{1cm} (5.10)

\[ T = t_0 + tY \] \hspace{1cm} (5.11)

\[ M = m_0 + mY \] \hspace{1cm} (5.12)

(iii) Notations and Restrictions

\[ Y = \text{national income} \]

\[ E = \text{private domestic expenditure} \]

\[ G = \text{public expenditure} \]
X = exports
M = imports
B = balance of payments current account
T = tax receipts

0 < e ≤ 1;
0 ≤ t < 1;
0 < m < 1

Notice that equation (5.11), the taxation equation, is incorporated in Vines' model therefore relaxing Whitman's assumption of a zero marginal tax rate. Totally differentiating (5.8) provides

\[ dY = dG + dE + dX - dM \]  (5.13)

From (5.10) and (5.11)

\[ \frac{dE}{dY} = e(1-t) \]  (5.14)

and from (5.12)

\[ \frac{dM}{dY} = m \]  (5.15)

Using (5.14) and (5.15) in (5.13) yields

\[ dY = dG + dX + (e(1-t) - m) dY \]
\[ = \frac{1}{e(1-t)-m} (dG + dX) \]
\[ = a * (dG + dX); \]  (5.16)
where \( a = \frac{1}{e(l-t)-m} > 0 \)

Similarly a change in the balance of payments current account can be written

\[
dB = dX - dM
= dX - mdY
\]

From (5.16), (5.17) becomes

\[
dB = dX - m(a (dG + dX))
\]

therefore

\[
\frac{dB}{dG} = -ma < 0
\]

The effects of a change in Government expenditure, as embodied in equations (5.16) and (5.18) are shown diagramatically in Figure 5.1.

Continuing on Milne's theme, Vines examined the facts that "two large devaluations of sterling - in 1967 and 1972 - had failed either to improve significantly the growth of British exports or to reduce the acceleration of imports" and "(in) addition massive increases in
FIGURE 5.1
Expenditure - Current Account Balance Relationships

\[ Y = E + G + \Delta G + X - M \]

Expenditure

\[ \Delta G \]

Current Account Balance

\[ -m\Delta G \]

National income

45°

aΔG

B
Government expenditure and the resultant high budget deficits had seriously exacerbated .... balance of payments difficulties" (p.213). The parameter employed by Vines to test that the private sector exhibits a small and predictable surplus is equivalent to that used by Milne.

Vines notes that the nonsense assumption that all taxes are lump sum must be employed for dB/dG = -1 as then a = 1/m. This assumption would stop internal leakages from the income flow. Therefore with t = 0, e = 1 and e₀ stable, any increase in Government expenditure would be matched by an equal import leakage.

The introduction of a tax leakage, (t > 0) with constant private savings (e = 1, e₀ stable) results in equivalent increases in the ex post Government deficit.

---

1 It can be shown that in equation (5.10) if e=1 and e₀ is small and constant then this is equivalent to stating that α = I-S. Equation (5.10) becomes E = K+(Y-T), where K = a constant and E = C+I. Therefore C+I = K+(Y-T), substituting for Y gives C+I = K+(C+I+G+X-M)-T. Rearranging this provides M-X = α + β(G-T) where α = K=(I-S) and β=1.
and imports. If

\[ D = G - T \tag{5.19} \]

where

\[ D = \text{the Government budget deficit then from (5.11)} \]

\[ D = G - (t_0 + tY) \]

differentiating yields

\[ dD = dG - dt_0 - tdY \]

where \( dt_0 = 0 \) as \( t_0 \) is a constant. Substituting for \( dY \)

using (5.16) provides

\[ dD = dG - ta (dG + dX) \]

If \( dX = 0 \) then

\[ \frac{dD}{dG} = 1 - ta \]

so that with (5.17) if \( ma = 1 - at^1 \)

then

\[ \frac{dB}{dD} = -1 \tag{5.20} \]

That is \( 1-e(l-t)-m-t=m \); or \( (1-e)(1-t)=0 \); which occurs when \( e=1 \) and \( 0<t<1 \).
Even if \((1 - e)\) is close to zero in the medium term, then "the Government action will necessarily be responsible for a worsening (current account) deficit" (Vines, p.217). Vines suggests that we should extend the forecasting horizon to capture this effect.

Criticism levelled at this analysis has emphasised the omission of consideration of monetary factors. The interest rate effect, following an expansion of private income, may cause a decrease in private expenditure. Therefore \((5.10)\) may be written as

\[
E = e_0 + e(Y - T) + \gamma i + \mu ; \gamma < 0. \tag{5.21}
\]

This may constrain some of the feedback to the trade balance via the income multiplier effects.

Mundell (1968) also examined fiscal policy and balance of trade linkages. He makes the supposition that Government spending is to be solely financed by money creation.
(i) Assumptions

* no taxation

* all Government borrowing through money creation, that is, there are no sales of Government securities except to the central bank

* the central bank determines the money supply

(ii) The Model

\[ Y = E + G + B \quad (5.22) \]

\[ B = \frac{dR}{dt} \quad (5.23) \]

\[ \frac{dM^s}{dt} = G + \frac{dR}{dt} \quad (5.24) \]

(iii) Notation

\[ Y = \text{national income} \]

\[ E = \text{private domestic expenditure} \]

\[ G = \text{Government spending} \]

\[ B = \text{balance of trade} \]

\[ \frac{dR}{dt} = \text{flow of exchange reserves} \]

\[ \frac{dM^s}{dt} = \text{flow of money} \]
Substituting (5.23) in (5.24) provides

\[
\frac{dM^S}{dt} = B + G
\]  

(5.25)

According to Mundell, the "Government, which may initially try to finance its deficit by creating more money, finds that its deficit is really being financed out of foreign exchange reserves .... (o)f course, the process cannot go on forever, because exchange reserves are not inexhaustible" (p.124). He concludes, "the basic assumption that there are no securities, means that monetary and fiscal policies are not distinct from one another and that balance of payments problems persist because of the failure of the authorities to balance the budget" (p.129). Other studies emphasizing a similar theme include Keller (1980) and Jonson (1976).

Keller used an income and absorption framework to analyse the effects of credit policies on the balance of payments current account. He concluded that "the increase in Government credit is initially reflected in an equally sized current account deficit" (p.471).
Jonson formed a highly aggregated model to explore "the relatively rapid postwar growth of the Government sector, which has produced .... persistent trade deficits" (p.980). His disequilibrium monetary model explicitly links domestic credit creation with the budget deficit. Therefore Jonson could outline the monetary consequences of deficit spending, stating that these "have further added to domestic demand pressures, as excess money balances have increased private sector expenditures and produced .... balance of payments deficits" (p.980).

Aktar, Putnam and Wilford (1979) examined the impact of fiscal constraints on monetary policy within the context of the monetary approach to the balance of payments. Their main contribution was to recognize that the "change in domestic credit is ultimately constrained by the budget deficit and net sales of Government securities" (p.204). So that,

\[ GC = G - T - CGSP \]  \hspace{1cm} (5.26)

where

\[ GC = \text{Government credit} \]
III

G = Government expenditure
T = taxation receipts
CGSP = public borrowing from the non monetary sector

From Chapter 2 for convenience, the money demand and money stock equations are restated:

\[ M_d = f(Y, p, r) \]  \hspace{1cm} (5.27)

\[ M^S = (R + D) \]  \hspace{1cm} (5.28)

and in equilibrium provide

\[ \Delta R = f(Y, p, r) - \Delta D \]  \hspace{1cm} (5.29)

the estimating form of which is often (see Spencer, 1978, p.3) expressed as

\[ \frac{(R/M^S)}{\Delta R} = \alpha_1 \frac{\Delta Y}{\Delta R} + \alpha_2 \frac{\Delta P}{\Delta R} + \alpha_3 \frac{\Delta r}{\Delta R} \]

\[ - \frac{(D/M^S)}{\Delta D} + \mu \]  \hspace{1cm} (5.30)

where the notation used is
\[ \Delta \log = \text{change in log, } \Delta \log \]

\[ M^d = \text{money demand} \]

\[ Y = \text{national income} \]

\[ P = \text{prices} \]

\[ r = \text{interest rate} \]

\[ M^S = \text{money stock} \]

\[ R = \text{overseas backing of the money supply, that is holdings of overseas currency reserves and gold} \]

\[ D = \text{domestic asset backing of the money supply} \]

\[ \nu = \text{stochastic term} \]

\[ \alpha_2 = \text{price elasticity} \]

\[ \alpha_3 = \text{interest elasticity} \]

and the restriction

\[ \alpha_1 = 1 \]

Since Government credit (GC) forms a part of the domestic backing of the money supply (D), equation (5.30) can be rewritten as

\[ \frac{R}{M^S} \Delta R = \alpha_1 \Delta Y + \alpha_2 \Delta P + \alpha_3 \Delta r \]

\[ - \left( \frac{GC}{M^S} \right) \Delta GC - \left( \frac{PC}{M^S} \right) \Delta PC + \mu \]

(5.31)
where

\[ \text{PC} = D - GC \]

Equation (5.31) suggests that reductions in Government spending or increases in taxation and non-monetary borrowing would improve the reserve position.

Much research using the monetary approach has emphasized the level of reserves as the objective of policy. The theory does not make "any predictions as to how the changes in foreign reserves of a country are brought about, i.e. whether through the trade balance or the capital balance or some combination of the two" (Khan, 1976, p.1), but the monetary approach does suggest that the current account is influenced through some channel by the net excess supply or demand for money. Khan develops a monetary model of the balance of payments not dissimilar to Jonson's. An important contribution of both Khan and Jonson is their development of a flow demand for money variable, which is defined as

\[
F_t = \alpha \left[ \frac{M^d}{P} - \frac{M^S}{P} \right]
\]

(5.32)
where

\[ a = \text{the coefficient of adjustment, and} \]
\[ 0 < a < 1. \]

Both authors incorporate \( F_t \) as an explanatory variable in a real expenditure equation.

Following Frenkel and Rodriguez (1975), Craig (1981) developed a monetary model of the balance of trade for fixed exchange rates. He postulated that the trade balance \( (B) \) is a function of transitory income and the real excess supply of money, that is

\[ B = a_1 Y_t - a_2 \left( \frac{M^S}{P} \right) - \left( \frac{M^d}{P} \right) \]

(5.33)

where

\[ Y_t = \text{transitory income} \]
\[ M^S = \text{money supply} \]
\[ M^d = \text{money demand} \]
\[ P = \text{prices} \]
By substituting a demand for real money equation, (see for example Frenkel and Johnson (1976)), (5.33) becomes

$$B_t^s = \alpha_1 Y_t - \alpha_2 (\frac{M^S}{P}) + \alpha_3 Y + \alpha_4 i$$

(5.34)

A more complete specification of (5.34) may include the effects of monetary disequilibria on consumption and investment. Nevertheless, Craig concludes, after estimation of (5.34), that "monetary factors have a direct influence on the balance of trade" (p.466).

Ursprung (1983) applying a similar methodology to Craig, but making prices endogenous, strikes a similar conclusion, in that "the persistent balance of trade deficit in New Zealand is and always has been due to a too expansionary monetary policy" (p.32). The argument presented by Ursprung for excluding capital flows from his New Zealand model is also found elsewhere. For instance, Spencer (1978), "New Zealand is far from an open economy in terms of the freedom of capital flows. Exchange restrictions have prevented New Zealanders from earning high interest rates on overseas capital markets and the traditionally low domestic rates have distracted
any substantial short term capital inflow. Hence any effects on the balance of payments due to monetary disturbances have effectively been limited to the current account" (p.7).

Rather than estimate a single equation, similar to (5.30) or (5.31), Spencer empirically tested monetary hypotheses of the monetary approach to the balance of payments by extending the Reserve Bank of New Zealand's econometric 'core model'. He concluded, "(f)rom the statistical significance exhibited by the disequilibrium money terms ..... and from the powerful feedback relationship through the current account ..... it appears that a 'monetary approach' is relevant to the analysis of New Zealand's balance of payments" (p.11).

Summary

In this section alternative analytical frameworks that have been used to explore fiscal, monetary and balance of payments linkages have been considered. Milne exposed the debate of the Cambridge New School and developed a simple regression equation. Whitman, Vines, Mundell and
Keller developed qualitative models, the first three are discussed in full and the conclusions of all four are presented.

Jonson's real monetary disequilibrium results are recorded and the reduced form equation derived by Aktar (et al) is presented. Khan's criticism of this approach is outlined and his real monetary disequilibrium term is discussed. Two quantitative balance of trade models are discussed, those of Craig and Ursprung, and finally Spencer's conclusions after testing of the monetary approach to the balance of payments (with the RBNZ core model) are summarized.
In Chapters 3 and 4 short perspectives on the nature of balance of payments policy and fiscal policy were presented. Overviews of the trends in the major macroeconomic magnitudes were also presented, and these should be considered as background to the model development. In Chapter 5 an analytical background for this chapter was established. In this Chapter, hypotheses about relationships between fiscal policy and the balance of payments are formulated, and quantitative estimation of the parameters in a small econometric model is commenced.

In order to fully investigate the linkages between the budget deficit and the balance of payments current account, it is perhaps best to develop a structural model. Such a model should describe the set of relationships between fiscal policy, its financing, domestic credit, money, private expenditure decisions, and thereby the current account.
The model to be presented derives much of its theoretical basis from work by Whitman (1970), Vines (1976), Jonson (1976), and Khan (1976). The departure from previous research is to formalise Corden's (1977) stated need to analyse the balance of payments problem by examining the public and private sector contributions to the current account balance separately (see Corden, p.45).

In presenting the model it is most convenient to initially specify and discuss each equation independently. Comment on the properties and relationships of the model as a whole follows the revised estimation in Chapter 7.

6.1. Equation Specification

The standard Keynesian demand identity,
\[ Y = C + I + G + X - M \]
can be transformed to provide
\[ Y = E + G/P + RCUB \] (6.1)
where

\[ Y = \text{real output} \]
\[ E = \text{real private expenditure, } C + I \]
\[ G/p = \text{real Government spending} \]
\[ RCUB = \text{current account of the balance of payments in real terms} \]

To derive real disposable income, it is necessary to introduce a taxation equation into the system. Income taxation receipts, \( TY \), are considered a direct function of the value of aggregate output. Therefore

\[ TY_t = a (P \times Y)_t + \mu \quad (6.2) \]

Real disposable income, \( YD \), is by definition

\[ YD = Y - TY/P \quad (6.3) \]

Equation (6.4) defines the desired level of private domestic expenditure, \( E \). It is hypothesized that \( E \) is a function of disposable income

Therefore,

\[ E_t = a YD_t + \mu \quad (6.4) \]

and \( 0 < a \)
Following the portfolio approach, and by "assuming a constant speed of adjustment", (Spencer, 1977, p.4), the partial adjustment formulation toward short run equilibrium private domestic expenditure is often specified as

\[ E_t - E_{t-1} = \beta_1 (E^*_t - E_{t-1}) + \beta_2 \left( \frac{W^*}{P} - \frac{W}{P} \right) + \nu \]  

(6.5)

where

\[ \begin{align*}
    W^* &= \text{desired wealth} \\
    W &= \text{actual wealth} \\
    P &= \text{prices} \\
    \nu &= \text{stochastic term}
\end{align*} \]

The real balance effect depicted in equation (6.5) derives from the work of Archibald and Lipsey (1958).

Since equation (6.4) embodies private decisions

\[ \text{This formulation is attributed to Nerlove (1956, 1958) and is based on a 'stock adjustment principle', where the actual realised change in a variable is only a fraction of the actual change. Koutsoyiannis (1977, p. 310-313) gives a summary of the method.} \]
regarding real assets, equation (6.5) can be rewritten as

$$E_t - E_{t-1} = \beta_1 (E_t - E_{t-1}) + \beta_2 \left( \frac{M^d}{P} - \frac{M^s}{P} \right) t + \nu \quad (6.6)$$

where

$$\beta_1 > 0$$

and implies a lagged adjustment period; and

$$\beta_2 < 0$$

indicating that, if the money supply is greater than the demand for money, private domestic expenditure will rise as households and firms act to expend their excess supply of real money balances.

Equations (6.4) and (6.6) can be combined to provide an estimating equation for private expenditure. By replacing $E$ in (6.6) with equation (6.4) we derive

$$E_t - E_{t-1} = \beta_1 (a \cdot YD + \mu - E_{t-1}) + \beta_2 \left( \frac{M^d}{P} - \frac{M^s}{P} \right) t + \nu$$
Rearranging terms yields

\[ E_t = \beta_1 YD_t - \beta_1 E_{t-1} + E_{t-1} \]

\[ + \beta_2 \left( \frac{M^d}{P} - \frac{M^s}{P} \right)_t + (\nu + \beta_1 \mu) \]

Simplifying

\[ E_t = \beta_1 YD_t + (1 - \beta_1) E_{t-1} \]

\[ + \beta_2 \left( \frac{M^d}{P} - \frac{M^s}{P} \right)_t + (\nu + \beta_1 \mu) \]  \quad (6.7)

Consistent with Corden's idea that we should "just assume for the purposes of discussing balance of payments issues that the private sector knows what it is doing, and what is good for it as far as spending and savings decisions are concerned", (p.45), the model will use the current account data formed in Appendix 3. This divides the data into Government and private sector contributions. It is therefore necessary to specify individual equations for the components. Both Government and private overseas current account receipts are treated as exogenous elements. Whilst it would be possible to utilise a world GNP proxy and a relative price variable to model exports, it is felt that this would not greatly benefit the achievement of the objectives of the model.

Equation (6.8) describes the desired demand for private
imports, $\hat{PM}$. These are measured on a nominal OET basis. It is postulated that $\hat{PM}$ is a function of (i) private sales ($(E \cdot P)$ and nominal private exports, $PE$), representing the level of domestic activity, (ii) a relative price variable,

$$PI(1 + t_m)/P$$

where

$PI = \text{import price index}$

$t_m = \text{effective tariff rate}$

$P = \text{consumer price index}$

and (iii) a proxy for Government import controls, $ZM$, so that

$$\hat{PM}_t = \alpha_1 (E + PE)_t + \alpha_2 (PI(1 + t_m)/P)_t + \alpha_3 ZM_t + \mu \quad (6.8)$$

As with private domestic expenditure, private imports are assumed to exhibit a partial adjustment toward equilibrium "justified by uncertainty about future demand and the operation of short-run capacity constraints" (Jonson, 1976, p. 993). Therefore, the import adjustment process can be represented by,

$$PM_t - PM_{t-1} = \beta(\hat{PM}_t - PM_{t-1}) + \nu \quad (6.9)$$
By replacing $PM$ in (6.9) with equation (6.8) we derive

$$PM_t - PM_{t-1} = \beta \alpha_1 (E + PE)_t + \beta \alpha_2 (PI(1 + t_m)/P)_t + \beta \alpha_3 ZM_t - \beta PM_{t-1} + (\nu + \beta \mu)$$

Rearranging yields

$$PM_t = \beta \alpha_1 (E + PE)_t + \beta \alpha_2 (PI(1 + t_m)/P)_t + \beta \alpha_3 ZM_t + (1 - \beta)PM_{t-1} + \nu + \beta \mu \quad (6.10)$$

As already stated, when the Government runs a deficit it must find the requisite finance. The budget deficit, $G - T$ (where $T = TY + TI$, $TI = \text{indirect taxes}$), can be financed by non-monetary borrowing, CGSP (that is the sale of Government securities to the private non-M3 sector), or by money creation, GMC. So that by definition

$$G - T = GMC + CGSP$$

therefore

$$GMC = G - T + CGSP$$

To derive the internal monetary effect of the public
sector on the money base, as presented in Chapter 4, it is necessary to add to GMC net Government current overseas exchange transactions, GOET. These comprise current receipts, CURG; current payments on visibles, CUPGM; and invisibles, CUPGN. Therefore

$$\text{GOET} = \text{CURG} - \text{CUPGM} - \text{CUPGN}$$

and

the net effect of the Government on the monetary base is given as

$$\text{GCE} = G - T - \text{CGSP} + \text{GOET} \quad (6.11)$$

A money supply identity is needed to make changes in the stock of money endogenous. The identity is adapted from those presented by Spencer (1978 and 1979) and Grimes (et al) (1983).

$$\Delta M^S = \text{PE} - \text{PM} + \text{FK} + \text{GCE} + \text{CCMSR} + \text{DCE} \quad (6.12)$$
where

\[ \Delta M^S = \text{change in the M3 definition of the money supply} \]

\[ PK = \text{net private capital overseas exchange transactions} \]

\[ \text{CCMSR} = \text{change in official lending to private sector - mainly RBNZ lending to marketing boards} \]

\[ \text{DCE} = \text{domestic credit expansion}^1 \]

An equation describing the demand for money is used to create the real monetary disequilibrium term used in equation (6.7). The theory regarding the use and estimation of money demand functions is well documented (see Friedman, 1978, Goodhart, 1975 and Frenkel and Johnson, 1976) and this thesis is constrained to only estimate a suitable one for New Zealand. The initial specification uses the RBNZ data series on money demand, \( M3D \), as the left hand side variable. Nominal national income, and the short term interest rate on Government securities, \( r \), are used as explanatory variables, so

---

1 DCE = \( \Delta \)Lending to private sector by trading banks and other M3 institutions + \( \Delta \)Net other assets of trading banks and other M3 institutions - Inter-institutional demand and fixed deposits of trading banks and other M3 institutions + \( \Delta \)Deposits, savings bank cheque accounts + \( \Delta \)Compensatory deposits with trading banks.
that

\[ M^d_t = \alpha_1 (P \cdot Y)_t + \alpha_2 r_t + \mu \quad (6.13) \]

where

\[ \alpha_1 > 0, \quad 0 > \alpha_2 \]

reflect a positive desire to hold money as output increases (income elasticity) and a negative desire to hold money as an opportunity cost of holding money increases. This specification therefore includes a transactions demand for money and a single interest rate to represent observed monetary yields on alternative assets.

The model is completed with an identity defining the current account balance,

\[ \text{CUB} = (\text{PE} - \text{PM}) + (\text{CURG} - \text{CUPGN} - \text{CUPGM}) \quad (6.14) \]

The initial specification of the full model is presented
TABLE 6.1
Initial specification of entire model and list of notation used.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y = E^+ G/P^+ \text{ RCUB} )</td>
<td>(6.1)</td>
</tr>
<tr>
<td>( TY = \hat{a}_{11} (P^*Y) )</td>
<td>(6.2)</td>
</tr>
<tr>
<td>( YD = Y^- (TY/P) )</td>
<td>(6.3)</td>
</tr>
<tr>
<td>( E_t = \hat{a}<em>{21} YD_t + \hat{a}</em>{22} \left( \frac{M_d^d}{P} - \frac{M^S}{P} \right)<em>t + \hat{a}</em>{23} E_{t-1} )</td>
<td>(6.7)</td>
</tr>
<tr>
<td>( \log PM_t = \hat{a}_{31} \log((E^*P)+PE)<em>t + \hat{a}</em>{32} \log(PI(1+tm)/P)_t )</td>
<td>(6.10)</td>
</tr>
<tr>
<td>( GCE = G - TY - TIN - CGSP + GOET )</td>
<td>(6.11)</td>
</tr>
<tr>
<td>( \Delta M^S = PE - PM + PK + GCE + CCMSR + DCE )</td>
<td>(6.12)</td>
</tr>
<tr>
<td>( M^d = \hat{a}<em>{41} (P^*Y) + \hat{a}</em>{42} R )</td>
<td>(6.13)</td>
</tr>
<tr>
<td>( \text{CUB} = (PE-PM) + (\text{CURG-CUPGM-CUPGN}) )</td>
<td>(6.14)</td>
</tr>
</tbody>
</table>

**Notation**

- \( Y = \) real output
- \( E = \) real private expenditure, C+I
- \( G = \) nominal Government spending
- \( P = \) consumers price index
- \( \text{RCUB} = \) real current account balance, OBT basis
- \( \text{PX} = \) export price index
- \( \text{PI} = \) import price index
- \( TY = \) income taxation
- \( YD = \) real disposable income
- \( M^d = \) money demand
- \( M^S = \) M3 definition of money supply
- \( PM = \) private imports
- \( PE = \) private exports
- \( tm = \) effective tariff rate
- \( ZM = \) synthetic variable representing quantitative import restrictions
- \( \text{GCE} = \) Government credit expansion
- \( \text{TIN} = \) Indirect taxation
- \( \text{CGSP} = \) Net sales of Government securities to the private sector
<table>
<thead>
<tr>
<th>Notation - contd</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOET = Net Government current account balance</td>
</tr>
<tr>
<td>= CURG - CUPGM - CUPGN</td>
</tr>
<tr>
<td>PK = Net private capital overseas exchange</td>
</tr>
<tr>
<td>transactions</td>
</tr>
<tr>
<td>CCMSR = change in official lending to the private</td>
</tr>
<tr>
<td>sector - mainly RBNZ lending to marketing</td>
</tr>
<tr>
<td>Boards</td>
</tr>
<tr>
<td>DCE = domestic credit expansion</td>
</tr>
<tr>
<td>R = interest rate on short-term Government</td>
</tr>
<tr>
<td>securities</td>
</tr>
<tr>
<td>CUB = current account balance, OET</td>
</tr>
<tr>
<td>CURG = current overseas receipts, Government</td>
</tr>
<tr>
<td>CUPGM = current overseas visible payments,</td>
</tr>
<tr>
<td>Government</td>
</tr>
<tr>
<td>CUPGN = current overseas invisible payments,</td>
</tr>
<tr>
<td>Government</td>
</tr>
</tbody>
</table>
in Table 6.1, along with a complete list of notation. As Chow (1983) states "for an econometrician wishing to use the model of simultaneous equations (referring to a macroeconomic model) there are two major problems to be resolved. First is the problem of identification ..... (second)........is the problem of estimation". The next two sections discuss these problems.

6.2. Identification Condition of the Model

For the identification of the entire model, there has to be at least as many independent equations as endogenous variables, and each equation in the model must be identified. The identification condition of a model must be satisfied else, "estimates of parameters of relationships between variables measured in samples may relate to the model in question, or to another model, or to a mixture of models" (Koutsoyiannis, p. 346).

The structural form approach to establishing identification of the model has two conditions, the order and rank conditions. The order condition is a necessary but not sufficient condition for the
identification of an equation. It states, "for an equation to be identified, the total number of variables excluded from it but included in other equations must be at least as great as the number of equations of the system less one" (Koutsoyiannis, p. 352). As Table 6.1 indicates, the model has 23 variables without any single equation having more than 6 variables. Therefore, at most, an equation has 17 variables excluded from it, which is greater than the 9 equations. Therefore the order condition is satisfied and indicates that the model is overidentified.

The rank condition requires "that in a system of G equations, any particular equation is identified if, and only if, it is possible to construct at least one non-zero determinant of order (G - 1) from the coefficients of the variables excluded from the particular equation but contained in other equations of the model" (p.353). However, as Wallis (1973) points out, in "many situations the rank condition will .... merely underline the order condition for we usually simply assume that it is safe to proceed as if the relevant function of structural parameters were non-zero" (p. 59).
6.3 Choice of Estimation Technique

The choice of estimation technique depends on several factors including the purpose that the model was designed for, the identification condition, the nature of the relationship of residuals, the importance given to various explicit statistical properties as opposed to more general features of the model performance, and the desired degree of computational complexity.

As Koutsoyiannis stresses, "the problem of choice of technique becomes important for overidentified systems" (p.499). The ranking of econometric techniques on the basis of their ability to 'test' economic theory uses evaluation of the desirable statistical properties of unbiasedness and minimum variance (for small sample estimates), and consistency and efficiency (that is the asymptotic properties, for large sample estimates).

Given that the model is simultaneous and overidentified, there are two types of estimators available. The first of these are 'single equation methods', which are applied to each equation of the system individually. For
instance, instrumental variables (IV) and two-stage least squares (2SLS). The second set of estimators are 'complete system methods', which are applied to the system as a whole. Examples of these are three-stage least squares (3SLS) and full information maximum likelihood (FIML)\(^1\).

Due to the data requirements and computational cost, a single equation method is used. The method of instrumental variables chooses only a subset of the exogenous variables to use as instruments, ignoring the effects of other exogenous variables. Therefore the method of 2SLS will be used for the initial estimation as it takes account of the influence of all the predetermined variables in the model on the dependent variable.

The 2SLS method assumes that the stochastic term \( \mu \) satisfies the usual assumptions of zero mean, constant variance and zero covariance. The last assumption, that of zero covariance, is required to ensure that there is no autocorrelation of the error term. Expressed in expectations form, this assumption is:

\[
E(\mu_i, \mu_j) = 0 \text{ for } i \neq j
\]

\(^1\) For further references see Johnston (1972, Chapter 13) and Chow (1983, Chapter 5).
Other assumptions required are: that the explanatory variables are not perfectly multicollinear; that the variables are correctly aggregated; that the model is correctly specified in terms of the exogenous variables; and that the data set is large enough.\(^1\)

The results of 2SLS estimation of equations (6.2), (6.7), (6.10) and (6.13) are presented in Table 6.2.

6.4 Initial Estimation and Discussion of Results

The initial regression results, read in conjunction with their accompanying notes, are not very encouraging. However, the dominant problem, at least in the taxation, expenditure and money demand functions, is the influence of an autocorrelated error term, as indicated by the Durbin-Watson and h-statistic results. These results are discussed in notes (iii) and (iv) of Table 6.2. Therefore one of the assumptions of 2SLS estimation is

\(^1\) That is the number of observations is greater than the number of predetermined variables in the model.
TABLE 6.2
Summary of 2SLS regression results on initial specification.

1. Income taxation equation
\[ \hat{TY}_t = 0.1947(P*Y)_t \]
\[ (14.44) \]
\[ \bar{R}^2 = 0.51 \quad DW = 3.15 \quad RMSE = 464.44 \]

2. Real expenditure equation
a. \[ \hat{E}_t = 0.2841(YD)_t - 0.0033(p - p) + 0.6831(E)_{t-1} \]
\[ (9.90) \quad (0.12) \quad (21.01) \]
\[ \bar{R}^2 = 0.79 \quad DW = 1.45 \quad h = 2.10 \quad RMSE = 97.24 \]
b. \[ \hat{E}_t = 0.2789(YD)_t - 0.0298(Md/P)_{t-1} + 0.6880(E)_{t-1} \]
\[ (9.83) \quad (1.08) \quad (21.37) \]
\[ \bar{R}^2 = 0.78 \quad DW = 1.49 \quad h = 1.95 \quad RMSE = 97.34 \]

3. Private import equation
\[ \hat{logPM}_t = 0.2073log((E*P)+(PE))_t - 0.0757log(PI(1+tm)/P)_t \]
\[ (2.46) \quad (0.35) \]
\[ - 0.1013(ZM)_t + 0.7599LOG(PM)_{t-1} \]
\[ (2.21) \quad (7.64) \]
\[ \bar{R}^2 = 0.99 \quad DW = 1.86 \quad h = 0.77 \quad RMSE = 0.074 \]

4. Money demand equation
\[ \hat{Md}_t = 1.8476(P*Y)_t - 5.6410(R)_t \]
\[ (17.36) \quad (0.09) \]
\[ \bar{R}^2 = 0.97 \quad DW = 0.70 \quad RMSE = 746.12 \]

Notes: (i) Data period 1969(D) - 1983(J).
(ii) Quarterly data is collectively presented in Appendix 6.
(iii) The DW upper and lower levels at a 95% confidence level for equations one and four respectively are: - 1.53; 1.60 and 1.49; 1.64. Therefore for both equations we reject the null hypothesis of no autocorrelation.
TABLE 6.2 - contd

(iv) The h-statistic, which is a large sample test for serial correlation when there are lagged dependent variables present, was developed by Durbin (1970). Using the first-order correlation coefficient of the residuals, which is approximated as $r = 1 - \hat{d}$ (where $d$ is computed using the formulae in Table 4.4), we calculate

$$h = r \sqrt{\frac{n}{1-n\hat{V}(b_1)}}$$

where

$\hat{V}(b_1) = \text{the sampling variance of the coefficient of the lagged dependent variable.}$

If $h > 1.645$ we reject the null hypothesis of zero autocorrelation at the 95% confidence level. Therefore we reject null hypothesis for both a. and b. specifications of the real expenditure equation and fail to reject it for the private import equation.

(v) The root mean square error (RMSE) gives a measurement of combination of the unbiasedness and minimum variance properties of the estimated equation. Ideally the RMSE should be small, it is calculated as,

$$\text{RMSE} = \sqrt{\frac{\sum (\text{Fitted}-\text{Actual})^2}{n}}$$

(vi) t-statistics are in brackets underneath the coefficients. The two-tail t-scores with 54 degrees of freedom at 90%, 95% and 99% confidence levels are 1.67, 2.00 and 2.67 respectively.
violated, causing the results of 2SLS estimation to become less efficient compared with alternative estimators which account for the serial correlation of the error term in simultaneous equation models. These include a technique outlined by Fair (1970).

Prior to Fair's suggested procedure, Sargan (1961) and Amemiya (1966) both developed estimators for the estimation of simultaneous equation models with serially correlated errors. According to Fair, Sargan's method uses a "large number of instrumental variables" and "is likely to be of limited practical use" (p.507). However, Sargan's method, referred to in the literature as S2SLS, yields consistent estimates, and is asymptotically efficient compared with 2SLS, when the model to be estimated is of the form

\[ AY + BX = U \]  \hspace{1cm} (6.15)

\[ U = RU_{-1} + E \]  \hspace{1cm} (6.16)

where

\[ Y = \text{an } h \times n \text{ matrix of endogenous variables} \]
\[ X = \text{a } K \times n \text{ matrix of predetermined variables} \]

\[ U, E = h \times n \text{ matrices of residuals, } E \text{ is distributed} \]
\[ \text{according to the normal stochastic} \]
\[ \text{assumptions} \]

\[ A, B, R = h \times h, h \times K \text{ and } h \times h \text{ are matrices of} \]
\[ \text{coefficients} \]

\[ n = \text{the number of observations} \]

\[ K = \text{the number of predetermined variables} \]

\[ h = \text{the number of endogenous variables} \]

However, Fair modifies Sargan's procedure, reducing the computational requirements. Using a given value of \( \rho \) (\( \rho_0 \) is the first-order autocorrelation coefficient of the residuals), setting equations (6.15) and (6.16) equal, lagging by one period, multiplying through by \( \rho \) and substracting provides

\[ A(Y - r_0 Y_{-1}) + B(X - r_0 X_{-1}) = (R - r_0 I)U_{-1} + E \quad (6.17) \]

where

\[ I = \text{an } h \times h \text{ identity matrix} \]

Equation (6.17) can be rewritten as

\[ Y = r_0 Y_{-1} A^{-1} B(X - r_0 X_{-1}) + (A^{-1} (R - r_0 I) U_{-1} + A^{-1} E) \quad (6.18) \]
Therefore "any endogenous variable, such as $Y_{it}$, can be expressed as a function of $r_0 Y_{it-1}$, of all the predetermined variables in the form $X_{it} - r_0 X_{it-1}$, and of an error term" (Fair p.512). If all the residual coefficients are similar, say to $r_0$, then $A^{-1}(R-r_0 I)U_{-1}$ in (6.18) is small. Fair's method involves avoiding many instruments. In the first stage of his modified two stage procedure a composite matrix of variables, $X_2 - r_0 X_{2-1}$, (where $X_2$ represents all the predetermined variables not in the equation being estimated) is used instead of regressing $Y_1$ on $X_2$ and $X_{2-1}$ separately. Fair points out that this technique "uses substantially fewer instrumental variables, and thus substantially fewer degrees of freedom. However, it may, depending on how nearly equal $R$ and $r_0 I$ are, have better (or at least not worse) small sample properties than S2SLS" (p. 512 - 513). Fair's technique is available in computer software package, Time Series Processor, Version 4.0, in Hall (1983), and therefore will be used where appropriate in the re-estimated model presented in Chapter 7. However, in the presence of lagged endogenous variables, Cooper (1972a) asserts that there will be a "downward asymptotic bias in the standard errors of the regression coefficients" (p.305). For instance if,

$$Y_t = x_t b_1 + a y_{t-1} + p u_{t-1} + e_t$$  \hspace{1cm} (6.19)
is an equation to be estimated in a simultaneous equation framework Cooper shows that, because the set of explanatory variables (predetermined, endogenous and lagged endogenous) can no longer be assumed to be fixed regressors the appropriate standard errors calculated using the unadjusted covariance matrices will be smaller than if the bias is accounted for. Unfortunately no suitable computational formula to account for this bias appears to exist in the literature.

The significance of most of the individual coefficients is satisfactory. However, given the presence of autocorrelation in three of the equations, these results are only tentative. Of especial concern are the size of the standard errors on four coefficients: the real monetary disequilibrium variable in the expenditure equations 2a and 2b; the relative price variable in the private import demand function; and the interest rate variable in the money demand function. Proposed alternative hypotheses will need be tested along with correcting for serial correlation of the error term.

1 Because of the presence of the lagged endogenous variable
In the case of the real monetary disequilibrium term, it is likely that the private sector's expenditure function displays some lagged response to changes in monetary conditions. The nature of the lag may depend on: the time taken to publish changes in the money supply and prices; a decision delay, which may be due to uncertainty regarding how to spend or save a net excess supply or demand of money; and an institutional lag, which delays the effect of monetary disequilibria on real expenditure. An example of the institutional lag is as follows. The Government may lower the trading banks reserve asset ratio, increasing the amount trading banks can lend. The banks lend to various customers, who purchase bonds or shares (financial assets), or spend their borrowed money on non-financial assets like real estate or consumer durables. Those who sell their assets will, of course, receive money which they, in turn, use to purchase other assets. All of these transactions take place within the existing institutional framework, and they all take time. Therefore, because of this chain of events, a monetary disequilibrium in one quarter may have effects on expenditure in following quarters. Two versions of the Reserve Bank's econometric model have used a lagged disequilibrium real money term as an explanatory variable in various consumption and investment equations. In two investment equations
Spencer (1979) found that a lag of up to two quarters on the monetary disequilibrium term was significant. In Chapter 7 the construction and estimation of a three quarter lag structure on this term will be discussed and presented.

The signs of the coefficients on the relative price and interest rate variables are consistent with theoretical expectations. However, the t-scores indicate that there is little reason to believe that a relationship exists between either private imports and the relative price variable, or money demand and interest rates. Instead it is suggested that the terms of trade \( (TOT = \text{export price index/import price index}) \) may sufficiently represent the effect of import price movements. Excluding the interest rate variable from the money demand equation results in that equation representing only the transactions demand for money. The exclusion of the interest rate variable is supported by evidence which shows that the financial markets have been subject to various forms of interest rate controls over much of the data set. Also Deane (et al) (1983) point out that seasonality plays an important role in determining the monetary base, and hence often the money supply (p. 164-165). The demand for money is influenced by the requirements of the agricultural
sector, therefore seasonal variables will be introduced into the money demand function. A dummy variable will also be introduced into the income taxation equation to explain the March quarter peak of taxation receipts.

Further discussion of the results of the model will follow in Chapter 7 where a re-specified model is estimated using Fair's technique on the taxation, expenditure and money demand functions.
CHAPTER 7

RE-ESTIMATION, PERFORMANCE OF THE MODEL, SIMULATIONS AND CONCLUSIONS.

In Chapter 6 it was suggested that the principle problem of the estimated equations was the presence of a first-order autocorrelation scheme in the residuals. Section 6.4 identified Fair's (1970) estimation technique as suitable for application to the taxation, expenditure and money demand equations to correct for the bias this autocorrelation introduces. In addition, several amendments were proposed to the initial hypotheses, the most important of these being the need to account for the lagged influence of the real monetary disequilibrium term on real private expenditures, as opposed to the initial hypothesis of a one period effect.

This chapter considers the results from re-estimation of the re-specified equations. It also discusses the transmission channels and performance of the main endogenous variables when the whole system is simulated.
Several theoretical, but not necessarily optimal, exogenous policy simulations are presented, and differences between the control simulation and the policy simulations are summarised. Overall conclusions on the whole thesis are presented, and the chapter concludes with suggestions for further research.

7.1 Discussion of Re-estimation Results

A summary of the results from re-estimation of the re-specified equations is presented in Table 7.1. The performance, as measured by the $R^2$'s and RMSE's of the individual equations, has improved and therefore, on the basis of 'goodness of fit', the results of the re-estimation are encouraging. As discussed in note (v) of Table 7.1, the use of Fair's (1970) modified 2SLS technique has successfully corrected for the presence of an autocorrelated error term

7.1.1. Income taxation equation

The inclusion of the synthetic variable (ZTY) to explain

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1 Ignoring Cooper's (1972a) 'non-computational' bias of the standard errors in the presence of lagged endogenous variables.
### TABLE 7.1
Summary of regression results from the re-specified equations.

1. **Income taxation equation**
   \[
   \hat{TY}_t = -252.3079 + 0.2069 (P*Y)_t + 629.0359 (ZTY)_t - 0.7552 \mu_{t-1}
   \]
   
   \[
   \begin{align*}
   \hat{TY}_t & = -252.3079 + 0.2069 (P*Y)_t + 629.0359 (ZTY)_t - 0.7552 \mu_{t-1} \\
   (7.28) & \quad (31.07) \\
   (12.12) & \quad (7.93)
   \end{align*}
   \]

   \[R^2 = 0.92 \quad DW = 1.80 \quad RMSE = 192.54\]

2. **Real expenditure equation**
   \[
   \hat{E}_t = 0.3441 (YD)_t + \sum_{i=0}^{3} w_i M3QE_{t-i} + 0.5690 (E)_{t-1} + 0.8262 \mu_{t-1}
   \]
   
   \[
   \begin{align*}
   \hat{E}_t & = 0.3441 (YD)_t + \sum_{i=0}^{3} w_i M3QE_{t-i} + 0.5690 (E)_{t-1} + 0.8262 \mu_{t-1} \\
   (22.41) & \quad (21.06) \quad (21.06) \quad (12.06) \quad (11.20)
   \end{align*}
   \]

   Third-degree polynomial lag coefficients:

   \[w_0 = 0.0303 \quad w_1 = -0.1121 \quad w_2 = -0.1189 \quad w_3 = -0.0587\]
   
   \[
   \begin{align*}
   (0.91) & \quad (5.28) \quad (6.77) \quad (1.89)
   \end{align*}
   \]

   \[R^2 = 0.83 \quad DW = 2.17 \quad h = 0.676 \quad RMSE = 89.38\]

3. **Private import equation**
   \[
   \hat{logPM}_t = 0.2385 \log ((E*P)+PE)_t + 0.2583 \log (PX/PI)_{t-1} - 0.1582 (ZM) + 0.7228 \log (PM)_{t-1}
   \]
   
   \[
   \begin{align*}
   \hat{logPM}_t & = 0.2385 \log ((E*P)+PE)_t + 0.2583 \log (PX/PI)_{t-1} - 0.1582 (ZM) + 0.7228 \log (PM)_{t-1} \\
   (3.60) & \quad (2.70) \quad (3.83) \quad (9.23)
   \end{align*}
   \]

   \[R^2 = 0.99 \quad DW = 1.93 \quad h = 0.319 \quad RMSE = 0.069\]

4. **Money demand equation**
   \[
   \hat{M}_t = 1.8316 (P*Y)_t + 367.8534 (S1) - 30.1295 (S2) + 44.2934 (S3) + 0.6702 \mu_{t-1}
   \]
   
   \[
   \begin{align*}
   \hat{M}_t & = 1.8316 (P*Y)_t + 367.8534 (S1) - 30.1295 (S2) + 44.2934 (S3) + 0.6702 \mu_{t-1} \\
   (112.92) & \quad (3.00) \quad (0.40) \quad (0.95) \quad (6.21)
   \end{align*}
   \]

   \[R^2 = 0.99 \quad DW = 2.03 \quad RMSE = 487.83\]
Notes: (i) Additional notation used:
ZTY = a synthetic variable explaining the March quarter peak in taxation receipts. ZTY = 1 in March quarter, zero in June, Sept. and Dec.

\[ W_i = \text{polynomial lag coefficients} \]

\[ M3QE = \left( \frac{M^d_p}{p} - \frac{M^s_p}{p} \right) \]

(ii) Data period 1969(D) - 1983(J)

(iii) Quarterly data collectively presented in Appendix 6.

(iv) See notes (iii), (iv) and (v) of Table 6.2 for discussion of DW, h-statistic and RMSE.

(v) Autocorrelation - in all four equations we fail to reject the null hypothesis of no autocorrelation at the 99% confidence level.

(vi) The RMSE for each re-specified and estimated equation is reduced. This is desirable as it indicates that the fitted values more accurately represent the actual values.

(vii) The lag distribution on the real monetary disequilibrium variable is an Almon (third-degree polynomial) type constrained to zero slope at the right hand end, where \[ \Sigma W_i = -0.2593. \] The standard error of the summed lag coefficients is 0.05406. Therefore we reject the null hypothesis that \[ \Sigma W_i = 0. \] The standard error of the sum of the lagged coefficients provides a 95% confidence interval of -0.1512 and -0.3674.
the March peak of income taxation receipts was found to be significant. It is of note, however, that the nominal income coefficient in the income taxation equation was not dramatically affected by the inclusion of either the constant term or the synthetic variable. The magnitude of the coefficient, 0.21, is consistent with expectations, as the average of the 'effective income tax rate of salary and wage earners' used in the Reserve Bank of New Zealand's econometric model is 0.22, with a standard deviation of 0.04.

Appendices 7a and 7b present a comparison of the actual and predicted series for each of the four estimated equations. The regression coefficient of the actual income taxation series on the predicted income taxation series shows little variation from the ideal value of one. Another measure used to evaluate the fit of an equation is Theil's inequality coefficient. If the inequality coefficient equals zero there is a perfect fit; if it equals one the "predictive performance is as

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1 See Pindyck and Rubinfeld (1982, p. 364) and Koutsoyiannis (1977, p. 492) for further discussion on the calculation of Theil's inequality coefficient and various decompositions.
bad as it possibly could be" (Pindyck and Rubinfeld, p. 365). The various decompositions of Theil's inequality coefficient are discussed in Appendix 7b. With respect to the income taxation equation, these proportions present satisfying results, and therefore the equation should not prevent the entire model from simulating well.

7.1.2 Real expenditure equation

The decision to estimate an aggregate real expenditure equation, as opposed to the more comprehensive approach of having functions for different types of consumption and investment, may account for the comparatively low 'goodness of fit' ($\bar{R}^2 = 0.83$), when compared with the adjusted $R$-squareds of the other three estimated equations in Table 7.1 and the estimated real expenditure equation of Khan (1976, p.322). However, several authors estimating only components of real expenditure have presented lower adjusted $R$-squareds. For New Zealand examples see Grimes (et al), (1983, p. 23) and Carey, (1984, Appendix A, p.1).
The coefficient representing the private marginal propensity to expend (PMPE) can be calculated by reconstructing the partial adjustment equations (6.4) and (6.6) using the estimated coefficients of the real expenditure equation in Table 7.1. The estimating form of the real expenditure equation is

\[ E_t = \hat{a}(Yd)_t + \hat{b}(E)_{t-1} + \sum_{i=0}^{3} \hat{w}_i M3QE_{t-i} - \hat{\mu}_{t-1} \]  

(7.1)

From equation (6.7)

\[ \hat{a} = \beta \alpha \]

\[ \hat{b} = 1 - \beta \]

Therefore

\[ \hat{\alpha} = \hat{a} / (1 - \hat{b}) \]

\[ = 0.798 \]

1 The re-specified real monetary disequilibrium term does not affect the specification of the partial adjustment parameter as presented in equation (6.6), which is required to calculate the PMPE.
Thus the estimated PMPE is 79.8%, which according to theory is a satisfactory result. This indicates that a $100 million change in aggregate real disposable income would result in a $79.8 million change in aggregate desired real expenditure.

The estimated partial adjustment coefficient (which equals one minus the estimated coefficient on the lagged endogenous variable) indicates that 90% of the adjustment towards the desired level of real private expenditures will take place in four quarters. This is calculated using a formula presented by Stewart and Wallis (1981, p.40). Given a 'proportion of adjustment' (P) after 'n-periods' which equals:

\[ P = 1 - b \]  

(7.2)

where

\[ b \hat{=} \hat{b} \] from equation 7.1, that is, the estimated coefficient on the lagged endogenous variable

then

\[ n = \frac{\log_e (1 - P)}{\log_e \hat{b}} \]  

(7.3)

Therefore when \( P = 0.9 \) and, from Table 7.1, the coefficient on the lagged endogenous variable in the
real expenditure equation equals 0.5690, 90% of the adjustment will take place in 4.08 quarters, or approximately one year. This length of adjustment is comparatively rapid, as private real expenditures include farm and non-inventory investment items which, given a rise in disposable income, may take longer than one year to adjust. However, many purchases of consumption durables may have a shorter stock adjustment process, perhaps two quarters, therefore balancing the overall adjustment of real expenditures. As this thesis is not specifically inquiring into the individual response relationships of items of real expenditure, the estimated partial adjustment coefficient \((1 - b)\) will be tentatively accepted as representative of the true adjustment process.

The response of real expenditures to changes in the real monetary disequilibrium term \((M3QE)\) is spread over several periods. However, as Hebden (1983) points out: "there are certain situations in which a finite lag is more appropriate. The constraint on infinite lags (such as the partial adjustment model) is that they necessarily imply a geometrically declining sequence of weights attached to successive past values of the causative variable, so that the effect of this variable wears off
steadily and at an ever-decreasing rate" (p.49). Whilst this infinite decline at an ever-decreasing rate is theoretically correct for the real expenditure response to changes in real disposable income and the private import response to changes in private sales, it is not appropriate for the real monetary effect. Instead, a finite lag scheme was estimated. The polynomial lag scheme was chosen rather than regressing individual lags of $M3QE_t$ on $E$. The disadvantage of entering individual variables of $M3QE_{t-i}$ into the equation is the strong possibility of multicollinearity in the $M3QE$'s, since economic variables do not usually change erratically over time, but systematically, following a trend, so that a fairly regular connection may be found between $M3QE_t$ and its predecessors. The consequences of this are that the coefficients of the $M3QE$'s may be poorly defined (that is have large standard errors) though the regression may fit well (as measured by the adjusted $R$-squared and $F$-statistic$^1$).

1 See Judge, Griffiths, Hill and Lee (1980, p. 459) for a discussion of these effects.
A flexible lag distribution which allows the impact of a set of lagged regressors on the regressand to rise and decline non-linearly is the polynomial lag distribution. As outlined in Section 6.4, the lag length estimated in previous equations extended to only two quarters. However, to capture 'all' the real monetary disequilibrium effects, a finite lag of three quarters is estimated. A thorough discussion of the polynomial lag distribution and its estimation is presented in Judge (et al) (p. 641 - 651). Briefly the procedure assumes a variable described by

\[ \sum_{i=0}^{n} w_i X_{t-i} \]  \hspace{1cm} (7.4)

or in matrix form

\[ Xw \]  \hspace{1cm} (7.5)

where \( w_i \) are unknown distributed lag coefficients or weights; \( X_{t-i} \) are lagged values of the exogenous variable; and \( n \) equals the lag length. It is assumed the lag weights are values of an unknown function - say \( F(i), i=0, 1, \ldots n \). Although the actual function is unknown, it may be approximated on a closed interval by a polynomial function. "Usually a third - or fourth - degree polynomial will provide a sufficiently accurate approximation of the lag structure" (Pindyck and
A third-degree polynomial was used to approximate the true polynomial function for the lagged values of M3QE. Therefore it was assumed that the lag weights fell on a polynomial of the form:

\[ w_i = c_0 + c_1 i + c_2 i^2 + c_3 i^3 \quad i=0, 1, 2, 3 \]

\[ w_i = 0 \text{ for } i > 3 \quad (7.6) \]

This specifies that the lag weights follow a third degree polynomial for the current period and first three lagged quarters, and after the third quarter changes in M3QE will not affect real expenditure.

In matrix notation

\[ w = Hc \quad (7.7) \]

where

\[ H = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 2 & 4 & 8 \end{bmatrix} \quad (7.8) \]

The matrix of variables used to estimate the set of
polynomial lag coefficients is obtained by substituting (7.7) into (7.5). That is

\[ XHc = Zc \quad (7.9) \]

The matrix of the estimates of the coefficients on the lagged values of \( X \), \( \hat{B} \), can be obtained by the application of a least squares estimator to, for instance,

\[ y = Zc + u \quad (7.10) \]

The estimator \( \hat{c} = (Z'Z)^{-1} Z'y \) is used to derive \( \hat{B} = H\hat{c} \).

This approach is outlined by Cooper (1972b) as an alternative formulation of Almon's approach to estimating polynomial distributed lags.

The results of the estimation of M3QE, as defined by (7.4) and (7.6) in the real expenditure equation, are presented in Table 7.1. These results are satisfactory in terms of their statistical properties and the desired sign and size of the coefficients. The 95% confidence interval around the sum of the lagged coefficients (note vii of Table 7.1), indicates that we expect the effect of increases in the real money supply to always exert a
positive influence on real expenditure and vice versa for increases in the real demand for money. The strength of the first and second lags, $w_1$ and $w_2$, as expected, account for the strong negative effect of $M3QE$ on $E$. The third quarter lag has less statistical significance. However, we still reject the null hypothesis that $w_3 = 0$ at the 95% confidence level. The impact in the current quarter may be negative or positive as the 95% confidence interval around $w_0$ is between $-0.024$ and $0.097$. Also the $t$-statistic for this coefficient indicates that we only have a 60% confidence level in rejecting the null hypothesis that $w_0 = 0$.

The low standard error of the sum of the lag coefficients, coupled with the attribute of having lag coefficient estimates with expected signs and sizes, has led to the acceptance of the estimated polynomial lag distribution of $M3QE$ as presented in Table 7.1.

The comparison for actual and predicted series for the individual equations, presented in Appendices 7a and 7b, indicate satisfactory results for the real expenditure equation, although the regression of actual values on fitted values indicates that the fitted values are on
average overpredicting the series by a small margin. This may inhibit simulation of the entire model system. However, a trade off between the ease of modelling one expenditure equation and the complications involved in modelling several consumption and investment equations to derive better 'fits' will always develop in macro-econometric work.

7.1.3 Private import equation

The inclusion of the terms of trade variable represents the only specification change in the private import equation. The inclusion of this alternative variable has not affected the stability of estimates of other coefficients in the equation. The adjusted R-squared remains significantly high at 99%, and the RMSE has reduced to 0.069.

Using equation (7.3), 90% of the stock adjustment process will take place in the first seven quarters. This result seems reasonable, given the lags of decision, transport and payment involved. The most recent

1 Note: as OET data is used all estimation is on a cash basis, not accrual.
estimation of the Reserve Bank's econometric model, in Carey (1984) indicates that for imports of goods and services 90% of the stock adjustment will take place in one and a half quarters, whereas the Reserve Bank's equation explaining changes in current payments for all imports indicates that 90% of the stock adjustment will take place in just under five quarters (see Carey, Appendix A, equations 7 and 8). A 95% confidence interval around the estimated coefficient of the lagged endogenous variable provides (as the extreme values) 90% stock adjustment lags of five quarters and ten quarters. Therefore the results are tentatively accepted as evidence for the present substantial lags in the private import adjustment process. Jonson (1976), investigating United Kingdom data, found "an approximate mean time lag of just over 2 years for imports" (p.1002).

Solving for the estimated coefficient on the private sales variable in equation (6.8) indicates that: an increase in nominal private sales of $100 million will increase the desired demand for private imports by $52.58 million. This result, using only private data, is more satisfactory than previous attempts at estimating the relationship between total sales and the

1 Note: The estimated coefficient equals (0.8604); and the \( \log(100) = 4.60517 \). Therefore \( (4.60517) \times (0.8604) = 3.9622; \) \( \exp(3.9622) = $52.58 \) million.
import of goods and services. As Grimes (et al) (1983) points out, the Reserve Bank's coefficient on total sales (S) is "significantly greater than unity. This suggests that in the long-run the desired demand for imports will increase more than proportionately relative to S; behaviour which is not supported by historical data" (p.9).

A point to note regarding the private sales variable is its composition. The first term, private nominal expenditure, is an endogenous variable (although prices are exogenous), and therefore when the model is simulated, any movements in variables explaining shifts in real expenditure will be passed on into the private imports equation. The second term, private exports, is exogenous to the model. However, a $100 million increase in PE, given that nominal expenditure stays constant, would still result in an increase in desired demand for private imports of $52.58 million. This is a significant result as incentives for domestic producers to export more goods will have a direct impact on the current account balance of less than half the amount of private export income received.
Additional information describing the performance of the equation is presented in Appendices 7a and 7b. Of particular note is the regression coefficient of actual values on fitted values which equals 1.006; Theil's inequality coefficient (0.0001) and the fraction of error due to residual variance (0.9965). These results are welcome especially as they result from uncorrected 2SLS estimation (avoiding Cooper's (1972a) 'downward bias' in the standard error of the coefficients), and also the coefficient estimates are consistent with prior hypotheses.

7.1.4 Money demand equation

The final functional form of the demand for money is not dissimilar to that used by the Reserve Bank in several recent versions of their econometric model (see Spencer (1978, 1979, 1980), Grimes (et al) (1983) and Carey (1984)). Therefore, because the statistical properties are satisfactory, and as the specification of the equation is not original, the interested reader is referred to those references for further commentary.
The re-estimation, using Fair's technique, has improved the 'goodness of fit' of the equation and substantially decreased the standard error on the nominal income variable. Other statistical criteria and a graph of actual on predicted provide a reasonable basis to argue for the inclusion of the equation in the model system.

7.2 Policy Simulations

As outlined in section 1.2, the principle aim of this thesis is to analyse (at the aggregate level), the impact of fiscal policy on the external current account balance. The three paths that link changes in fiscal policy to the current account balance are defined within the model presented. Those three channels are:

1. The direct link between levels of Government external debt and Government current payments on invisible transactions. (Discussed in section 3.1.5 and presented in Table 3.5 - where in 1983 'official debt interest payments' accounted for 73% of 'total Government invisible payments'). A reduction in 'official debt interest payments'
resulting from reduced external borrowing by the Government can be simulated by reducing current payments for Government 'invisibles' by an appropriate amount.

2. The indirect link of the impact of only fiscal policy on the current account balance is described by changes in: total income, identity (6.1); disposable income, using equation (6.2) and identity (6.3); real private expenditure, as re-specified in Table 7.2; and thereby desired private import payments. As discussed in sections 7.1.2 and 7.1.3, the stock adjustment process involves lags of one year for expenditure and two years for import adjustment (of desired to actual levels). Therefore, in this linkage there will be a lengthy delay between a change in fiscal policy and a change in the current account.

3. The indirect link of the monetary impact of fiscal policy on the current account is expressed by a 'real balance effect' using the polynomial lag distribution of the real monetary disequilibrium term in the real expenditure
equation. This monetary linkage also exhibits protracted lags between the policy change and the response in the current account aggregate.

The results of five policy simulations, including the control simulation, are presented in the following sections.

7.2.1 Results of the control simulation

The analyses of ex post or historical simulation of the entire system of equations using a set of imposed policy responses requires a base, or control simulation, to compare differences in the actual and simulated values of endogenous variables. As Pindyck and Rubinfeld state, "a comparison of the original data series with the simulated series for each endogenous variable can provide a useful test of the validity of the model" (p.359). Appendices 9a and 9b present graphs of actual and simulated values, and a summary of the relevant statistics for five endogenous variables: total income taxation; real private expenditure; private imports; money demand; and the current account of the balance of
payments. These results are encouraging although, in comparison to the other endogenous variables, the tracking of simulated real private expenditure on actual is a little disappointing. Nevertheless, the two 'important' endogenous variables – private imports and the current account of the balance of payments – perform well when the model is simulated.

Using the experimentation technique of "letting exogenous policy variables follow different time paths" (Pindyck and Rubinfeld, p. 359), it is possible to examine the economic consequences of what 'would' have resulted given different policy settings.

7.2.2 Simulation experiments

Four different types of policy changes were imposed on the model to examine the effects of alternative instrument settings of fiscal and debt management policy. First, the unadjusted Government deficit before borrowing was lowered by half through an 8.2% reduction in Government expenditure over the period 1970:(J) – 1983:(J). In addition, a 6.0% reduction of Government
expenditure was simulated; this is equivalent to a reduction in the unadjusted Government deficit of one third. The results of these simulations are presented in Table 7.2. As expected, the larger the reduction in Government expenditure, the greater the decrease in private imports. Of note, however, is the differences in the impact of the change in fiscal policy across the three time periods. The average reduction in private imports per quarter is higher between 1979(S) and 1983(J) than either of the previous periods.

The second simulation restricts Government credit creation, equation (6.11) to equal zero, by setting the change in sales of Government debt to non-M3 institutions equal to the unadjusted deficit plus net Government current account transactions. This policy attempts to establish independence between monetary policy and fiscal policy. However, a more comprehensive model, one that includes a function describing the demand for Government securities by the non-M3 institutions, and a function explaining movements in interest rates, may indicate that continually large amounts of Government securities cannot be sold to the private sector without implications for monetary policy - see Friedman (1978). He states that "even
<table>
<thead>
<tr>
<th>Table 7.2: Summary of policy simulation experiments and their results</th>
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<tbody>
<tr>
<td><strong>1(a)</strong> 6.0% reduction in Government expenditure.</td>
</tr>
<tr>
<td>Equivalent to 1/3 reduction in the unadjusted Government deficit before borrowing.</td>
</tr>
<tr>
<td><strong>(b)</strong> 8.2% reduction in Government expenditure.</td>
</tr>
<tr>
<td>Equivalent to 2/3 reduction in the unadjusted Government deficit before borrowing.</td>
</tr>
<tr>
<td>2. Restrict Government credit creation to equal zero by ensuring that the internal Government deficit is financed by sales of debt to the private sector only. This requires an 18% increase in non-M3 Government debt sales.</td>
</tr>
<tr>
<td>3. In addition to 2., because of the assumed reduction in external debt, Government invisible payments are lowered by 70%.</td>
</tr>
<tr>
<td>4. A combination of 1(a) and 3. Note that the amount of debt sold to the private sector will be smaller than in 2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1970(S)</th>
<th>1974(S)</th>
<th>1979(S)</th>
<th>1980(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=16</td>
<td>n=20</td>
<td>n=16</td>
<td>n=52</td>
<td></td>
</tr>
<tr>
<td>$m$</td>
<td>$m$</td>
<td>$m$</td>
<td>$m$</td>
<td></td>
</tr>
<tr>
<td>1(a)</td>
<td>11.92</td>
<td>44.84</td>
<td>75.81</td>
<td>132.57</td>
</tr>
<tr>
<td>ΔPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(b)</td>
<td>16.31</td>
<td>61.36</td>
<td>103.75</td>
<td>181.42</td>
</tr>
<tr>
<td>ΔPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>0.54</td>
<td>-3.77</td>
<td>0.74</td>
<td>-2.49</td>
</tr>
<tr>
<td>ΔPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>0.54</td>
<td>-3.77</td>
<td>0.74</td>
<td>-2.49</td>
</tr>
<tr>
<td>ΔCUB</td>
<td>-231.57</td>
<td>-940.29</td>
<td>-1839.98</td>
<td>-3011.82</td>
</tr>
<tr>
<td>4.</td>
<td>5.58</td>
<td>11.41</td>
<td>17.34</td>
<td>34.34</td>
</tr>
<tr>
<td>ΔCUB</td>
<td>-244.63</td>
<td>-989.31</td>
<td>-1922.81</td>
<td>-3156.78</td>
</tr>
</tbody>
</table>

ΔXᵢ = ΣXᵢ(Control) - ΣXᵢ(Simulated)  
where X₁ = PM(Private imports)  
X₂ = CUB(Current account balance)
debt-financed deficits are inflationary because what matters for prices is not only the money stock but some combination of money plus the outstanding interest-bearing Government debt" (p. 595).

The results of the second policy simulation (in Table 7.2) indicate clearly that, in this simplified model, the 'real balance effect' does not dramatically impinge on the demand for private imports. However, the implications for balance of payments policy of financing Government deficits through internal borrowing - preferably from the non-M3 sector - rather than external borrowing, are expressed in the results of the third simulation.

In the third simulation it is assumed that Government current payments for invisibles will reduce by 70% following the financing of all the internal Government deficit by sales of debt to the private (non-M3) sector. The impact of this policy simulation on the current account of the balance of payments is distinctly demonstrated in Table 7.2. The sum of the control simulations of the quarterly current account balances (1970:(S) - 1983:(J) is $6722.86 million. This compares
satisfactorily with the sum of the actual values which is $6937.78 million. The third policy simulation reduces the sum of the quarterly current account balances by $3011.82 million. This is a substantial reduction of 45% on the control simulation result.

The fourth policy simulation experiment combines a 6.0% reduction in Government expenditure with the assumptions used in the third simulation. However, instead of the 18% increase in the change of sales of Government debt required to neutralise the monetary impact of the budget deficit in the second simulation, an increase of only 13% - over the 52 quarters - in CGSP is required. As expected, the combined impact of both reducing the Government's budget deficit and restricting Government security sales to only the private sector (and therefore reducing Government invisible payments) results in a greater reduction in the external current account deficit than either policy applied separately. More importantly, the 'direct' influence of reduced official debt interest payments on the current account far outweighs the influence of either the indirect impact of only fiscal policy or the indirect monetary impact of the Government deficit on the external current account.
7.3 Summary and Conclusions

This thesis has examined New Zealand's balance of payments problem from a new perspective. It has abstracted from the central debate in balance of payments issues which revolves around the choice of one theoretical approach from those reviewed in Chapter 2. Instead, assuming that 'free' international trade is indeed desirable, the approach offered investigated the economic problem by analysing the inter-relationships between Government expenditure, its consequent financing and impact upon both the private sector's demand for imports and the Government's net current account position.

The brief overview of New Zealand's balance of payments situation highlighted that the New Zealand economy is dependent upon changes in the world economy and, compared with other nations, has experienced a volatile terms of trade. Nevertheless, the use of overseas reserves management and short-term borrowing as instruments to cope with dramatic changes in import payments and export receipts is appropriate in the
short-term. However, given a long-term decline in the terms of trade, sustaining real incomes at the 1972 level, using external borrowing to buoy up internal expenditure, is not a sensible policy.

It was suggested that the growth in the 'invisibles' deficit gives cause for concern, and is conspicuously, not only contributing but, in all (June) years since 1975, determining, the continual chronic external deficits. The policy of increasing the external debt is reflected in the rise in official debt interest payments. The thesis indicates that the economic problem behind balance of payments deficits, rather than export uncompetitiveness, is the policy of regular and increasing official overseas borrowing.

The division of the current account data into Government and private sector contributions indicated the importance of demand management policy in influencing the private sector's external activity. The division also disclosed that the trend towards larger current account deficits is supported entirely by the continuing rise in the Government's current account deficit. However, having focussed attention at the Government's
current account deficit as the economic problem to be addressed, the thesis acknowledges the presence of alternative and conflicting economic objectives.

The issue of the role of fiscal policy in stabilizing economic conditions was discussed, and the uncertain effect of lags on the implementation of such policy was outlined. Difficulties in the measurement of the impact of fiscal policy were outlined. A qualitative comparative static model was developed to discuss the theoretical fiscal multiplier effects of changes in Government expenditure. In addition, two alternative measures of monetary multipliers were estimated for New Zealand data to gauge the monetary impact of financing fiscal deficits. The results of estimation of a money multiplier proved to be inconclusive, and it was concluded that several factors impinge on changes in monetary conditions. As a background to the model development, the stance of New Zealand's fiscal policy was discussed, along with a comparison of Swedish stabilisation policy.

A critique of the relevant literature on analytical frameworks for exploring relationships between fiscal
policy and the external accounts was presented. A policy simulation model was developed. Subsequent amendments to the initial hypotheses proved to be sufficient to proceed with historical policy simulations. These experiments strengthened the argument for considering the effect of Government expenditure and its financing upon the external accounts, especially when sectors of the economy lobby for fiscal incentives to export or ask the Government to provide fiscal concessions for 'import-substitution' industries.

To conclude: the new approach taken in this thesis, which highlights the transmission of the budget deficit and its financing to New Zealand's balance of payments, has indeed turned the spotlight toward the Government's current account deficit as the external constraint. The analysis has shown that for stabilisation purposes there are lengthy lags involved in the private real expenditure and private import stock adjustment processes. This implies that fiscal policy should not be used to insulate the economy from fluctuations in the external current account, especially when the costs of servicing the increased official debt exacerbate the external deficit. This conclusion is supported by the historical policy simulations imposed on the econometric
model, where the impact of the direct link between Government deficit spending, financed by external borrowing, and the current account balance overshadows either the fiscal or monetary indirect channels of influence. As a result, the Government, using external borrowing to finance the budget deficit, has allowed the New Zealand economy to still select its lunch - albeit at the expense of future generations - from the 1972 menu. However, the cost of servicing the external debt, which resulted from overseas borrowing to finance the budget deficit, may now serve as a constraint on the economy as it restructures itself to combat the continuing decline in the terms of trade. Therefore the New Zealand economy may yet be facing bread and red wine for its supper.

7.4. Further Areas for Research.

The model presented employed the general price level as an exogenous variable, and therefore the analysis did not incorporate discussion on the effects of fiscal policy on prices in the economy. A rise in the internal price level, which may follow a period of 'excessive' monetary expansion, would impact on the current account
balance through relative price effects. Thus, a large fiscal deficit financed by money creation will have repercussions on both the domestic demand for private imports and the overseas demand for New Zealand's exports. Future research may involve the inclusion of a price equation in the model presented to account for these effects.
ACKNOWLEDGEMENTS

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Introductory Econometrics.  

Policies for Internal and External Balance.  
Princeton University (Special Papers in International Economics, No. 9): Princeton, New Jersey.
## APPENDIX 1
Summary of invisible transactions

<table>
<thead>
<tr>
<th>Years ending June</th>
<th>Invisible Receipts</th>
<th>Private Invisible Payments</th>
<th>Govt. Debt Interest</th>
<th>Govt. Misc. Payments</th>
<th>Total Invisible Payments</th>
<th>Invisible Deficit as % of GDP</th>
</tr>
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<tbody>
<tr>
<td>1970</td>
<td>156</td>
<td>300</td>
<td>35</td>
<td>36</td>
<td>370</td>
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<td>322</td>
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<td>37</td>
<td>392</td>
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<tr>
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<td>372</td>
<td>33</td>
<td>44</td>
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<tr>
<td>1973</td>
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<td>37</td>
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<td>1979</td>
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<td>1557</td>
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<td>186</td>
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<td>1980</td>
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<td>1799</td>
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<td>211</td>
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<td>211</td>
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<td>2805</td>
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<td>197</td>
<td>3521</td>
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</tr>
<tr>
<td>1983</td>
<td>1937</td>
<td>3136</td>
<td>670</td>
<td>251</td>
<td>4058</td>
<td>6.9</td>
</tr>
</tbody>
</table>

1983:
- 1970: 12.4 10.5 19.1 7.0 11.0 (13.0)
- 1974: 4.6 5.6 19.7 4.0 6.2 (9.6)

**Sources:**
- RBNZ Longterm Statistical Series, 1978
- RBNZ Bulletin various issues
- New Zealand Statistics Dept.
APPENDIX 2

Summary of private capital flows, IMF transactions and official reserves.

<table>
<thead>
<tr>
<th>Years ending June</th>
<th>Private Capital Account Balance</th>
<th>IMF Transactions (including S.D.R's)</th>
<th>Change in official Overseas Reserves</th>
<th>Official Overseas Reserves</th>
<th>Official Reserves as a % of Current Payments</th>
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<td>+114</td>
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SOURCES: RBNZ Bulletins
### APPENDIX 3

Quarterly Government and private sector current account balances, OET basis.

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<th>CURPG</th>
<th>GOFET</th>
<th>PE</th>
<th>PN</th>
<th>PULI</th>
<th>CUB</th>
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<td>25.20000</td>
<td>27.24700</td>
<td>337.45200</td>
<td>-265.48800</td>
<td>76.7500</td>
<td>37.72500</td>
</tr>
<tr>
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<td>337.45200</td>
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<td>1970:2</td>
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<td>-265.48800</td>
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</tr>
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<td>1970:3</td>
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<tr>
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<td>27.24700</td>
<td>337.45200</td>
<td>-265.48800</td>
<td>76.7500</td>
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<td>1971:3</td>
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<td>337.45200</td>
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<td>1973:1</td>
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<td>27.24700</td>
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<td>37.72500</td>
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<tr>
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<td>37.72500</td>
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<tr>
<td>1973:3</td>
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<td>25.20000</td>
<td>27.24700</td>
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<td>-265.48800</td>
<td>76.7500</td>
<td>37.72500</td>
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<tr>
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<td>76.7500</td>
<td>37.72500</td>
</tr>
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</table>

**Sources:** CURG: from Reserve Bank of New Zealand Balance of Payments Section. PE obtained as residual. Others from RBNZ Bulletin, various issues.
APPENDIX 4

Comparison of various measures of Government's net overseas exchange current account transactions.

<table>
<thead>
<tr>
<th>Year ending March</th>
<th>Buckle and Snively</th>
<th>Deane and Smith</th>
<th>Difference</th>
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<tbody>
<tr>
<td>1969</td>
<td>99.7</td>
<td>79.9</td>
<td>19.8</td>
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<td>103.6</td>
<td>85.0</td>
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<tr>
<td>1971</td>
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<tr>
<td>1972</td>
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<td>22.5</td>
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<td>32.6</td>
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<tr>
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<td>100.3</td>
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<tr>
<td>1975</td>
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Deane and Smith do not give a source, rather they claim that their data represents "Government's deficit on Current OET Transactions via Reserve Bank" (p.25).
APPENDIX 5A

Buckle and Snively's estimated regression equation compared with two updated versions (ordinary least squares and first-order autoregression) using more recent data.

<table>
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<th>Variables</th>
<th>Estimated Coefficients</th>
<th>t-values</th>
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</thead>
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<td>Buckle - Snively</td>
<td>Updated OLS</td>
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<tr>
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<tr>
<td>B_t</td>
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<td>0.16</td>
</tr>
<tr>
<td>B_t-1</td>
<td>0.15</td>
<td>0.11</td>
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<tr>
<td>B_t-2</td>
<td>0.24</td>
<td>0.16</td>
</tr>
<tr>
<td>B_t-3</td>
<td>0.17</td>
<td>0.18</td>
</tr>
<tr>
<td>C</td>
<td>3.99</td>
<td>0.05</td>
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<tr>
<td>S1</td>
<td>-6.00</td>
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<tr>
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<tr>
<td>S3</td>
<td>-3.77</td>
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<td>( \rho )</td>
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<tr>
<td>( \bar{R}^2 )</td>
<td>0.86</td>
<td>0.81</td>
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<tr>
<td>DW</td>
<td>1.65</td>
<td>1.25</td>
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</tbody>
</table>

Notes:

(i) Both M3 and \( B_t \) were measured as quarterly per cent changes, i.e. \( (M_{3_t} - M_{3_{t-1}}) / M_{3_{t-1}} \)

(ii) Data period - Buckle-Snively 1961(M) - 1978(D)
     Updated 1964(S) - 1983(J)

(iii) Data: - for updated version in Appendix 5B.

(iv) Durbin-Watson critical levels for 95% confidence with \( n = 76 \).
     \( d_L = 1.51 \) and \( d_u = 1.77 \).

(v) t-statistic - all the t-values above are significant at the 99% confidence level.
<table>
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<tr>
<th>Year</th>
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<th>PCM3B</th>
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PCM3 = (M3-M3-1)/M3-1
PCM3B = (M3B -M3B-1)/M3B-1

SOURCES: M3 - Reserve Bank of New Zealand data base - Jan. 84.
M3B - Trading banks cash (from RBNZ bulletins) + Reserve asset holdings, trading banks (RBNZ data base - variable : FTR) + Govt. security holdings, other M3 institutions (RBNZ data base - variable: OM3G) + currency, notes and coins of public (RBNZ data base, variable : CUR).
APPENDIX 6
Quarterly data used for econometric estimation.

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APPENDIX 7a
Graphs of fitted and actual series.

(1) Income taxation equation

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Actual

Fitted

(2) Real private expenditure equation
(4) Money demand equation
APPENDIX 7b

Summary of statistics for individual equations. Comparison of actual and predicted series.

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(1) Income taxation equation
(2) Real private expenditure equation
(3) Private import equation
(4) Money demand equation

...OVER
APPENDIX 7b - contd

Notes on summary of statistics

(i) Mean error = \( \frac{1}{T} \sum_{t=1}^{T} (Y_t^f - Y_t^a) \)

where \( T \) = the no. of periods in the series

\( Y_t^f = \) the fitted value of \( Y \)

\( Y_t^a = \) the actual value of \( Y \)

The mean error also gives a measure of the deviation of the fitted value from its actual time path - however the root-mean-square error outlined in Table 6.2 gives a better measure of the simulation performance, since it penalizes large individual errors more heavily.

(ii) Theil's inequality coefficient is defined as

\[ U = \sqrt{\frac{1}{T} \sum_{t=1}^{T} (Y_t^f - Y_t^a)^2} \]

\[ = \sqrt{\frac{1}{T} \sum_{t=1}^{T} (Y_t^f)^2} + \sqrt{\frac{1}{T} \sum_{t=1}^{T} (Y_t^a)^2} \]

this scales the root-mean-square error to lie between 0 and 1. If \( U = 0 \), \( Y_t^f = Y_t^a \) for all \( t \) and there is a perfect fit.

The decomposition of \( U \) reveals the bias, variance and covariance proportions. The bias proportion refers to the systematic error as it measures the extent to which the average values of the fitted and simulated series deviate. It is desirable for this to approach zero. According to Pindyck and Rubinfeld "a large value...would be quite troubling, since it would mean that a systematic bias is present". (p.365).

The variance proportion indicates the ability of the equation or model to replicate the amount of variability in the series. Ideally this proportion should be small. This leaves the covariance proportion as a 'residual' and therefore ideally should approach one.
NZP's credit slips again

NZP's staff correspondent, "New Zealand's international credit rating has slipped again.

"Institutional Investor," a monthly New York-based magazine aimed at insurance companies and similar big investors, has pulled New Zealand's rating down 3.1 points (out of 100) over the last six months, and 4.3 points over the last year. New Zealand slips from fifteenth to nineteenth out of 107 countries surveyed, sliding past Hong Kong as Italy and Belgium rise to positions above New Zealand.

The magazine's credit ratings are allotted after polling 75 to 100 bankers. Topping the list is the United States with 96.4 points — up 0.3 between March and September but down 0.7 points since September 1982.

At the other end of the scale is Uganda, with 4.1 points (up 0.1 over six months but, like the United States, down 0.7 over the year).

New Zealand's credit rating is 70.7 points.

The New Zealand falls 3.1 over six months and 4.3 over the year, are considerably higher than the average of the 107 countries — down 1.2 points over the six months and down 2.7 points over the year. The average rating is 41.0.

Australia fell from sixth in the March survey to ninth in the September survey, with falls of 3.1 over six months and 4.3 over the year. Its rating is now 84.6.

The "Institutional Investor" quotes one banker as saying New Zealand "is on a trip back 25 years in time" and a British lender as saying that "New Zealand is a land of perennial problems — from boom to bust and back again — every time they have an election."

The "Institutional Investor" rating is unlikely to make it more expensive for New Zealand to borrow internationally.

Major ratings, which can affect the interest rates New Zealand pays, are put out by such firms as Standard and Poor's and Moody's investors' service.

Standard and Poor's recently knocked New Zealand down from AAA to AA plus, and Moody's is due to put out a revised rating any day now. The Prime Minister, Mr Muldoon, told journalists in Washington recently that he was not worried by the change in the Standard and Poor's rating, and that bankers he had talked to in Washington had assured him New Zealand's credit was still excellent.

See also RBNZ - New Zealand News Review (Vol.2, No.5, p.7) especially that "the downgrading reflects the public sector's large and increasing debt burden and the deterioration of the current account balance of payments."
APPENDIX 9a

Graphs of simulated and actual series

(1) Income taxation
(2) Real private expenditure

- Actual
- Fitted

Millions of Dollars

(3) Private imports
(4) Money demand

[Graph showing money demand from 1970 to 1984 with actual and fitted data points.]
(5) Current account of the balance of payments
APPENDIX 9b
Summary of statistics on model simulation. Comparison of actual and simulated series.

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<thead>
<tr>
<th>Actual Series: TI</th>
<th>Predicted Series: TI2</th>
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<tbody>
<tr>
<td>Current Sample: 1970-12 to 1984-12</td>
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<tr>
<td>Correlation Coefficient: 0.9607</td>
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<tr>
<td>Root-Mean-Squared Error: 0.93119</td>
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<td>Mean Absolute Error: 0.41386</td>
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<td>Fraction of Error Due to Residual Variance: 0.04266</td>
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</table>

Endogenous variables:
(1) Income taxation
(2) Real private expenditure
(3) Private Imports
(4) Money demand
(5) Current account of the balance of payments