The Exchange Rate and Macroeconomic Policy in Australia

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1. Introduction

The choice of an exchange rate regime is thought to have significant implications for macroeconomic outcomes and macroeconomic policy. Therefore, it is interesting that after nearly 10 years of a floating Australian dollar ($A) there is little disagreement with the view that exchange rates should be market determined. This could be partly due to the fact that substantial fluctuations in the prices of commodities traded by Australia are a major source of external shocks to the economy and a reasonably freely floating rate is expected to provide a degree of insulation from foreign price movements, thereby cushioning terms of trade shocks. The facility to operate an independent monetary policy is another important and related property of floating that is believed to have been of value to Australia. One task of this paper is to review Australia's exchange rate experience and policy in an attempt to ascertain whether these expected benefits for macroeconomic policy from floating the currency have been delivered. With some exceptions, the conclusions of the paper are supportive of the present system of managing exchange rates, though not necessarily in agreement with the monetary policy behind some of the exchange rate movements.

Of course, many authors have considered these issues before. For Australia, two influential papers are those by Sieper and Fane (1980) and Blundell-Wignall and Gregory (1990). The first of these is a comprehensive and detailed examination of exchange rate regimes and exchange control written for the Australian Financial System Inquiry. It is worth quoting from its concluding paragraphs:

> Which regime one prefers must clearly depend on one's judgement as to the main sources of exogenous disturbances. The greatest shocks appear to have come from changes in world prices ... In these circumstances a floating exchange rate has obvious advantages over a fixed rate ... in the intermediate run, the exchange rate regimes differ mainly in their implications for the domestic price level. Under fixed exchange rates a country is forced to inflate, or deflate, at roughly the same rate as the rest of the world ... Under flexible exchange rates each country can choose its own inflation rate ... Flexible rates permitted the great hyperinflations; but flexible rates have also enabled

* I am indebted for discussion and for comments on various drafts to Adrian Blundell-Wignall, Alan Catt, George Fane, David Gruen, Ian Macfarlane and Philip Lowe, none of whom necessarily share the views expressed here.

> Japan, Switzerland and West Germany to avoid inflating as fast as the rest of the world in the 1970s [pp. 256-257].

They saw floating the $A as conferring a major advantage of being able to choose an inflation rate different from that of the rest of the world and not dictated by world commodity price cycles. Blundell-Wignall and Gregory (1990), on the other hand, contend that a floating rate is necessary because Australia's real exchange rate is likely to fluctuate with its terms of trade. Thus they argue that adjustments in the real exchange rate would be much harder to achieve and damaging to the real economy if domestic prices, rather than the exchange rate, were required to facilitate the changes. The present paper demonstrates that these two views are closely related and argues that they are probably still valid for Australia.

The consequences of the exchange rate regime for inflation are a major concern of the paper. Foreign inflation is likely to be imported with a fixed rate but, as discussed above, a flexible rate system may insulate the economy from foreign price rises. The consequences for policy are considerable. If the exchange rate floats and insulation works, there is no necessity for the authorities to watch foreign price movements as part of an anti-inflationary policy. If it floats, but insulation does not work, there is an implication that foreign price rises cause disequilibrium in goods markets and that attempting to prevent them from affecting the economy may compound this disequilibrium. In this connection, the logic of the practice of targeting the nominal exchange rate to achieve particular inflation outcomes needs to be closely examined. Nominal depreciation is by no means always inflationary. For instance, it can be part of a real rate response in which case it represents a *relative* price adjustment, or an insulating response to foreign price falls when it will not produce domestic price rises. However, if price insulation does not work, monetary policy as well as exchange rate targeting will have a difficult task sustaining equilibrium while not absorbing foreign price shocks. While such issues arise from consideration of inflation questions, they nevertheless have implications for real outcomes because of the relations between real variables and inflation, and between an anti-inflationary policy and real variables.

Several further macroeconomic issues in the operation of exchange rate policy warrant attention. Firstly, there is the question of the large depreciations in 1985 and 1986. These depreciations raised many macroeconomic policy issues, including that of the appropriate connection between wages policy and currency depreciations. Secondly, how should the exchange rate behave when there are current account deficits? Thirdly, what purpose, if any, does the Reserve Bank of Australia's (RBA) policy of exchange market intervention achieve? Finally, it should be recorded that because of time limitations a number of important topics are not covered at

all or, at best, only briefly. In particular, the role of the exchange rate mechanism, if any, in transmitting foreign growth cycles to Australia has not been examined and the paper only touches on the question of how terms of trade shocks impinge on domestic demand and activity.

A recurrent theme in the paper is that there are a variety of causes of nominal exchange rate movements. Hence, it is not possible to infer any policy conclusions from a nominal rate movement. Unless the cause is known, it cannot be inferred that a particular nominal depreciation is inflationary. Nor can it be deduced that it will have particular consequences for the current account deficit. For example, it could be a response to a rise in saving, a fall in foreign currency traded goods prices, a deterioration in the terms of trade, or a monetary expansion. The implications for the economy and for policy can differ for each case.

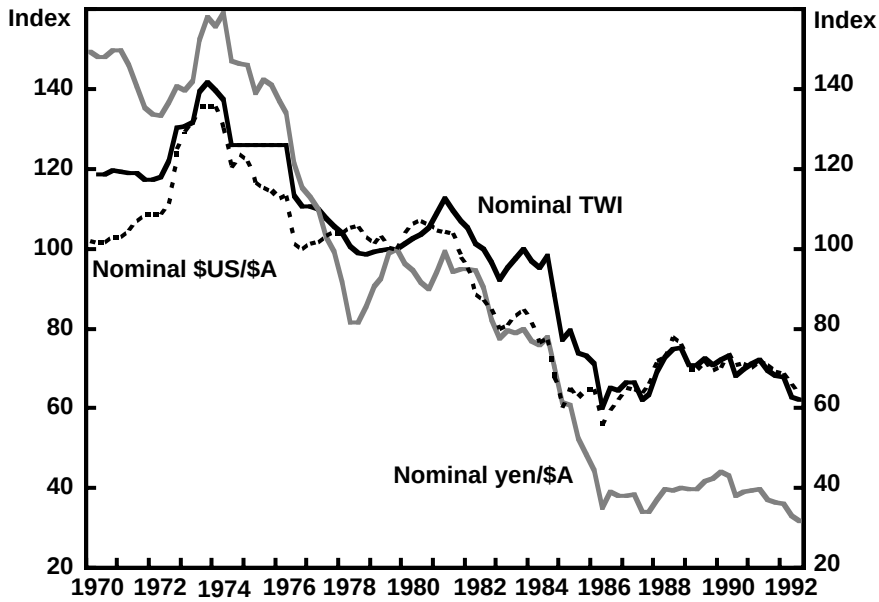
The first section sets out data on various relevant concepts. In particular, it demonstrates the volatility of Australia's terms of trade and of the foreign currency traded goods prices on which it is based. Related to this, it is argued that conventional concepts of the real exchange rate are inappropriate for many purposes for which they are used and suggests that measures of traded goods prices should supplement them. Section 2 briefly treats major theories of exchange rate determination relevant to issues of macroeconomic policy. Section 3 examines the issue of monetary independence and Section 4 asks about the capacity of a floating rate regime to cushion shocks in traded goods prices and the terms of trade, respectively. Section 5 addresses the question of the relation between exchange rate behaviour and inflation and whether the exchange rate should be used to target inflation. An appraisal of the experience of macroeconomic activity and policy in relation to exchange rates since the float in December 1983 is one of the purposes of the paper and is set out in Section 6. Conclusions are summarised in Section 7.

1.1 Stylised Facts

Nominal exchange rates are measured as the number of units of foreign currency per Australian dollar.[1] Movements in various nominal exchange rates are shown in Figure 1. Notable features are the steady depreciation of the trade-weighted index (TWI) from the mid-1970s until the latter part of the 1980s, the large depreciations in 1985 and 1986 and the generally similar pattern of movement between the US dollar ($US), yen and TWI rates, apart from the depreciation of both the $US and $A against the yen in the 1980s.

1. I shall follow the Australian convention (unless otherwise stated) of defining the nominal exchange as the foreign price of domestic currency when looking at data. However, again following convention, the reciprocal measure (price of domestic currency) is used in the theoretical sections.

Figure 1: Nominal Exchange Rates Indexes
(March 1980 = 100)



Fluctuations in international commodity prices are among the most important types of shocks affecting the Australian economy.[2] Figure 2 shows annual inflation rates of the US dollar-valued RBA commodity price index and the OECD consumer price index. There were substantial falls in commodity prices in the early 1980s, then rises in the mid-1980s followed by falls. The direction taken in many propositions in this paper is motivated by the observation that the prices of commodities have a far greater amplitude of fluctuation than do prices of final goods and services.

Commodity price movements are reflected in the foreign currency prices of Australian exports and imports. Because Australia's share of the market for many of its traded commodities is typically small, it is usual to assume that foreign currency prices are determined independently of domestic supplies and demands. The domestic currency price indexes of these traded goods have been converted to 'foreign currency' values by multiplying by the trade-weighted exchange rate index. If the 'law of one price' holds, this gives estimates of average foreign currency prices, bearing in mind the averaging techniques used to construct export and import prices indexes and the TWI. Rates of change of these indexes are compared in Figure 3, where it can be seen that prices of both groups of Australia's

2. Indeed, it is often said that Australia has a commodity currency. See, for example, the papers in the volume edited by Clements and Freebairn (1989).

Figure 2: RBA Commodity Price Index and OECD Consumer Price Index
(inflation rates, per cent per annum)

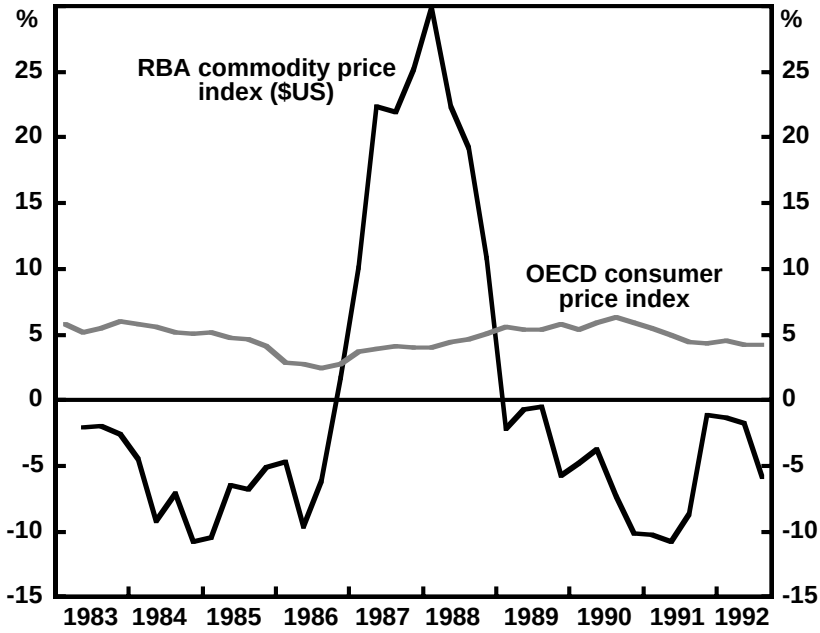
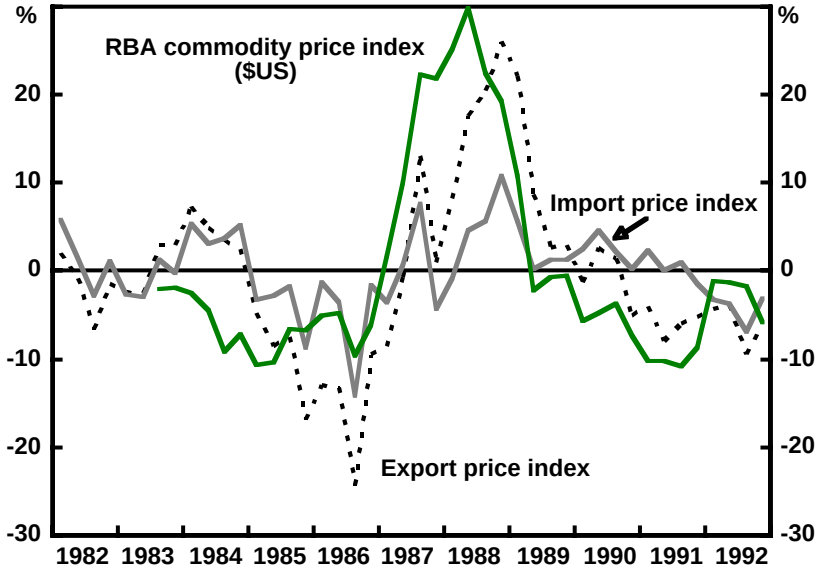


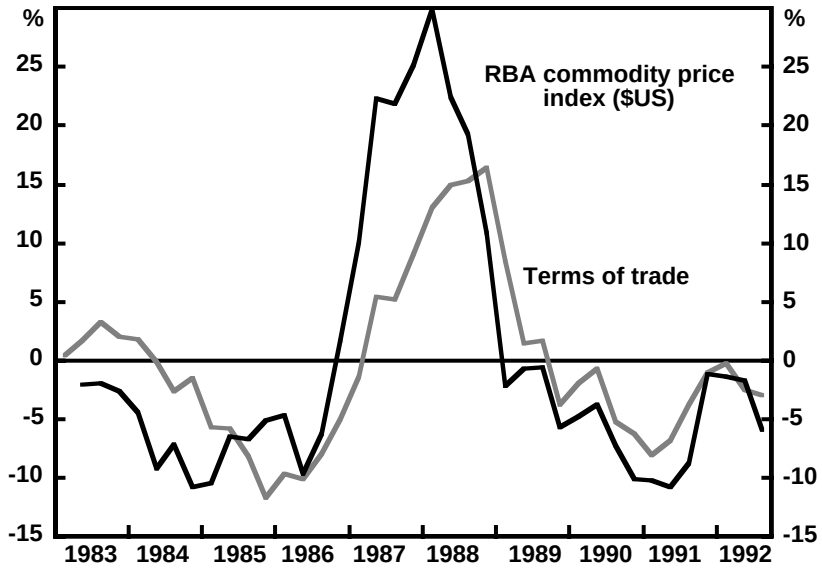
Figure 3: Traded Goods Prices and Commodity Prices: Inflation Rates
(traded goods prices adjusted by TWI, per cent per annum)



traded goods move in a similar fashion to each other and to commodity prices and that export price fluctuations often have a greater amplitude than those of import prices.[3] The consequence is that the terms of trade usually also move in a similar fashion to commodity prices (Figure 4). The terms of trade worsened from the September quarter 1984 to the September quarter 1987, improved until the December quarter 1989 and thereafter worsened again. These movements have significant implications for Australia's real income stability, prices and exchange rates.

One important consequence of the diversity of movement of both commodity and trade prices as compared with consumer prices is that the concept of 'the real exchange rate' is by no means clear-cut. Real exchange rates are a measure of relative prices, usually of home and foreign goods. When relative prices at home and abroad are constant, the real exchange rate is unambiguously the ratio of a domestic price, say the consumer price index (CPI), to the foreign CPI, the latter being translated by the nominal exchange rate into domestic currency. The notion captures the idea of the amount of country X's bundle of consumption goods that can be exchanged for a given amount of the domestic consumption bundle.

Figure 4: Commodity Price and Terms of Trade Fluctuations
(per cent per annum)

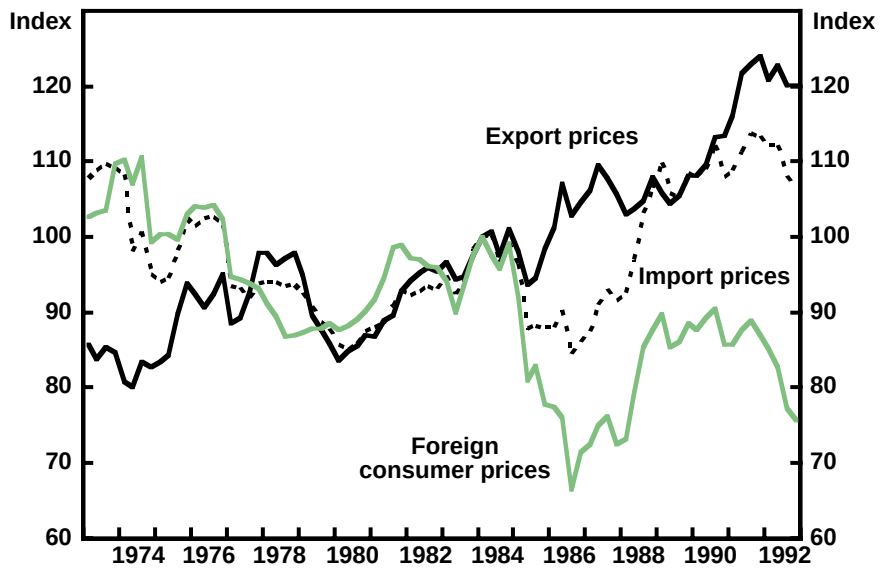


3. The oil price shocks of the 1970s are notable exceptions.

However, when relative prices are changing this concept is not always satisfactory. Nevertheless, it is the conventional measure in Australia and is constructed by taking the ratio of a price index of domestic consumption to foreign consumption prices. In Figure 5, the series labelled foreign consumer prices is put together from the CPIs of 22 countries with which Australia trades, converting them to Australian currency values, weighting them according to trade values and dividing the resultant index into the Australian CPI. It depreciated substantially in 1985-86, appreciated through 1987-88, was steady during the 1989-91 period and thereafter has depreciated.[4] The concept is relevant to those contemplating foreign travel, but if traded goods prices behave very differently from consumer prices, it will not be an appropriate measure for those engaging in trade. Exporters, for instance, are ultimately interested in the number of units of domestic consumption goods which can be exchanged for the domestic currency value of their foreign currency earnings.

Hence, for several reasons it would seem desirable to define measures of the real exchange rate in terms of the relative prices of non-traded goods to prices of

Figure 5: Real Exchange Rates, Trade and CPI-Based Indexes
(1984 = 100)

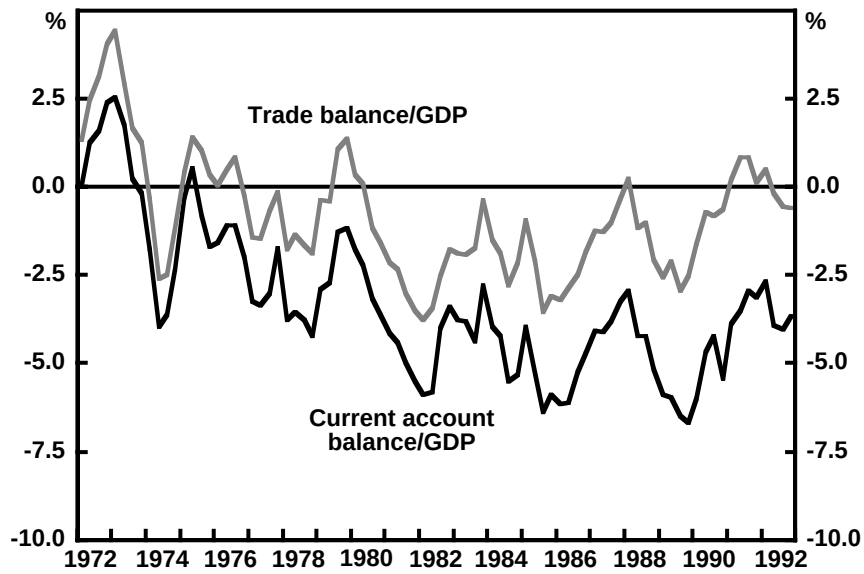


4. I am grateful to the Reserve Bank of Australia for supplying the data for this series. The method of compilation is described in Jones and Wilkinson (1990).

imports and exports.[5] For this purpose, further real exchange rate indexes are defined by taking the ratios of a domestic price index to the import and export price indexes. I shall call these indexes 'trade-based' by contrast with the CPI-based measures. An interesting feature of Figure 5 is the difference in behaviour between the three measures of the real exchange rate. Starting from December 1984, the TWI depreciated significantly through 1985 and 1986. The conventional CPI-based real exchange rate measure also depreciated at this time, but the import-based measure depreciated by much less and the export-based index hardly at all. Subsequently, the export-based index appreciated steadily while the import-based and CPI-based indexes appreciated through 1987 and 1988. All measures have shown a tendency to depreciate in the past two years.

In Figure 6 the current account balance and the balance on goods and services (trade balance) are shown as a per cent of GDP. The major difference between the two balances is the net foreign income balance. Net income, being dependent on the size of net foreign liabilities, is partly determined by the history of the current account balance. Hence, so far as exchange rate issues are concerned it is often

Figure 6: Current Account, Goods and Services Balances
(per cent of GDP, quarterly, seasonally adjusted)



5. Blundell-Wignall and Gregory's (1990) work involves both terms of trade shifts and separate prices for non-traded goods. They define the relative price of imports to non-traded goods as the real exchange rate. This neglects the role of the relative price of exports. See Section 4 for further discussion.

preferable to examine the behaviour of the trade balance. Long-term adjustment of the current account balance must lag that of the trade balance because of inertia in the income balance when it is large. The two main features of the performance of the trade balance are that it can be seen to follow cycles similar to those in real GDP and that the trade deficit increased in the early 1980s and fell in the latter part of the decade. The trend increase evident for much of the 1980s in the current account balance has been a matter of concern for policy makers. However, there is some suggestion of a trend *reduction* in the trade deficit through the latter part of the 1980s. Each peak and trough is a little higher through the decade than the one that preceded it. This has occurred despite the appreciation of the export-based real exchange rate.

Both short and long-term real interest rates, calculated using actual to stand for expected inflation rates, are shown in Figure 7. The notable features of their behaviour are, firstly, that it can be shown that they have followed cycles with a similar period to and roughly in phase with those of GDP. Secondly, from negative levels in the 1970s, real interest rates rose to become positive in the early 1980s and since then, have shown a slight upward trend.

Finally, GDP growth is central to macroeconomic policy and is illustrated in Figure 8. The three recent recessions are evident as periods of low or negative growth. The real interest rate and current account series also have three distinct peaks in the last 12 years, strongly suggesting a relationship with GDP cycles.

Figure 7: Real Interest Rates
(deflated by implicit consumption prices)

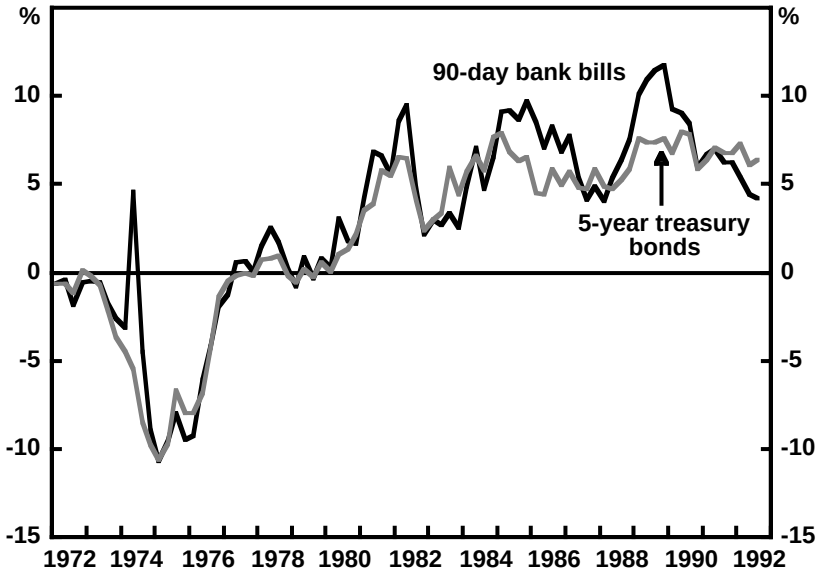
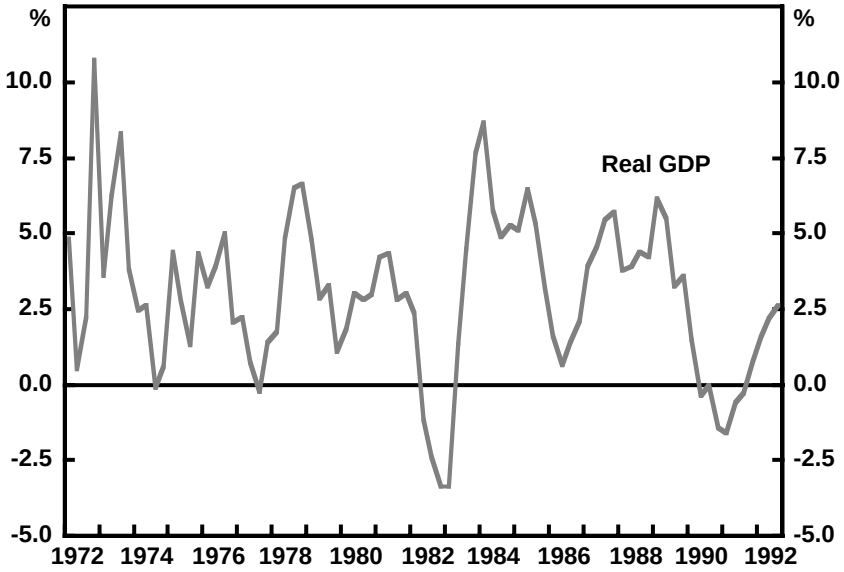


Figure 8: Real GDP Growth Rate
(year-ended percentage change)



Moreover, Australian GDP fluctuations have followed a similar pattern to those in comparable economies. Growth cycles similar to those referred to above have taken place in most Western economies. Apart from shocks in trade goods prices, fluctuations in world activity would appear to be a significant, though related, source of disturbance to the Australian economy.

2. Exchange Rate Determination

There have been considerable developments in the theory of exchange rate determination in recent decades, though econometric testing of theories has not been particularly successful.[6] In a world of internationally mobile financial capital and floating rates, the old notion that the exchange rate is determined by the balance of payments has little credibility. To see how it worked, define π and e as the real and nominal exchange rates, respectively, Y the level of real output, NX net exports and K the capital account balance. Then, the balance of payments is:

$$NX(\pi, Y) + K = 0 \qquad (1)$$

6. See MacDonald and Taylor (1992). Their survey finds that, apart from covered interest parity, none of the major theories of exchange rate determination receive strong support from the empirical studies.

In the theoretical sections the real and nominal exchange rates are defined as the reciprocals of the conventional measures for Australia. For simplicity, it is assumed that there are no changes in reserves and also that the net income item in the current account is zero with the consequence that the current account balance equals net exports. To suggest a world of limited capital mobility, suppose that K is constrained to be a constant. Then with Y determined by consumption and investment plans and macroeconomic policy, the balance of payments does indeed determine the real exchange rate. Taking monetary policy to determine the level of domestic prices P, the nominal exchange rate is found from:

$$\pi = eP^*/P \tag{2}$$

where P^* is the foreign currency price of imports. However, with *unconstrained* international capital flows, K is a residual satisfying the demand for funds at current international and domestic interest rates.[7] The factors determining the exchange rate do not include the condition in equation (1). To see this, consider the simple open economy Mundell-Fleming type model which is based on the assumption that the foreign good is imported, but not produced domestically and that there is a single good produced at home and exported:

$$M = PL(i,Y) \qquad LM \tag{3}$$

$$Y = C(Y) + I(i) + G + NX(\pi,Y) \qquad IS \tag{4}$$

$$i = i^* \qquad \text{interest parity} \tag{5}$$

$$Y = Y(\overline{W}/P) \qquad \text{supply} \tag{6}$$

where variables not previously defined are:

- M nominal money supply
- i nominal interest rate
- C consumption
- I investment
- G government expenditure
- $\overline{W}$ nominal wage

and * refers to foreign variables. Both the foreign interest rate and the foreign currency price of imports are taken as exogenous. The simpler versions of the Mundell-Fleming system avoids dynamics, in part by assuming that expectations

7. This point has long been absorbed in the theoretical literature, but continues to surface in 'practical' discussions. See Kouri (1976) for further discussion of the point that the balance of payments does not determine the exchange rate.

about exchange rates and prices are static.[8] It is modified above by the addition of a supply function (6), that incorporates the assumption that the nominal wage is determined at any time by exogenous wages policy.[9]

Substituting out for equation (5) in the system (2) to (6) determines the endogenous variables *(P, Y, e)* given the exogenous variables $P^*, M, i^*, G, \overline{W}$. In particular, the system determines the real and nominal exchange rates without reference to (1). Thus, given the usual assumptions about signs and some choice of $\overline{W}$, output of the home good is an increasing function of the price of the home good. Substituting (6) in the $\overline{LM}$ equation, monetary policy can then be shown to determine the price level $P(M,\overline{W})$. Substituting $Y[P(M,\overline{W})]$ into the *IS* curve, it is seen that the supply and demand for the home good determine its relative price $1/\pi$, which is the reciprocal of the real exchange rate. Finally, the nominal exchange rate is found by substituting solutions for π and P in (2).

Although the model is short run and limited in ways previously and to be described, it possesses properties of more complete systems. It is readily shown that:

1. The real exchange rate is a relative price determined by domestic supply and home and foreign demand for the home good.
2. The nominal exchange rate is determined not by the balance of payments but by relative prices, wages and monetary policy.
3. The system allows an autonomous monetary policy.
4. A rise (fall) in the foreign price level will induce an exactly offsetting appreciation (depreciation) of the nominal exchange rate. This follows because P is determined by monetary policy and labour market conditions and π by the market for home goods. This is the 'inflation insulation' property of flexible rates.
5. The usual assumptions about the signs of the system ensure that there will be a unique real exchange rate for given values of exogenous variables M, i^*, G, and $\overline{W}$.
6. The nominal money supply influences the real exchange rate because nominal wages are taken to be exogenous. At the other extreme, if nominal wages are allowed to adjust to clear the labour market at the

8. This or some variant is the more convenient approach for those who find difficulty in solving the comparative dynamics of second or higher order non-linear difference and differential equation systems in their head.

9. This must be regarded as a first approximation to wages policy as it does not explicitly allow for wages to be adjusted according to particular rules. Also, it would be preferable to include relative prices in the supply function as the supply of labour depends on both domestic and foreign prices. See Pitchford (1990).

natural rate of unemployment, the real exchange rate then depends only on i^*, G and monetary changes will not affect real variables.

As the model stands, aggregate demand shifts, such as those induced by fiscal policy, have no effect on real variables. An increase in government spending on the home good will appreciate the real exchange rate just sufficiently to crowd out an equal amount of private expenditure so resulting in no change in real output. This traditional Mundell-Fleming result no longer holds if a wage adjustment rule, such as partial or even full indexation, is added to the system.[10] It then follows that:

7. Shifts in the exogenous variables i^* and G will shift output, employment and the real exchange rate; for instance, fiscal expansion will increase output and appreciate the real and nominal exchange rates.

The propositions above contrast with those which would be obtained if the older view, embodied in condition (1) was imposed, that is that the current account deficit had to remain unchanged. According to this view, if either monetary or fiscal expansion are thought to raise output, this would tend to increase a current account deficit and then depreciation would be necessary to ensure the trade balance did not change.

The model needs to be amended in a number of ways both to add realism and to ensure that properties such as homogeneity hold where appropriate. It is worth mentioning these qualifications briefly. Relaxing the Mundell-Fleming model assumption that exchange rate expectations are static introduces the interest parity condition that domestic and foreign nominal interest rates differ by the expected depreciation rate between the currencies involved. This also brings dynamics into the model. Further, it needs to be recognised that current account imbalances imply changes in net foreign assets which in turn affect investment and consumption behaviour. The current account feedback models developed to capture these effects usually neglect the relationship between private foreign borrowing and the investment which is its purpose. If capital stock effects are overlooked, these models give an incomplete and often misleading picture of the current account feedback process.

Models such as those surveyed by Branson and Henderson (1985) incorporated the assumption that foreign and domestic bonds need not be perfect substitutes. In the widest version of this 'portfolio balance' class of models agents hold a portfolio of bonds, equity and money denominated in various currencies on the basis of their expected future returns. Current account imbalances lead to accumulation or decumulation of these asset stocks in a potentially bewildering variety of ways. Finally, there are numerous models of optimal intertemporal

10. This extended model is set out in the Appendix, Part B, where it is used to discuss the effects of shifts in real wages on the trade balance.

borrowing and lending by consumers and/or producers.[11] While they deal satisfactorily with the motives for intertemporal substitution, it is not straightforward to incorporate them into macroeconomic models driven by aggregate demand.

Given this range of additions to the original system it is unlikely that the behaviour of the nominal exchange rate could be fully comprehended without the aid of an extensive econometric model. Notwithstanding, economists make attempts to short-circuit the complications and understand the workings of the system from selected parts. For instance, differentiating (2) with respect to time:

$$\hat{e} = \hat{P} - \hat{P}^* + \hat{\pi} \tag{7}$$

If the real exchange rate is assumed to be constant this amounts to the 'relative purchasing power parity' theory of exchange rate determination. If also it is assumed, that output is constant, using (3) and (5) for both the domestic and foreign economy:

$$\hat{e} = \hat{P} - \hat{P}^* = \hat{M} - \hat{M}^* \tag{8}$$

which is the one of the tenets of the 'monetary approach' to the balance of payments. Despite the neatness and appeal of these hypotheses, they will be satisfied in practice only to the extent that the theoretical and empirical assumptions on which they are based are satisfied.

While the model just studied is popular because of its simplicity, it cannot deal with complications which were shown in Section 1 to arise from the behaviour of Australian traded goods prices. The alternative model in the literature is the traded/non-traded goods system. This allows for domestic production of both goods, but is still inadequate for many purposes because of its assumption that the terms of trade are fixed. In order to represent typical price shocks for the Australian economy, the system should allow for the production and consumption of exportables, importables and non-traded goods. For the present, note that now two relative prices, namely eP^*_X/P_N and eP^*_M/P_N (where subscripts $_{X,\,M}$ and $_N$ stand for exports, imports and non-traded goods, respectively) and, hence, two real exchange rates are relevant to trade issues.[12] Arising out of this model are the issues of whether and to what extent exchange rate policy can cushion foreign currency price shocks and terms of trade fluctuations. The appropriate theory will be spelt out in the section on these effects.

Finally, there is the question of whether monetary policy should be conducted

11. See, for instance, Blanchard and Fischer (1989), Pitchford (1989, Ch. 2), Svensson and Razin (1983).

12. Some of the properties of this model are discussed in Long and Pitchford (1993) and Pitchford (1993).

according to rules which involve the exchange rate. Firstly, various monetary policy 'rules of thumb' have been suggested for particular macroeconomic purposes. Leaning against the wind involves tightening monetary policy when the exchange rate is depreciating and loosening it when it is appreciating, apparently with the intention of slowing down, or even reversing market-induced changes in the exchange rate. Closely related are monetary policy rules which target other endogenous variables. For instance, the 'modified monetary targeting' practiced in the 1970s in Australia and other countries involved adjusting the target money growth rate down when inflation exceeded desired levels. Roper and Turnovsky (1980), for example, show that rules of this type may perhaps be justified as optimal policy responses.[13] They formulate a simple open economy Keynesian model, similar to that above and allow for random shocks in aggregate demand, the domestic money supply and the foreign interest rate. Provided the authorities know the structure of the economy, including the means and variances of the distribution of the shocks, it is optimal to adjust the money supply in line with variations in the exchange rate.[14] The criterion for optimality is the minimisation of real income fluctuations. The information demands of such a scheme, even at the level of the simple theoretical model they study, are such that it is unlikely that it could form the basis of useful policy. In practice, the realistic operating response for active monetary policy is to respond to each shock as it occurs, with little guide as to its future size and duration. It is doubtful that econometric results will be able to do more than inform such choices in a general, rather than a precise way.

3. Monetary Independence

Views differ as to the value of monetary policy independence. An economy wishing to improve its inflation performance and credibility may choose to peg its exchange rate to that of a country with a record of low inflation. Alternatively, it may choose to select its own means of implementing anti-inflationary monetary policy. As noted, Australia is subject to foreign trade price disturbances which behave very differently from foreign CPI inflation rates. Unless such cycles were to disappear, price stability is hardly likely with pegged exchange rates. Moreover, if it is believed that monetary policy has real effects, even if only in the short run, there is a danger evident in recent European experience that real as well as monetary disturbances might be imported by pegging to particular economies. Finally, pegged rates would make it difficult or impossible to use monetary policy in a counter-cyclical way and/or to offset undesirable real shocks.

13. The considerable literature on optimal intervention is surveyed in Pilbeam (1992).

14. The sign of the response function is ambiguous so that it cannot be shown that leaning against the wind is necessarily optimal.

Of course, if pegged exchange rates are adjustable, it may be possible to realise a degree of monetary independence by changing the peg as necessary. However, this requires the authorities to imitate the trends of a floating rate. The value of floating is that rate adjustments are not subject to the delays, forecast errors, calculation uncertainties, political and bureaucratic influence and speculation which characterise adjustable pegged systems. Open market operations to sterilise unwanted monetary movements is another way in a pegged rate system of seeking to offset undesired foreign influences on the domestic money supply. However, this can only be a short-term measure, for unless the causes are short run, the factors responsible will continue to put pressure on the money supply to change.

For the reasons indicated above it would seem desirable that Australia have a reasonable degree of monetary independence.[15] Has floating brought this about? It is convenient to start with the situation before floating when exchange rates were managed or pegged. In the case of a pegged rate and perfect mobility of financial capital, a monetary expansion would, in theory, lead to downward pressure on domestic interest rates, a capital outflow and eventually a complete offset of the monetary expansion.[16] On the other hand, with a pegged rate, a balance of payments surplus, due say to improved trading conditions resulting in a current account surplus, would generate an increase in the money supply.

An episode in the early 1970s suggests that Australia's monetary independence was limited before floating. As a result of a high rate of exploitation of Australian mineral and oil resources through the 1960s and the export price boom of 1972-73, Australia experienced increasing trade surpluses in the late 1960s and early 1970s. Foreign exchange reserves rose by 80 per cent in 1971 and 72 per cent in 1972. At the time, wool prices were low and for political reasons the Coalition Government did not appreciate the exchange rate. Open market operations were successful in confining the growth in the money supply (M3) to 8.6 per cent in 1971, but with a substantial rise in unemployment in 1971 and an election in prospect, open market sales were reduced and M3 rose by 18 per cent in 1972 and 22 per cent in 1973.[17] This experience suggests that, at least in the short run, there is some scope under pegged rates for the monetary authorities to moderate external pressures on the money supply. However, when the need for an adjustment of the exchange rate is resisted, exercising control over the money supply can be an increasingly difficult task.

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15. With monetary policy implemented through control of short-term interest rates, the money supply becomes endogenous. Monetary independence in such circumstances can be interpreted to mean the facility to set independent short-term interest rates without credit or other financial controls.

16. Offset was rarely found to be complete. See Macfarlane (1979) for a survey of the Australian results.

17. These events are described in Pitchford (1977).

Some evidence of monetary independence since the float is that Australia realised a money growth and inflation rate significantly above that of its main trading partners for most of the 1980s. From 1983 to 1989 Australia's average inflation rate was 7.3 per cent, whereas that for the United States was 4 per cent and for Japan 1.2 per cent. Also the rapid increase in Australia's M3 in the late 1980s, often regarded as a consequence of financial deregulation, has no counterpart in most G7 (i.e. 'Group of Seven') countries.[18]

4. Insulation

4.1 Insulation, Traded Goods Prices and the Terms of Trade

The inflation insulation property of flexible rates is usually established on the assumption that there is only one type of foreign good.[19] This simplifies the analysis greatly because it precludes changes in the relative prices of foreign goods, which incidentally implies an unambiguous definition of the foreign real interest rate. However, it has been established that many of the interesting questions about Australian exchange rate behaviour specifically require that foreign production of exportables as well as importables be recognised. Assume that the market for non-traded goods clears, so that the expression for zero excess demand in that market is given by:

$$-\gamma i^* + \delta_X (e + s - p) + \delta_M (e + q - p) = 0 \qquad \text{non-traded goods market} \quad (9)$$

where the symbols are defined below. The model is completed by adding expressions for the price index and the money demand function, respectively, as shown below:

$$\psi = a_X (e + s) + a_M (e + q) + a_N p, \;\; a_X + a_N + a_M = 1 \qquad \text{price index} \quad (10)$$

$$m = -\mu i^* + \beta (s - q) + \psi \qquad \text{money demand} \quad (11)$$

where all variables except interest rates are in logarithms and

- e exchange rate (price of foreign money)
- s foreign currency price of exports
- q foreign currency price of imports
- p price of non-traded goods

18. Foster (1993) argues that this money supply growth was significantly related to the property market boom of the time and that financial deregulation was only a minor factor.

19. 'Foreign price insulation' will be referred to just as 'insulation' in the paper. If necessary, other types of insulation will be given distinguishing labels.

ψ price index of domestic consumption

m nominal money supply

i^* foreign nominal interest rate

All elasticities and parameters $\gamma, \delta_i, a_i, \mu, \beta$ are positive. In equation (9) excess demand for non-traded goods is influenced by interest rates and the relative prices of each traded good to the non-traded good. As in Section 2, the complications associated with interest parity are avoided by assuming static price and exchange rate expectations. Real money demand depends on the nominal interest rate as well as real income which, in turn, can be shown to depend on the terms of trade $s-q$. As in the system of Section 4, exchange rate and price expectations are static if the domestic nominal interest rate equals the foreign nominal interest rate. Notice that, for simplicity of exposition, a number of factors that will affect real exchange rates both in the short and the long run have been omitted. These include real output (other than terms of trade effects), government variables and measures of disequilibrium in markets.

Differentiating (9) to (11) and rearranging:

$$de = -(a_X + \beta + a_N\delta_X)\, ds - (a_M - \beta + a_N\delta_M)\, dq + dm \qquad (12)$$

The coefficients of ds and dq in (4.4) add to -1 for:

$$(a_X + \beta + a_N\delta_X) + (a_M - \beta + a_N\delta_M) = a_X + a_M + a_N\,(\delta_X + \delta_M) \qquad (13)$$

and it is shown in Long and Pitchford (1993) that $\delta_X + \delta_M = 1$. Moreover, it is reasonable to take the case where the coefficient of dq is negative.[20] As a consequence, movements in the nominal exchange rate are a weighted average of the proportional changes in foreign currency traded goods prices plus the proportional change in the money supply. In particular, when both foreign currency prices change in the same proportion, the nominal exchange rate will, other things being equal, appreciate in that proportion, hence exactly offsetting the rise and leaving the domestic currency value of traded goods prices unchanged. This is the conventional 'foreign price insulation' property of flexible exchange rates. Here the concept is extended to the circumstance of any foreign currency traded goods price shifts, in which case it can be seen that the exchange rate response offsets a weighted average of the foreign currency trade price changes. The expression for exchange rate movements (12) can be viewed as an extension of purchasing power parity (8) to take account of foreign traded goods price

20. The terms of trade effect coefficient β in the money demand function consists of the response of real income to an increase in the terms of trade times the income elasticity of demand for money. The first effect is shown in Long and Pitchford (1993) to equal the share of exports in total expenditure. Unless the money elasticity is very large the coefficient will be negative.

movements rather than consumption price inflation or deflation.[21] Notice that the exchange rate response can be written as:

$$\begin{aligned} de &= -dq - (a_X + \beta + a_N\delta_X)(ds - dq) + dm \\ &= -ds + (1 - [a_X + \beta + a_N\delta_X])(ds - dq) + dm \end{aligned} \tag{14}$$

and hence is shown to consist of a terms of trade adjustment and a pure insulation effect with respect to an absolute price change.

From (10) and (12), the effect on the price index can be shown to be:

$$d\psi = -\beta(ds - dq) + dm \tag{15}$$

The absolute foreign currency price effects disappear, but the price index will fall with improving and rise with deteriorating movements in the terms of trade. However, it can be seen that this terms of trade effect arises from the change in the demand for money induced by the influence of the terms of trade on real income. It would seem reasonable for monetary policy to finance such real income changes, in which case there would be an accommodating monetary response of:

$$d\tilde{m} = \beta(ds - dq) \tag{16}$$

The change in the price index would then be given by any further monetary expansion and the foreign price changes would have no impact on the index. Insulation would be complete. Notice that this money demand effect is quite independent of the size of absolute price shocks, depending only on the change in the terms of trade.

Finally, the effects on domestic currency prices of exports and imports are given by:

$$d(e + s) = (a_M - \beta + a_N\delta_M)(ds - dq) + dm \tag{17}$$

$$d(e + q) = -(a_X + \beta + a_N\delta_X)(ds - dq) + dm \tag{18}$$

These movements can be seen to depend on terms of trade shifts and monetary growth. For a terms of trade improvement, for instance, if $dm = 0$ the domestic currency prices of exports will rise and imports prices will fall, the magnitudes of these changes being smaller than the corresponding foreign price changes. The export and import-based real exchange rate movements, using the price index ψ

21. However, in principle, allowance should also be made for factors that might shift real exchange rates, and for non-traded goods markets not clearing.

in their definition, are:

$$de + ds - d\psi = (a_M - \beta + a_N\delta_M)(ds - dq) + dm - d\psi = (a_M + a_N\delta_M)(ds - dq) \quad (19)$$

$$de + dq - d\psi = -(a_X + a_N\delta_X)(ds - dq) \quad (20)$$

assuming (15) to apply. In the context of exogenous price shocks and monetary movements, these real exchange rate concepts depend solely on shifts in the terms of trade.[22]

Adding further complications such as non-static exchange rate expectations and the absence of market clearing for non-traded goods and labour need not necessarily affect this result. Firstly, the result is a partial one so that further sources of shocks do not necessarily upset it. Secondly, in models with simpler production structures the result is robust to most such qualifications.[23] However, in these models it is required that the foreign Fisher effect operates. The result may not have to be greatly qualified if this does not hold, provided real interest effects are small in the short run.

Given the substantial fluctuations evident in Australia's foreign currency trade prices the benefit of insulation is that nominal exchange rates will move to offset much of their nominal effects. In a world of nominal contracts, if not money illusion, this has the potential to mitigate the effects on real as well as nominal variables. In the 1980s a typical foreign price shock involved rises or falls in foreign currency export prices in a greater proportion than foreign currency import prices. For instance, in the case of an unexpected fall in the foreign currency prices of agricultural exports, other things being equal, the exporters concerned will have already incurred costs of production and their losses will be greater the greater the fall in the *domestic* currency prices of their products. The exchange rate will depreciate so as partially to offset foreign currency price falls, so limiting the extent of income falls. However, the depreciation obviously cannot offset the *terms of trade* decline and its effects on exporters' incomes. The events associated with the first oil price shock of the 1970s is an example of a terms of trade decline produced by the foreign currency price of imports rising more than that of exports. With a pegged rate it would be difficult to avoid this having substantial effects on the domestic price index. The insulating response is an appreciation which partially offsets the import price rise and produces falls in the prices of exportables. Because all terms of trade shocks must involve a rise or fall in some absolute foreign currency traded goods price, it is not appropriate to talk about the effects

22. Of course, other real shocks, such as shifts in saving and investment, real interest rates, or product market disequilibrium will affect them.

23. See, for example, Pitchford and Vousden (1987).

of such shocks independently of absolute price changes. In the two cases given above, the nominal exchange rate appreciates when the terms of trade deterioration is produced by an import price rise and depreciates when an export price fall is the cause.

The present section has much in common with a paper by Blundell-Wignall and Gregory (1990) which advocates exchange rate flexibility as the most appropriate method of dealing with terms of trade shocks. Their basic argument is that the real exchange rate depends on the terms of trade. Hence, real exchange rate adjustment to terms of trade shocks will be easier if the exchange rate is allowed to facilitate the required changes. For the present model it has also been shown that the two possible measures of the real exchange rate depend solely on the terms of trade (see (19) and (20) above). A reconciliation of the two approaches results when account is taken of their assumptions both that the ratio of import prices to the domestic goods price is 'the' real exchange rate and that foreign currency import prices are held constant. On the first point, their model contains two relative prices pertinent to trade issues. The second point they justify on the grounds that export prices are more volatile than import prices. Given their choice of the ratio of domestic currency import prices to non-traded goods prices as the real exchange rate, their fundamental relationship is closely analogous to (20). While their approach is basically the same as given here, it obscures two aspects of the process. Firstly, terms of trade movements arising from import price fluctuations are obviously not covered. Secondly, the absolute foreign price insulation aspects of floating exchange rate mechanisms, while implicitly part of their analysis is not accorded its appropriate significance.

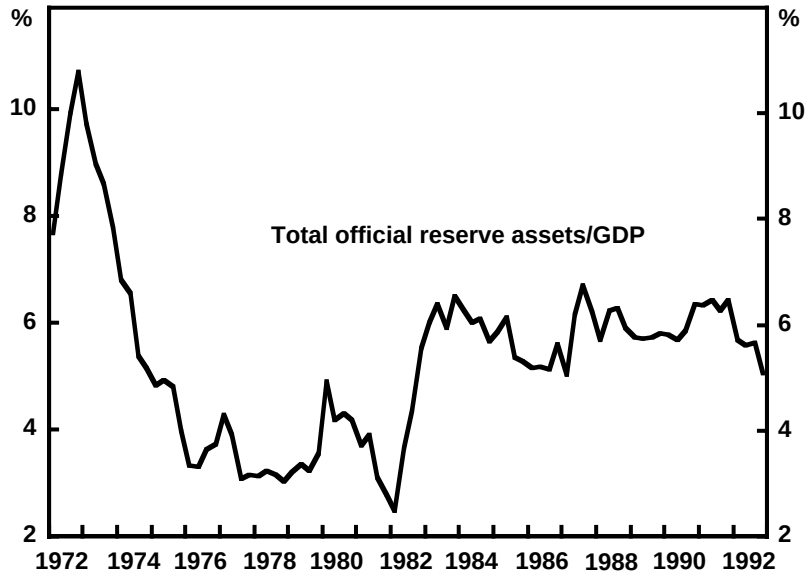
To verify the closeness of the two approaches, note that their basic relationship (20) can be rearranged to yield (19). Further, another rearrangement of (20) gives:

$$\begin{aligned} de &= -dq - (a_X + a_N\delta_X)(ds - dq) + d\psi \\ &= -(a_X + a_N\delta_X)ds - (a_M + a_N\delta_M)\, dq + d\psi \end{aligned} \tag{21}$$

which is a version of the basic relationship (12) of this section. In fact, substituting (15) into (12) yields (21), so that (21) can be seen to be a special case of (12) where the effects of terms of trade shifts on the demand for money have not been incorporated into the analysis.

The analysis so far has not taken account of interest parity. The Appendix, Part A, investigates the conditions under which insulation will apply when it is considered. It is sufficient for insulation if the foreign real interest rate is independent of the foreign inflation rate and that the foreign inflation rate is a particular weighted average of the inflation rate of the foreign currency prices of the goods Australia trades.

Figure 9: Total Official Reserve Assets
(per cent of GDP)



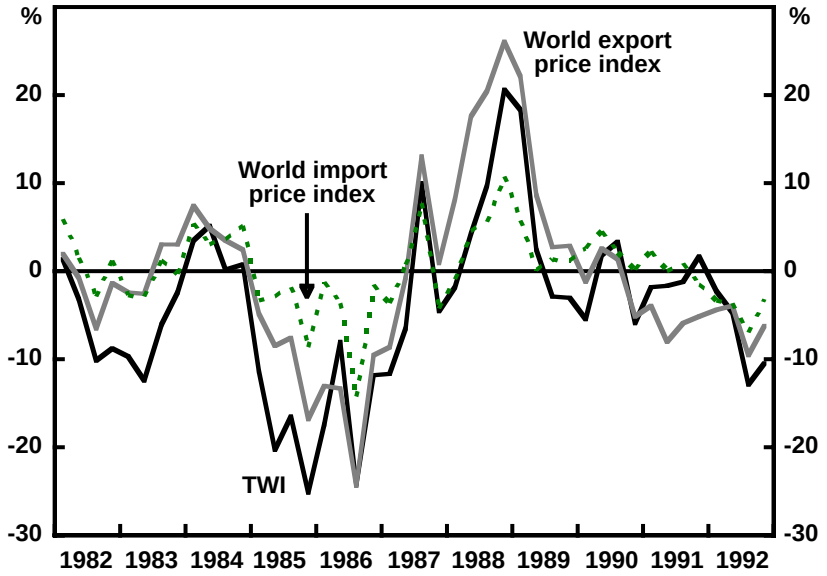
4.2 Insulation in Practice

The insulation property could not be expected to operate if the exchange rate was pegged or heavily managed.[24] There would then be a tendency to import foreign price movements. Given that countries that float often take the option of retaining foreign exchange reserves, how can a judgement be made that these reserves have been held at levels that are neutral with respect to intervention? If the option retained is that of returning to a pegged or heavily managed rate, the authorities would need to hold reserves in some reasonable ratio to imports or GDP. Figure 9 shows reserves as a percentage of GDP and the picture is similar for imports. This measure has been fairly stable since the float, certainly as compared with its behaviour in the 1970s and so does not suggest a long-term operation to affect exchange rates. However, an active policy of sterilised intervention in the foreign exchange market has been operated since the float. Its possible effects are discussed in Section 5.

Given the proposition that the float has been relatively clean, how could the insulation property be examined and tested? The record of foreign currency price

24. See Pitchford and Vousden (1987) for examples of how various forms of management interfere with insulation. Another combination of rigidities which would impede its short-run effectiveness is set out in the discussion of exchange rate policy and inflation in Section 5.

Figure 10: Rates of Change of TWI and Traded Goods Prices
(per cent per annum)



movements since the float can be examined to determine whether the direction and magnitude of exchange rate shifts have been of a sign and size appropriate for insulation.

Figure 3 shows that there were two major commodity price shocks in the 1980s. Falls occurred in foreign currency traded goods prices and the terms of trade during 1985-86 and rises during 1988-89.[25] Did anything like an insulation response (which for the first episode would be a depreciation) happen in practice? In fact, as Figure 10 shows, this was a period of substantial nominal depreciation for the TWI which fell 24 per cent in the year to September 1986. Of course, some or all of the depreciation could have been due to other factors, such as monetary expansion or falls in investment. A feature of an insulating response when the terms of trade worsen is that the export-based real exchange rate appreciates and the import-based rate depreciates (see Figures 4 and 5). In fact, the export-based index depreciated slightly, indicating that there could have been other causes of nominal depreciation.

In 1988, both the export and import price indexes measured in foreign currency rose, with the terms of trade improving. Annual rises to December 1988 were

25. Measured in foreign currency, export prices fell 23 per cent and import prices 17 per cent in the year to September 1986.

28 per cent for exports and 13 per cent for imports. The TWI appreciated by 21 per cent over the same period and the export-based real index depreciated slightly while that for imports appreciated over the same period by 13 per cent. Again these nominal and real exchange rate changes could have had some further cause. However, the money growth rate was positive and high at this time and the inflation rate was of the order of 7 per cent. For both episodes the nominal exchange rate movements were essentially consistent with their being insulation responses.

This experience contrasts with that in the 1970s when there were foreign currency trade price shocks both from the export and import side and the exchange rate was pegged or heavily managed. In all these cases Australia appeared to import significant inflation pressures. For example, following the first oil price shock the domestic currency import price index rose by 34.6 per cent and the consumption price deflator rose by 19.6 per cent over the year to March 1975. Without exchange rate flexibility, attempting to combat these direct effects on the price index by monetary restraint led to lower activity but did not prevent inflation.

It has been seen that the model tested by Blundell-Wignall and Gregory (1990) embodies the insulation property. Hence their econometric tests amount to tests of (20) and also of (21), but with the restrictions that the coefficients of ds and dq add to -1 and that of $d\psi$ is unity, already imposed. The econometric work they have done on this relation which supports their basic relationship is also a test of (12) with the above coefficient restrictions imposed. Their conclusions are generally supportive of their form of the insulation hypothesis and so the form used here. Further investigation of the insulation response is contained in Pitchford (1993) and again the results are not inconsistent with the exchange rate providing insulation from foreign price shocks.

Finally, it must be recognised that the insulation property may not work to produce the essence of the results outlined here. Inflation then, at least initially, would be imported directly through the effects of commodity price shocks and, perhaps, also indirectly through the inability to control the money supply. The problems this might raise for macroeconomic and exchange rate policy are considered in the following section.

5. Inflation and the Exchange Rate

At one extreme, if exchange rates are pegged or heavily managed it will be difficult to avoid importing foreign inflation. At the other, a floating rate has the potential to insulate the economy from foreign currency trade price movements and to provide monetary independence. In between, if the rate floats without significant intervention, but insulation is incomplete, some part of foreign price rises will be reflected in the domestic price index. In this last case, it would seem

necessary to know the nature of the failure of insulation in order to appreciate the implications for macroeconomic policy. The context of this discussion is a convenient one in which to discuss a policy approach which seems to have attracted attention, that of 'targeting' the exchange rate to produce desired inflation outcomes. It is pertinent to ask whether or not this is an effective way of combating inflation. Imported inflation is treated briefly in the first subsection, the failure of insulation in the second, exchange rate targeting in the third and the question of what might be an appropriate inflation target in an economy with a floating exchange rate in the last.

5.1 Imported Inflation

It is useful to treat imported inflation because the possibility exists that inflation will have some of the features of a fixed rate regime if insulation does not work. Consider an equilibrium in a pegged rate system in which the real interest rate is constant and foreign currency export and import prices are rising at a common and constant rate. If there is truly equilibrium, other nominal magnitudes (in particular the money supply, non-traded goods prices and hence an index of consumer prices) will all be rising at the same rate.[26] From the system of Section 4, equilibrium is definable for constant values of i^* and s-q. Where $\cdot$ denotes the derivative with respect to time, it follows that:

$$\dot{\psi} = \dot{s} = \dot{q}, \text{ for } \dot{e} = 0 \tag{22}$$

That is, it will not be possible to achieve a lower inflation rate than that of external prices without creating disequilibrium.

As has been noted, the data show that steady rates of increase of traded goods prices are not common. Rather, price surges lasting two to three years have been the rule. Equilibrium of the kind referred to above would occur, at most, only briefly. However, the discussion still suggests that fixed rate regimes will have little chance of achieving independent inflation outcomes except by policies that must imply disequilibrium.

Suppose a Phillips curve equation for non-traded goods prices of the form:

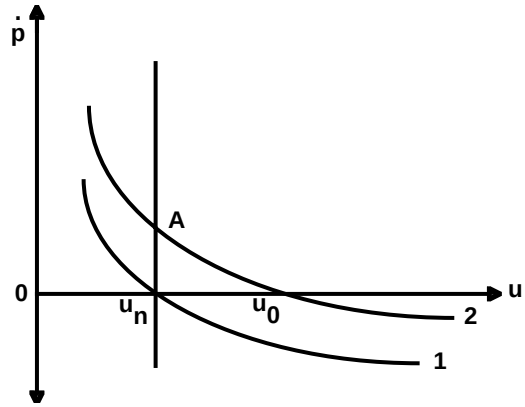
$$\dot{p} = E[\dot{\psi}] + f(u) \tag{23}$$

where $E[\dot{\psi}]$ is the expected inflation rate and u the unemployment rate. Using the definition of the price index given in (10) and assuming perfect foresight:

$$\dot{p} = (a_X\dot{s} + a_M\dot{q})/(1 - a_N) + f(u)/(1 - a_N) \tag{24}$$

26. In the classic case, the domestic money supply will not be controllable by the monetary authorities and will be growing at the same rate as foreign inflation.

Figure 11: Phillips Curve



In Figure 11 inflation is given by curve 1 for the case of zero foreign inflation. If foreign inflation occurs, foreign currency price rises shift the Phillips curve upward to curve 2. Equilibrium is now at point A. Zero inflation for non-traded goods prices can be achieved by raising unemployment from u_n to u_0. For the price index to be stable, non-traded goods prices would have to fall to offset the effect of rising traded goods prices, so that a still higher unemployment rate than u_0 would be necessary. By contrast, it was shown in Section 4 that, with a flexible rate, foreign inflation or deflation will not impinge on the domestic economy if insulation works. In this case, curve 1 applies for the flexible rate system.

5.2 If Insulation Fails

Although the behaviour of the Australian economy since the float suggests that monetary and inflationary outcomes have been largely independent of foreign influences, it could be that this proposition may be proven false in the future. If the exchange rate floats, but insulation does not work, some or all of average foreign currency trade price changes are liable to be imported into domestic prices. Unlike in the case of pegged rates, appreciation is possible, but is not sufficient to offset foreign inflation. However, the possibility exists that monetary policy could induce the *further* appreciation needed to prevent foreign currency price rises being imported. Notice also that the conditions for monetary independence may not be met if the exchange rate mechanism does not work in an insulating way, in which case foreign monetary shocks, probably related to the price changes, will also be imported. This situation is likely to arise out of systematic exchange market intervention.

One set of conditions that would inhibit a short-run insulation response are set out in Pitchford (1985). They are that exchange rate expectations are static, the

price of non-traded goods moves sluggishly to clear the non-traded goods market and foreign and domestic bonds are imperfect substitutes. Assume the current account balance is initially zero. A once-and-for-all rise in the absolute foreign currency price of traded goods elicits no immediate exchange rate response so is fully imported. This leads to a relative price rise, so creating excess demand for non-traded goods and a rise in net exports. The price of non-traded goods will begin to rise. To this point the behaviour of the economy is similar to the case of pegged rates, but here the exchange rate is flexible. The rise in the relative price of traded goods, being a depreciation of the real exchange rate, produces a surplus on the current account. This eventually causes the exchange rate to appreciate.[27] The absolute and relative price of traded goods starts to fall and the system moves back toward the initial equilibrium levels of real *and* nominal variables. In the long run, unless there is money illusion, insulation works. However, this is not the end of the story, because as the price of non-traded goods has initially been pushed upward by excess demand, it must now be brought down by excess supply to get back to equilibrium. Hence, the lack of short-run insulation leads to phases of domestic disequilibrium.

Rather than static exchange rate expectations, various types of forming expectations, such as adaptive expectations, give partial insulation to the extent that they track exchange rate movements though with a systematic bias.[28] Partial insulation responses could then lead to less extreme forms of the processes outlined above. In the class of models considered here rational expectations is a necessary but not sufficient condition for complete insulation. The problem will be made more difficult if the non-traded goods price does not adjust rapidly to clear this market.

In terms of the direct effects through the price index, foreign price shocks are potentially inflationary if a weighted sum of foreign currency price movements is positive. To see this rearrange the expression (12) in the form:

$$d\psi = de + \alpha ds + (1 - \alpha)dq, \quad \alpha = a_X + a_N\delta_X \tag{25}$$

For simplicity, take the case where monetary expansion in excess of that needed to compensate for terms of trade changes is zero. There will be inflationary or (deflationary) pressure on the price index from traded goods prices as:

$$\alpha ds + (1 - \alpha)dq >(<)0 \tag{26}$$

27. The asset side of the model is a portfolio balance system. The nominal exchange rate appreciates to adjust the domestic currency value of foreign currency bonds to the increased supply caused by the current account surplus.

28. See Floyd (1978) and Van Duyne (1980) for examples of this.

If the insulation property does not operate fully:

$$-de < \alpha ds + (1-\alpha)dq \text{ for } \alpha ds + (1-\alpha)dq > 0, \text{ and}$$

$$de < -\alpha ds - (1-\alpha)dq \text{ for } \alpha ds + (1-\alpha)dq < 0 \quad (27)$$

Given all the above assumptions (25) can be written as:

$$\begin{aligned} d\psi &= \alpha(ds+de)+(1-\alpha)(dq+de) = dq+de+\alpha(ds-dq) \\ &= ds+de-(1-\alpha)(ds-dq) \end{aligned} \quad (28)$$

where de is an exchange rate response that does not give complete insulation. Consider two cases of the several that can be constructed of exogenous price shifts. If a fall in the terms of trade involves falling export prices and constant import prices (in foreign currency terms), that is, $ds < 0$, $dq = 0$ and insulation is incomplete, there will be a *deflationary* effect on the price index. Notice that this is separate from the deflationary effect of the fall in the terms of trade on real income and hence aggregate demand. Symmetrically, a terms of trade improvement of the form $ds > 0$ and $dq = 0$ will be inflationary.

It is sometimes argued that exportables will feature only to a minor extent in the Australian consumer price index. Moreover, it is suggested that in this case, the terms of trade decline will be inflationary because the depreciation induced by the terms of trade decline will raise the index because it will raise the import component. To investigate this, take the extreme case in which $\alpha = 0$, though this implies also that substitutability between non-traded goods and importables is zero. Equation (25) then becomes:

$$d\psi = de + dq \quad (29)$$

With no change in the import price index there will be no depreciation. The terms of trade fall does not affect the nominal price index and this is reasonable because $\alpha = 0$ ensures that exportables do not figure in domestic consumption and are not close substitutes for domestic goods. For the same reasons the real exchange rate defined in this case as the reciprocal of the relative price of home goods to imports is not affected. The terms of trade decline will still reduce real income because income from exports is reduced, but absolute and relative prices are unaffected and the insulation mechanism is not called into operation. If α is small, these results will imply that nominal depreciation and absolute and relative price effects will be small, and with incomplete insulation the effect is still a price fall.

To complete the catalogue of simple cases, note that a terms of trade decline produced solely by a rise in foreign currency import prices will be inflationary when insulation is partial, despite the appreciation of the exchange rate. In the

same circumstances, an improvement in the terms of trade caused by a fall in import prices will be deflationary as the exchange rate will not depreciate sufficiently to offset the effects of the import price falls.

What are the options for policy when insulation is incomplete? Because the exchange rate is market determined, the extreme results of the fixed rate case do not hold. Nevertheless, failure of insulation means that foreign nominal price changes will cause real disequilibrium, which, while transitory, may persist for a significant period. There are no simple policy choices. Monetary restraint could be used to produce an appreciation which offsets the effect of the rise in the domestic currency value of traded goods prices. However, in the sort of world where insulation is incomplete, this raises domestic interest rates and reduces real expenditure on both traded and non-traded goods. This effect would have to be offset by some form of expansionary policy to have a chance of leaving the real economy largely unaffected by the process.[29] Monetary restraint is not enough by itself. The other pole involves importing inflation to the extent that insulation fails and using an expansionary monetary policy to avoid the development of excess supply in the non-traded goods market.

5.3 Targeting the Exchange Rate to Inflation

Other things being equal, a depreciating exchange rate will put upward pressure on the prices of traded goods used domestically and on the general price index, while an appreciating rate will produce downward pressure. Therefore, it is tempting for governments seeking low inflation to use monetary policy to resist depreciation and, indeed, to encourage appreciation in the interest of an inflation target. Enough has been said above to suggest that, in a floating rate system, exchange rate depreciation has purposes that only sometimes reflect inflationary pressures. If one considers the factors that can cause depreciation it can be seen that offsetting monetary policy may well give rise to undesirable consequences and may not be the best way to manage inflation. Some of the major factors likely to cause depreciation are:

- the insulating exchange rate response to foreign currency trade price falls;
- exogenous reductions in the demand for exports or increases in the demand for imports;
- a financial capital outflow in response to higher world interest rates;
- a process of adjustment toward a lower current account deficit;
- exogenous increases in private saving or falls in investment;

29. An example of this is given in Pitchford (1985). Knowledge of the structure of the economy and of the reasons for the failure of insulation would need to be considerable.

- reduced government expenditure or increased taxes; and
- domestic monetary expansion.[30]

Consider just a few of these to illustrate what might happen as a result of a blanket resistance to devaluation. When foreign currency traded goods prices fall, if insulation works, the exchange rate response will moderate the degree of price fall for the traded goods sector. If the terms of trade also fall, depreciation reduces the impact of the consequent decline in real income on demand. Targeting the exchange rate when it wants to depreciate, in these circumstances, deprives the economy of this cushioning influence of floating rates. It is most unlikely that this source of depreciation can readily be sorted out from other sources. Reliable information on export and import price movements is available with a lag of over two months and perhaps twice that time might be needed to guess at the direction of any trend.

On the other hand, if depreciation is due to a rise in saving, there will be pressure on the real exchange rate to devalue and on output to fall. Suppose the economy is in an expansionary phase of the trade cycle so that this reduction in real demand need not be an adverse occurrence. Depreciation of the real exchange rate can take place through a depreciation of the nominal exchange rate and/or a fall in home goods prices. Holding the nominal exchange rate fixed would imply that home goods prices should fall. Monetary policy would be required to turn the boom into a recession.

For an economy pursuing an inflation target, there are two cases in which a decision to resist depreciation may be valid. One is where the source of depreciation is a domestic monetary expansion and the other is where insulation fails. In the monetary policy case, it is the monetary expansion which is the cause of the problem and the depreciation is incidental. The inflation target might have been raised or the monetary stance might have been aimed at generating recovery from a recession. Perhaps the monetary expansion was a mistake. In any case, it is monetary conditions which should be examined and changed if necessary. Without detailed knowledge of the source of any shocks and the structure of the economy, the only way to avoid confusing these issues is to target inflation directly. Targeting it through the nominal exchange rate may then deprive the economy of the insulating effects of depreciation and may well complicate or prevent other adjustment processes.

So if the exchange rate floats and insulation works, there is no need, in principle, to achieve desired inflation outcomes through the exchange rate. Domestic

30. The elements of the list are not necessarily comprehensive or mutually exclusive.

monetary conditions and price movements would be the variables to watch and respond to. Exchange rates may be thought to have a role in this process in that, unlike prices which can only be observed with a lag, they are immediately observable. However, as the above discussion makes clear, inflationary conditions are only one of the many factors which may be moving them. Further, like prices, these other factors are also usually observable only with a lag. There would seem to be considerable room for error in this procedure.

On the other hand, if price insulation does not work, foreign price movements, and the exchange rate would need to be monitored. Consider the case of a terms of trade deterioration due to a fall in foreign currency export prices, where foreign currency import prices remain the same. As shown in Section 5.2 incomplete insulation results in *downward* pressure on the domestic price index. Depreciation in this case is not inflationary. For this to occur the insulation response would have to work to an excessive degree! By contrast, a terms of trade improvement coming solely from export prices may appreciate the exchange rate somewhat, but still implies additional inflation. Thus, it would then be even harder than if insulation worked fully to know how to interpret the inflationary significance of exchange rate movements. As noted in the previous section, policy would either have to accommodate this or to attempt to induce further appreciation while offsetting any contractionary effect from this policy on aggregate demand.

The recent New Zealand experience is of considerable interest because it embodies a particular method of using the exchange rate to reach an inflation target. The Reserve Bank of New Zealand (RBNZ) has been empowered to concentrate almost exclusively on achieving an inflation outcome in the chosen range of 0 to 2 per cent. It has elected to reach this goal by using monetary policy to affect the nominal exchange rate. The mechanism is described in Grimes and Wong (1992). Omitting some of the details, the equilibrium level of the CPI is supposed to be given by:

$$CPI_t^e = g(TWI_t, P^*_{X_t}, P^*_{M_t}, R_t, W_t) \tag{30}$$

where R is labour productivity, * refers to measurement in foreign currency and other symbols have obvious meanings or have been defined previously. Deviations in the right-hand side variables will give rise to deviations in the CPI from equilibrium. Specifically:

$$\Delta CPI_t = g(\Delta TWI_t, \Delta P^*_{X_t}, \Delta P^*_{M_t}, \Delta R_t, \Delta W_t, CPI_{t-1} - CPI^e_{t-1}) \tag{31}$$

Here CPI^e is the equilibrium value of the CPI. Forecasts of the right-hand side variables generate forecasts of the inflation rate. Notice that terms of trade movements are implicitly incorporated in (31). The implementation of the

inflation policy is, in the authors' words, such that:

> Given these forecasts, a range for the exchange rate can be derived that is consistent with the maintenance of 0-2% inflation ... Monetary policy is generally implemented with the desire to keep the exchange rate consistent with the conditional range [Grimes and Wong 1992, p. 5].

The first thing that should be noticed about this approach is that it implies a belief that insulation does not work, for if insulation works the procedure is not necessary. To see this, notice that in the context of the model of Section 4, it is possible to formulate an equation based on floating rates with an almost identical form to (31), that is:

$$d\psi = (a_X + a_M)de + a_X ds + a_M dq + a_N dp \tag{32}$$

In (32) the *dp* term (change in non-traded goods prices) replaces the wage and productivity variables of (31). Ignoring the possible relationship between the exchange rate and foreign currency trade prices, it might be possible to find plausible values of the coefficients of (32). However, this overlooks the relationship between exchange rates and foreign trade price movements. Suppose there is a rise in the foreign currency price of exports. If insulation were to operate, the appropriate price index equation would not be (32) but:

$$d\psi = -\beta(ds - dq) + dm = dm^* \tag{33}$$

where dm^* is the change in the money supply excluding monetary accommodation to terms of trade shocks. If insulation did work, monetary policy designed to appreciate the exchange rate ($dm < 0$) would then be in addition to the automatic appreciation response and would add an unnecessary degree of deflation to the system. Add a term $d\varepsilon$ to (33) to account for all the other factors held constant by the theory, so that:

$$d\psi = dm^* + d\varepsilon \tag{34}$$

Monetary policy would then involve operating to offset these other shocks. This process would not need to take exchange rates or foreign currency prices into account. The terms of trade would enter through its real income and hence demand effects and is one of the sources of disturbance in $d\varepsilon$. This appears quite different to the New Zealand approach.

Hence it may be that their system is based on the belief that insulation is incomplete in which case (25) applies and is also analogous to (31). Writing this with a disturbance term it is:

$$d\psi = de + \alpha ds + (1 - \alpha)dq + d\varepsilon \tag{35}$$

where the exchange rate change is insufficient for insulation. Given the inflation target, one function of monetary policy would then be to ensure a sufficient

exchange rate response to provide offsetting appreciation when foreign currency prices rise.[31] There would also need to be a way of counteracting the effects of this monetary restraint on interest rates and aggregate demand. The RBNZ has no mandate to do this and, in any case, may not have the instruments.

Compensating for an incomplete insulation response would probably be only a minor part of the anti-inflationary operations of the Bank. The main task would be likely to be offsetting the impact on the index of the many disturbances which are lumped into $d\varepsilon$. To do this, monetary policy would be used to achieve the appropriate change in e and so achieve an inflation target. But there may well be more to the process. Using (36), monetary constraint should affect both the exchange rate and the price of home goods, the former effect reducing the rise in traded goods prices and the latter the rise in non-traded goods prices. Formally, for $dq = ds = 0$:

$$d\psi = (a_X + a_M)de + a_N dp = dm^* \quad \text{as} \quad de = dp = dm^* \tag{36}$$

However, if non-traded goods prices adjust with a lag, exchange rate appreciation and monetary restraint will need to be greater than that shown in (36) to achieve the required inflation target. This has the potential to cause a decline in aggregate demand and output. As noted, this is not a responsibility of the RBNZ.

To illustrate this, suppose there is a rise in private saving which is not observed by the authorities. This is not entirely unrealistic because saving is notoriously difficult to measure and there is a substantial lag in the availability of the national income data on which it is based. This shift will depreciate the real exchange rate so there also may well be pressure on the nominal exchange rate to depreciate. A monetary response to prevent this from affecting traded goods prices would add to the contractionary effect of the fall in aggregate demand which the increased saving implies.

The philosophy of the New Zealand approach suggests that the Bank's response would be that these real consequences will be taken care of by flexibility in the system. Such a view is consistent with the adoption of an almost exclusive inflation target in the first place. If this is so, it is somewhat surprising that at certain points, their method of inflation control appears to involve a lack of faith in price flexibility and market clearing. Thus, if the system was fully flexible, insulation could be expected to be complete. The relevant formula would not be (31), but (34), the latter excluding exchange rate targeting and foreign currency price effects. If, as suggested above, that lack of flexibility of domestic goods prices is

31. When foreign currency traded goods prices fall it would be necessary to produce the additional depreciation to provide complete insulation. The possibility exists that (partially) insulating depreciation could be mistaken for an inflationary effect and resisted by monetary constraint.

a reason for targeting the exchange rate, this also implies reservations about how well the real economy would cope with the consequences of anti-inflationary monetary policy.

It is likely that the very narrowness of the target band for inflation forces the RBNZ to manipulate the exchange rate to achieve outcomes in the band. If a variety of sometimes large real and monetary shocks impinge on the system, large changes in the exchange rate can be engineered to achieve the target, while the alternative of setting interest rates or monetary magnitudes with a direct inflation outcome in mind is less likely to achieve a tightly specified inflation outcome. The potential costs in such an exchange rate targeting approach is that real magnitudes may have to vary in the course of achieving the nominal target, unless there is considerable flexibility in the system. This is illustrated in a recent episode. In the second half of 1992, the New Zealand 90-day bill rate averaged 6.25 per cent. Through November and December, the TWI fell towards 53, a level that the markets inferred was the Bank's 'lower limit', in the existing circumstances, for achieving the targeted inflation zone. However, in order to offset the tendency for the TWI to depreciate below 53 it was found necessary to cause the 90-day bill rate to rise to almost 8 per cent and then to 9.5 per cent. Subsequently, the bill rate fell to the 7.5 to 7.25 per cent range. Under its present Act, the level of economic activity is not a primary concern of the RBNZ. Nevertheless, this increase in the real rate could hardly be regarded as desirable for an economy in the early stage of recovery from a long recession. The necessity to hold interest rates, for some time, at higher than previous levels to preserve a given nominal exchange rate, suggests that some form of change in the fundamental determinants of exchange rates occurred. It is this type of pressure, difficult to forecast or even appraise except with hindsight, which has frequently forced devaluation in pegged rate systems.

To summarise, exchange rate targeting to achieve particular outcomes would not seem necessary if insulation is complete. If it is not, targeting the exchange rate appears to provide a practical approach to achieving inflation targets. However, it involves the danger that depreciation may sometimes be resisted when it is a necessary adjustment for the economy. Also, it may well require real variables to alter so as to reach the inflation target. Of course, it shares this feature with other approaches to achieving tightly specified inflation targets, such as (34). But it involves the additional difficulty that inflationary and non-inflationary exchange rate depreciation have to be distinguished if policy responses are to avoid introducing further undesirable real effects. Fortunately Australia's experience with floating rates to date appears to suggest that foreign price insulation works.

5.4 The Form of the Target

The final question has to do with the form of the inflation or other target in an open economy with a floating rate subject to terms of trade shocks. Here it will be assumed that insulation works. Firstly, using the model of Section 4, the relationship between the inflation rate measured by changes in the index ψ, foreign currency price movements, the non-traded goods inflation rate and the terms of trade movements is given by:

$$\dot{\psi} = (a_X\delta_M - a_M\delta_X)(\dot{s} - \dot{q}) + \dot{p} \tag{37}$$

where δ_M, δ_X are the price elasticities of excess demand for imports and exports respectively, they sum to unity and are positive if goods are gross substitutes. Note that the coefficient in the first set of brackets in (37) is indeterminate in sign. To see the reason for this, suppose there is a rise in the foreign currency price of exports. The exchange rate will produce an insulating appreciation, partly offsetting the rise in export prices, so that in domestic currency terms, these prices still rise. As foreign currency import prices have not changed, the domestic currency prices of importables will fall. Hence, for a given $\dot{p}$, the price index may change in either direction. The usual way of specifying the target is in terms of the price index of consumption, in which case it might take the form $\dot{\psi} = 0$. It follows from (37) that the price of non-traded goods must then move whenever there are changes in the terms of trade to offset that part of foreign currency price changes against which it is impossible for a floating rate system to insulate. To get a feeling for the magnitude of these effects suppose there is a 10 per cent fall in the terms of trade and that each of the elasticities are equal to 0.5. If for example, $a_X - a_M = -0.2$, then to keep the index constant, non-traded goods prices would need to fall by 1 per cent. While these numbers might seem small, every so often, fluctuations in the terms of trade are quite large. For instance, the annual rate of change of the terms of trade to the March quarter 1973 was 26 per cent and to March 1989 was 16.3 per cent. Offsetting the effects of terms of trade movements would require periodic disequilibrium in the non-traded goods sector to affect the appropriate price adjustments.

The alternative is to regard the inflation rate of non-traded goods prices as the target. There would then be fluctuations in the consumption goods inflation rate produced by the terms of trade and these would have their source in exchange rate movements. It would be necessary then for monetary policy to accommodate terms of trade fluctuations to the extent required to prevent the price of non-traded goods from changing. This would have the advantage that it would be consistent with maintaining real equilibrium in that market. Particularly when inflationary

expectations are low, a real target of this form which included the inflation target, might seem preferable to following a policy which required periodic disequilibrium.[32] On the other hand, there would then be periodic shifts in the general price index. The non-traded goods price will not be straightforward to identify in practice so that the price target might have to be the price index. In that case, the potential for disequilibrating effects in the non-traded goods market needs to be recognised.

Finally, the main merit in an approach which seeks to establish and maintain equilibrium in the non-traded goods market is that it has value for both the case where insulation works and where it is likely to be partial. As can be seen from Sections 4 and 5, equilibrium in this market means that relative prices involving non-traded goods are relatively stable and this is an important condition for insulation. However, if insulation is incomplete, the choice is between attempting to achieve low inflation or importing foreign price shocks and establishing real equilibrium. A policy which aims at equilibrium in the non-traded goods market can encompass reasonable outcomes both for the case in which insulation works and in which it does not.

6. Macroeconomic Policy and the Float

Three major macroeconomic policy issues pertaining to the exchange rate since the float, and not treated elsewhere, are the subject of this section. They are:

- policy with respect to the substantial depreciations of 1985 and 1986;
- the current account and the exchange rate; and
- the policy of sterilised intervention in the foreign exchange markets.

Before considering these issues in detail it is useful to examine the settings of fiscal and monetary instruments in the 1980s. Table 1 records data for the federal budget balance, corrected for inflation, and the average real 90-day bill rate.[33] An estimate of the stance of fiscal and monetary policy is made from these data for each period.

With the economy in recession in 1982/83, the early years in the table show both instruments at expansionary settings. With the recovery, this changed towards a contractionary stance of monetary policy. However, both because of the 1986/87 slowdown and the October 1987 stock market crash, the monetary stance was eased in 1987/88. The tighter fiscal stance in the latter part of the decade was directed at reducing the current account deficit. Monetary policy was tightened

32. Domestic goods market equilibrium would presumably help the maintenance of low inflation expectations because of the absence of excess demand in the labour and product markets.

33. The inflation corrected budget deficit estimates come from Makin (1990).

substantially in 1988/89 and 1989/90. Accompanying these policies for much of the 1980s, wages policy was aimed at limiting rises in real wages and, as discussed later, at facilitating the effects of depreciation.

Fiscal expansion is likely to appreciate the nominal and real exchange rates, and monetary expansion is likely to depreciate it. The effect of both together on exchange rates is then ambiguous in general. However, fiscal contraction and monetary expansion are both thought to work towards producing real depreciation. This policy mix could, in theory, be used to effect a real depreciation in an attempt to reduce a current account deficit and, if the combination were right, the level of output could remain unchanged.[34] Krugman (1991) points out that this approach was suggested by Johnson (1958) as a way of engineering a real depreciation. Table 1 shows that the only time it was tried in Australia was (inadvertently) in 1987/88. Whether the 'policy' worked is discussed in Section 6.2.

Table 1: Fiscal and Monetary Settings

	Real Fiscal Balance (% of GDP)	Fiscal Stance	Real Interest (% p.a.)	Monetary Stance	Investment Growth (% p.a.)	Trade Balance (% of GDP)
1982/83	-1.8	+	3.2	+	-11.1	-2.0
1983/84	-3.1	+	4.5	+	2.8	-1.4
1984/85	-2.5	+	7.4	-	9.2	-2.0
1985/86	-1.2	.	8.5	-	4.1	-3.2
1986/87	1.2	-	7.1	.	-1.4	-1.7
1987/88	3.2	-	4.6	+	5.5	-0.6
1988/89	3.2	-	8.7	-	11.7	-2.0
1989/90	3.9	-	10.4	-	-0.7	-2.0
1990/91			7.0	.	-9.4	-0.1
1991/92			6.0	+	-8.1	0.3

Of course, the real exchange rate will come under a variety of influences apart from policy changes. For instance, rises in investment are usually associated with cyclical upswings and falls with downswings. The growth rate of total (public and private) real investment is shown in the second last column of Table 1. Substantial falls in investment in the recession of 1982-83 were followed by rapid growth. The

34. This assumes wage adjustment that allows output effects from monetary policy, which seems valid for this period, given the operation of the Accord.

1986 recession is evident from the fall in investment at that time and again this was followed by rapid growth. It does not seem reasonable to ascribe all these changes to macroeconomic policies. Increased investment, unrelated to the stance of monetary policy, could be expected to increase real output and appreciate the real exchange rate.

6.1 Depreciation in 1985-86

While there can be many causes of nominal and real exchange rate depreciation, it is fair to say that the topic is often examined as if it can be analysed independently of its causes and of the other economic circumstances of the time. Between December 1984 and December 1986 the TWI fell by about one-third. Figure 10 shows a significant real depreciation for some, but not all, measures of the real exchange rate. A variety of interpretations were placed on this substantial nominal depreciation. One was that markets were testing the 'viability' of the fairly recent decision to float and another was that the desired depreciation would adjust the current account deficit to a lower level. The 1986 RBA *Annual Report* stated, with appropriate qualifications about timing, J curve effects and the need for other policies to reduce expenditure, that:

> The exchange rate depreciation during 1985 seemed large enough to promise a major diversion of spending from imports to domestically-produced goods; it was also expected to stimulate exports [p. 6].

It was argued in Section 4 that the nominal depreciation appeared to be a response to the falling foreign currency export and import prices and the terms of trade deterioration of the period. In that case, real depreciation would be limited and the effect on the trade balance would be minimal.[35] Recalling the formula for these real exchange rate changes ((19) and (20)), the real export-based exchange rate should *appreciate* and that for imports should *depreciate* when foreign currency trade prices fall with export prices falling more than import prices. Figure 10 shows that the export-based index hardly depreciated at all, while the import-based index showed more substantial and sustained depreciation. This suggests that there may well have been both a real depreciation and an insulation response in the exchange rate adjustment. The expectation that the depreciation would assist the trade balance may not have been entirely misplaced.

The trade deficit (goods and services balance) did fall through 1986-87 (Figure 12 and Table 1). Although this probably had much to do with the slowdown of investment and output induced by the high real interest rates of the

35. In the context of trade balance adjustment, using the models of Section 4, 'real depreciation' means a change in relative prices which would reduce the trade balance. It can be shown that a linear combination of the export and import-based real exchange rates must depreciate for the trade surplus to rise.

time (Figure 7), it is possible that some portion of the nominal depreciation could have been part of a process of current account adjustment. However, just as it was shown in Section 5.3 to be incorrect to assume that any depreciation is inflationary, it is also inappropriate to suppose that all nominal depreciations have the potential to raise net exports. For that reason, the widespread expectation that the 1985-86 devaluations would do this should have been backed up by analysis both to determine its causes and to ascertain if these causes were compatible with a reduction in the current account deficit.

The other interesting feature of the episode was the wages policy that accompanied the devaluation. The authorities argued at the time that the price effects of the devaluation should not be allowed to flow through to money wages and this principle was accepted and put into practice by the wage-fixing authorities. Why might such a policy have been advocated? As has just been noted, it is not possible to discuss this issue adequately without making some proposition about the cause of depreciation. While investment grew strongly in the calendar year 1985 it fell in 1986 so that one cause of the depreciation in 1986 may have been the fall in investment. Assume that this was the case and also make the most extreme assumption that wages were fully indexed. Using the model of Section 2 and the further assumption of fully indexed wages, the effect of a fall in investment is shown in the Appendix, Part B, to be a depreciation of the real exchange rate and a fall in output, so that the trade deficit falls. In a system with at least two goods, fixing the real wage in terms of a price index does not fix real wages costs in terms of the home good. Variations in the relative price of the home good allow variations in real wages costs and hence output and the trade balance. However, an argument for less than full indexation could be made on the grounds that it would help offset the fall in real output induced by the fall in investment.

Further, by itself, a reduction in real wages is shown in the Appendix to depreciate the real exchange rate and increase output, but nevertheless reduce the trade deficit. Given the persistently high rate of unemployment in the 1980s, it follows that the attempt to induce a fall in real wages could be justified independently of any trade balance effects, but it must also be observed that real wage restraint must have helped to increase the intensity of the subsequent boom of the 1980s. The proposition that knowledge of the causes of depreciation is needed before any conclusions can be drawn about its effects or the need for policy is again confirmed. Finally, although wage restraint is one method of reducing a trade deficit, it is surely preferable to relate wages policy to conditions in the labour market.[36]

36. While it is not appropriate to discuss this here, it would be inappropriate to overlook the need for greater flexibility in Australia's labour markets.

None of this denies the proposition that exchange rate flexibility can help to counter real wage inflexibility. However, it is not just real *wage* flexibility that floating rates can compensate for in a world of nominal contracts and sunk costs.

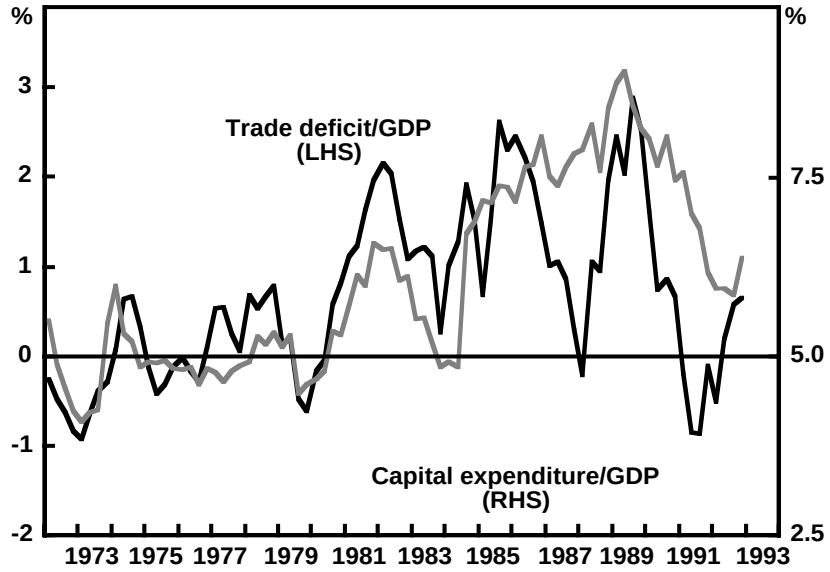
Another aspect of wages policy is the question of the relationship between real wages and the terms of trade. It is customary to claim that a terms of trade fall should result in a fall in real wages. The prices of exportable goods fall and prices of importable goods rise relative to an average of other prices. Aggregate real income must fall, so a presumption is often made that as wages are a large share of GDP, the real wage will fall. However, such a presumption may be unfounded. Equilibrium real wage movements will depend on the factor intensities in the various sectors and cases can be constructed where wages would rise. Suppose exportables are heavy users of resources, but use little labour and the import competing sector is labour intensive. The exportables sector will release only small quantities of labour, while the importables sector must bid labour from the non-traded goods sector. In these circumstances, the outcome could be only a small real wage fall, or even a rise. Further, if real wages fall with a deterioration in the terms of trade they should rise with an improvement. If it is to be based on the underlying fundamentals of the labour market, wages policy should be implemented for both rises and falls in the terms of trade.

The lesson for policy is that there are many reasons for nominal depreciation in a floating exchange rate system. Unless the cause is known, it cannot be inferred that nominal currency depreciation will inevitably lead to real depreciation, nor can the real and nominal effects of the depreciation or the need for ancillary wage policy be properly understood. So far, this discussion has largely disregarded the effect of the depreciation on the current account deficit. This is the topic of the next section.

6.2 The Exchange Rate and the Current Account

Australia's current account deficit averaged 4.5 per cent of GDP in the 1980s. Because this ratio had traditionally been of the order of 2 to 3 per cent, the increase which started at the end of the 1970s stimulated interest both in the causes of this change and in the possibility of either its automatic or policy-induced reversal. Indeed, these questions became a major policy preoccupation of the 1980s. It is by no means clear that it was in the best interests of the economy for the deficit to be reduced. Nevertheless, because of the policy interest in this eventuality at the time, it is worth documenting the exchange rate aspects of policies which were followed. It is preferable to concentrate on movements in the trade balance (goods and services balance, Figure 12, Table 1) as the net income item in the current account is to a large extent historically determined and need not respond in any simple way to changes in exchange rates. The discussion here will

Figure 12: Goods and Services Deficit and New Capital Expenditure
(per cent of GDP)



focus on an attempt to understand the role of the real exchange rate in any process associated with movements in either the trade deficit or policy in relation to it.

The proximate causes of the trade deficit are real exchange rates, domestic and foreign income and, at one remove on the other side of the income-expenditure identity, the determinants of investment, saving and the fiscal deficit. One salient aspect of the behaviour of the Australian trade balance is that it appears to track the fluctuations in GDP, though with a lag. The recessions of 1982-83, 1986 and 1990-92 all have their counterparts in low or negative values of the trade deficit. In turn, the GDP fluctuations are similarly related to investment, interest rates and foreign real activity. The other interesting feature of the performance of the trade balance is its increase at the start of the 1980s and its recent move to lower levels.

As suggested above, it would seem that fluctuations in investment have had much to do with movements in the trade balance. Investment is notoriously more volatile over the economic cycle than other elements of GDP. Figure 12 illustrates total new capital expenditure and the goods and services deficit, both as a percentage of GDP. There is a reasonably close relationship between the two series until late 1986 when the goods and services deficit fell sharply and the new capital expenditure ratio continued to increase. The divergence of the two series from this time can be explained by the reduction in the fiscal deficit which was then occurring. It is interesting that the upward shift of the trade deficit at the start of the 1980s coincides with the investment boom of that time. These data suggest that

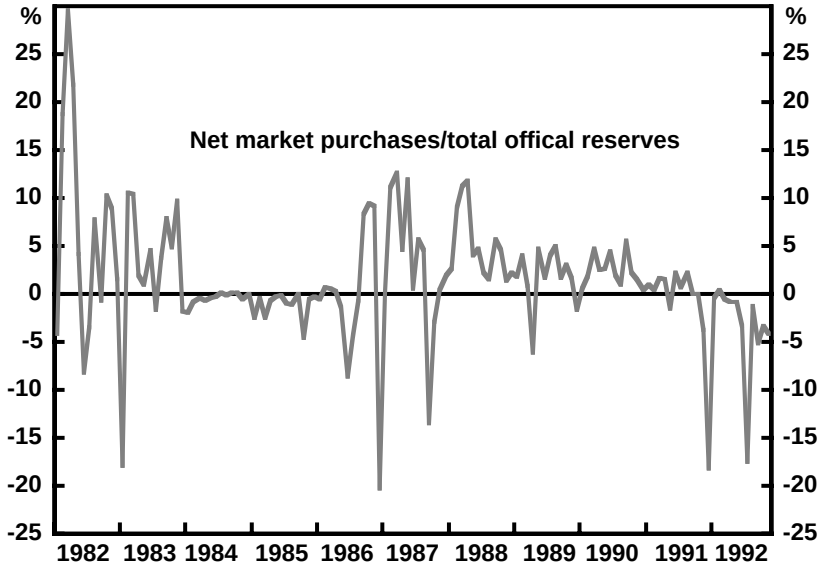
much of the movement in the trade balance and also the current account has been due to changes in investment. They also support the proposition that the reduction in the fiscal deficit in the second half of the 1980s initially contributed to a fall in the trade deficit, but that this effect was offset in 1988-89 by a further surge in investment.

Various macroeconomic policies in the 1980s were directed at reducing the current account deficit and the trade deficit. In particular, the high interest rates of 1985-86 and 1988-89, in part, were designed for this purpose as was the move to fiscal surpluses in 1986/87. There has been some discussion over whether tighter monetary policy, because it tends to appreciate nominal and real exchange rates, would have the effect of reducing the trade deficit. The outcome would seem ambiguous, because while appreciation increases the deficit, real income is adversely affected, thereby reducing the deficit. Some have argued that the appreciation effect will dominate, so that the deficit should rise. However, in practice, the trade deficit has *fallen* after periods of tight monetary policy, the fall in activity appearing to be the main factor involved. Tighter fiscal policy should depreciate the real exchange rate and reduce the trade deficit. It would appear from the data behind Figure 12 and Table 1 that this effect was masked by the rise in investment in the 1988-90 period.

Krugman (1991) has recently argued that the United States' current account deficit in the 1980s responded with a lag to real exchange rate movements, increasing when the rate appreciated in the first part of the 1980s and later falling after it had depreciated. The combination of tighter fiscal and easier monetary policies which, in theory, is one way of bringing this about was used in Australia in 1987, but was followed by a *rising* trade deficit. The usual explanation for this is that the rise in investment in these years offset any effects of the move to fiscal surplus. In Australia's case, there does not appear to be any simple discernible relationship between trade deficits and real exchange rates. This is highlighted by the fact that the trade deficit fell in the latter part of the 1980s while measures of the real exchange rate either appreciated or were steady. Indeed, given the multiple causes of trade deficits, the connection between trade balances and real exchange rates need not be strong. Manufactured exports grew very strongly in the latter half of the 1980s and it is quite possible that this could have resulted in a falling trade deficit accompanied by an appreciating real exchange rate.

Recently, the trade deficit has been significantly lower than for most of the 1980s. However, it is difficult to say whether this is part of an adjustment to a lower level or the consequence of the severity of the 1990-92 recession. Indeed, the search for an automatic or policy-produced adjustment process in Australia's case is often based on the notion that current account deficits are intrinsically

Figure 13: Net Market Purchases/Official Reserve Assets



undesirable.[37] The alternative view is that private sector borrowing or lending abroad in a world of mobile financial capital is part of a beneficial process of real capital accumulation which is not confined by national boundaries. As such, the timing of any adjustment process depends on the forces underlying the supply and demand for capital and is unlikely to be easily predicted.

6.3 Exchange Market Intervention

It was demonstrated earlier that the overall policy of the RBA with respect to reserves could be rationalised as one of retaining the option to revert to a pegged or heavily managed exchange rate system if desired. This seems to be confirmed by the fact that the ratio of official reserve assets to GDP has been held reasonably steady since the float (Figure 9). However, the RBA has an active policy of sterilised intervention in the foreign exchange market and this is of interest not only because it might imply that the exchange rate has not floated reasonably freely, but also because the motives for and effects of intervention are part of exchange rate policy. It would appear that for the most part the intention is to smooth market fluctuations, in which case the essentials of floating may be preserved. However, it must be asked why smoothing is necessary, how successful it has been and whether there are other motives for intervention.

37. Of course, distortions and externalities need to be corrected for current account deficits, or any other aspect of a growth process to be ideal.

The RBA reports monthly net market purchases of official reserve assets and Figure 13 shows the volume of these expressed as a percentage of total official reserve assets. Intervention was relatively minor in the two years following the float. However, with the dollar depreciation in 1985-1986, there were several months of extraordinary levels of sales. Indeed, intervention to support the $A shows up as a relatively small number of large isolated purchases. On the other side, sales of Australian dollars can be seen to involve much smaller amounts in any one month and relatively steady levels compared with purchases. Sales in the second half of the 1980s are greater than purchases, which is consistent with the accumulation of reserves to sustain a steady ratio to GDP. The picture then, is of asymmetrical intervention such that, at certain times, action to offset potential depreciation was regarded as critical. Appreciation, on the other hand was given a different treatment or accorded a different priority.

The size of official reserves appears such that unless elasticities of supply and demand for foreign currency are particularly high, a sufficient stock is available to influence $A exchange rates significantly in any short period, though the stock would not appear adequate for any sustained intervention.[38] However, the Bank's policy is to sterilise the effects of intervention on the money supply. Such action will entirely offset any impact on the market if domestic and foreign bonds are perfect substitutes. Sterilised intervention will have an effect on the price of foreign exchange only to the extent that foreign and domestic bonds are imperfect substitutes. Despite this, it is still possible for sterilised intervention to affect the exchange rate through mechanisms other than its impact on foreign currency demand and supply. Firstly, the market may take intervention to signal that unless the exchange rate moves in the direction the Bank desires, there may be a change in monetary policy to enforce the desired move. If the object of the Bank is to smooth fluctuations, it might be that by the time the threat is to be made credible, the market has moved of its own accord in the direction required. Hence, there may well be a tendency for rates to move initially in the direction implied by the intervention. This effect would suffer from a lack of credibility in cases in which rates consistently moved in the 'wrong' direction following intervention and no monetary substantiation was forthcoming.

Secondly, the Bank may possess superior information to that of the market. In that case depending on the nature of the information, sterilised intervention might have a short-run or even a long-run effect on nominal exchange rates by signalling to the market the direction of effect which the exclusive information might have

38. Thus in 1992, the average level of reserves was about 1.25 times the average daily turnover in the foreign exchange market against the $A. The *Bulletin* for May 1993 states that: 'In April 1992, trading in Australia accounted for only 45 per cent of the total turnover in Australian dollars (p. 5)'.

on exchange rates. The intervention which took place in January 1992, one of the biggest purchases of $A since the float, is of interest in relation to this.

> The market, however, became very unsettled early in 1992 in the lead-up to the Government's Economic Statement. This period was peppered with rumours of an impending fiscal expansion and perceptions of the Government favouring a lower exchange rate.
>
> The Bank believed the market was reacting over this period to fears about future policy directions that were not well based. It was also concerned that unwarranted falls in the exchange rate would limit the scope to lower interest rates in support of the recovery. In trade weighted terms, the dollar had already fallen 8 per cent from its September peak and, while that could be absorbed, any further sharp falls would weaken confidence and threaten a resurgence of upward pressure on prices.
>
> To help steady the market the Bank became a heavy buyer of Australian dollars throughout January; for the month as a whole purchases amounted to $4.3 billion. This intervention was successful in calming the market. After the Economic Statement was released at the end of February, the exchange rate recovered its December quarter levels [Reserve Bank of Australia 1992, p. 21].

In this period, the Bank was presumably using its superior knowledge of what would be in the Economic Statement to prevent *unfounded* rumours affecting the Australian dollar's value. Apart from any effect on the value of the currency in the short run, their operations could be interpreted as sending a signal that the market's fears about the forthcoming Economic Statement were unwarranted.[39] Where the bank has superior information it would seem better to use it directly to prevent the market moving in the 'wrong' direction. With politically sensitive information, this may well be impossible.

The view of many economists has been that sterilised intervention has had little or no effect on exchange rates.[40] In a study that does not distinguish between sterilised and non-sterilised intervention, Dominguez and Frankel (1990) differentiate between the portfolio and the signalling channels of effect on exchange rates. The former is the traditional market mechanism and the latter an expectations effect whereby the intervention of the central bank signals inside information about future monetary policy.[41] In a study of the $A/DM rate they find evidence in favour of both effects, but for the response to be large, the intervention needs to have been made public. 'Secret' intervention appears to have had a small and, in some periods insignificant impact on the exchange rate studied.

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39. Two other interesting aspects of this quote are worth noting in passing. Firstly, the belief that (future) fiscal expansion will *depreciate* the exchange rate (see Section 6.3) and secondly, the suggestion that exchange rate policy should be used for anti-inflationary purposes.

40. See the studies reported in Rogoff (1990).

41. In the case cited earlier, it was fiscal policy that was signalled.

It has sometimes been suggested that sterilised intervention can have an influence on the *equilibrium* levels of exchange rates. One case in which something of this sort might be achieved is that of 'speculative bubbles'. Bubbles are unstable paths of market variables whose individual steps might be rational, but which have become based on a forecast of market fundamentals which proves to be incorrect. The essence of bubble paths is that, at their commencement, market fundamentals are hard to appraise. The bubble bursts once the deviation from market fundamentals becomes apparent.[42] In such circumstances, intervention may have an effect on the level of exchange rates beyond the short run if it shifts them to paths more in line with fundamentals. In this case, it would be necessary for the Bank to have a much better perspective on fundamentals than the market. In any case, Flood and Hodrick (1990) claim that econometric tests have not yet demonstrated the presence of bubbles.

There are several reasons why intervention may encounter pitfalls. Firstly, although it sounds eminently reasonable to have a policy of smoothing of exchange rate fluctuations, the possibility exists that fluctuations of value to the economy may at times be prevented. For instance, it has become conventional to regard exchange rates as having the potential to overshoot equilibrium. However, overshooting may well have a valuable role. Dornbusch's (1976) original demonstration of the concept has exchange rates adjusting to a monetary shock in a way that overshoots equilibrium because prices are assumed to be sluggish. However, this adjustment is necessary to maintain equilibrium in the money market and is, therefore, of value to the economy. It is not enough simply to observe that an exchange rate response appears exaggerated. Something further than the impression of overshooting is needed to justify intervention. The other type of problem has to do with market fundamentals. If the fundamentals are different from those which the Bank has in mind, the resulting intervention, or monetary policy, may impose costs on the economy. For instance, a rise in the propensity to save is likely to lead to currency depreciation. If this is undetected, policy to prevent the depreciation could inhibit the adjustment of the current account deficit which would be the counterpart of a rise in saving.

In short, the clearest case for sterilised intervention would seem to be where the authorities possess superior information to that of the private sector. The instance referred to in the above quote is a good example of the Bank possessing information that could not be made available, but was relevant to the private sector. However, in cases where information can be made available, doing so directly, rather than signalling through intervention, would appear far preferable. The

42. See Blanchard and Fischer (1989, Ch. 5) and Flood and Hodrick (1990) for a survey of bubble behaviour and Gaber (1990) and White (1990) for appraisals of the potential for bubbles in practice.

alternative involves signals which may be misread. Because the evidence suggests that secret intervention is a good deal less effective than a more open approach it would seem preferable to give a degree of publicity to intervention operations.

Despite the above qualifications, there do not seem to have been any obvious cases in which intervention has been harmful and the process is said to have made money so that the taxpayer has not been required to finance it. If it helps to sustain confidence that the market is reflecting fundamentals, its contribution would seem valuable. In these circumstances there do not seem grounds for discontinuing sterilised intervention, provided it is conducted with an awareness of the possible pitfalls. In any case, it is monetary policy which is the instrument that has the potential to deliver serious problems, as well as major benefits.

7. Conclusions

The paper has concentrated on a number of inflation related issues, in particular, the capacity of a floating exchange rate to insulate the economy from foreign price shocks, the consequences if this does not work, the role of exchange rate targeting in anti-inflationary policy and the appropriate goal for inflation policy. In addition, the relation between wages policy and the depreciation, between the exchange rate and the current account and the role of exchange market intervention have also been discussed.

Since the float, the Australian economy appears to have independently generated its own monetary conditions and inflation rate. This and other evidence strongly suggests that the float has involved a reasonable degree of monetary independence and that insulation has worked. Moreover, in addition to the standard mechanism of the exchange rate moving to provide insulation from foreign price shocks, another influence appears to help absorb these shocks. This is the phenomenon of 'pricing to the market' which enables the smoothing of domestic price movements in importables and exportables.[43] If there is a reasonable degree of price insulation there is no need for the authorities to target the exchange rate, for instance by resisting depreciation, for anti-inflationary purposes. On the other hand, when there are significant inflationary foreign price shocks and insulation is incomplete, inflation will be imported. Reversing this without producing excess supply is likely to be a difficult problem for macroeconomic policy. Alternatively, to the extent that insulation allows some proportion of foreign currency price increases to affect domestic prices, this could be accommodated in the interest of sustaining domestic real equilibrium. For this and other reasons, the pursuit of equilibrium in the market for non-traded goods would seem a worthwhile strategy. Besides its

43. The study by Dwyer, Kent and Pease (1993) finds that in the contemporaneous quarter, pass-through is about 50 per cent, but that it is close to complete after one year.

intrinsic benefits, it could also mean a reasonable degree of stability of the price of non-traded goods when insulation works or when foreign price shocks are absent. When there is significant foreign price inflation and insulation does not work, it is a viable alternative to price stability and disequilibrium.

In the Australian context it has often been argued that wage restraint needs to accompany depreciation in order for the latter to have the effect of reducing the current account deficit. This was particularly so in 1985-86 when it was thought that the depreciation then had the role of reducing the trade deficit. However, because of the falls in foreign currency traded goods prices and the terms of trade at the time, it would appear that at least some of the nominal depreciation was an insulating response to these shocks. In any case, it is argued that even with indexed wages, a depreciation which is a response to some factor likely to change the current account, such as the fall in investment in 1986, would reduce the trade deficit. That is not to say that real wage restraint would not do the same. Moreover, the persistently high rates of unemployment at the time provided sufficient grounds for real wage restraint. Hence, it would seem that the source of any depreciation needs to be known before any conclusion can be drawn about its effect on the current account or about the need for any accompanying policy. Further, while Australia's wage fixing remains centralised it would seem preferable to relate wages policy to conditions in the labour market.

There does not appear to have been any simple relationship between real exchange rate movements, however measured, and the trade balance in the past decade. Fluctuations in investment, fundamental shifts in the fiscal balance and improvements in manufactured exports appear to explain what happened to the trade balance. Indeed, the weak trend towards a lower trade deficit has occurred despite all measures of the real exchange rate appreciating or remaining steady between 1986 and 1990.

Intervention in the foreign exchange market is often criticised by economists on the grounds that it is likely to have little or no effect if it is sterilised, as is the case in Australia. However, there is evidence that it can have an impact if it signals the credible possibility of a future change in monetary policy or if it conveys other information known to the Bank but not to the market. The heavy intervention in January 1992, when the market apparently became unsettled about the forthcoming Economic Statement is a case in point. However, as the exchange rate performs the role of a flexible link with the rest of the world it is not clear that smoothing *per se* is needed. As is often said, there is no such intervention in other markets, like the stock market. The possibility exists that where markets are thought to lose sight of fundamentals, intervention can shift the path of the exchange rate to one more soundly based. However, the authorities would need to have a better view of the fundamentals than the market, which in times of uncertainty might be hard

to achieve. The $A has not yet been floating for 10 years. Provided that the private sector continues to believe it has a role, there may be grounds for persisting with sterilised intervention.

Finally, the topic is large and a number of interesting and important issues have not been covered. In particular, apart from foreign currency traded goods price shocks, the tendency for the economy to experience similar growth cycles to other OECD countries and the role of the exchange rate mechanism in this process has been omitted. Also, the way in which terms of trade shocks contribute to expansionary or deflationary episodes has only been touched on.

Appendix

A. Interest Parity and Insulation

Suppose uncovered interest parity holds in the model of Section 4, so that:

$$i = i^* + \dot{e} \tag{A1}$$

where it is assumed that there are rational expectations, so that actual and expected exchange rate movements coincide. The interest parity condition can be rearranged as:

$$\begin{aligned} i &= (i^* - \dot{\Psi}^*) + (\dot{e} + \dot{\Psi}^*) \\ &= (i^* - \dot{\Psi}^*) + (\dot{e} + \varnothing_X \dot{s} + \varnothing_M \dot{q}) + (\dot{\Psi}^* - \varnothing_X \dot{s} - \varnothing_X \dot{q}) \end{aligned} \tag{A2}$$

where $\varnothing_X$ and $\varnothing_M$ are the insulation coefficients from (12) and the $\cdot$ is the time derivative of a variable. If insulation works this reduces to:

$$i = \rho^* + (\dot{\Psi}^* - \varnothing_X \dot{s} - \varnothing_X \dot{q}) \tag{A3}$$

where ρ^* is the foreign real interest rate. The condition for there to be no effect on the domestic interest rate is that the foreign real interest rate is independent of foreign currency trade price movements (the Fisher effect) and that the foreign inflation rate is equal to an average of the inflation rates of foreign currency for the traded goods. Otherwise, foreign inflation would tend to change interest rates.

B. Wages, the Current Account and Depreciation

Two questions are raised in the text. Firstly, will depreciation be ineffective in reducing a current account deficit if wages are fully adjusted to a price index? Secondly, what is the effect of a fall in real wages on the current account?

Suppose depreciation is caused by an exogenous fall in investment and suppose that nominal wages are fully indexed so that:

$$W = \omega I = \omega[aP + (1 - a)eP^*] \tag{A4}$$

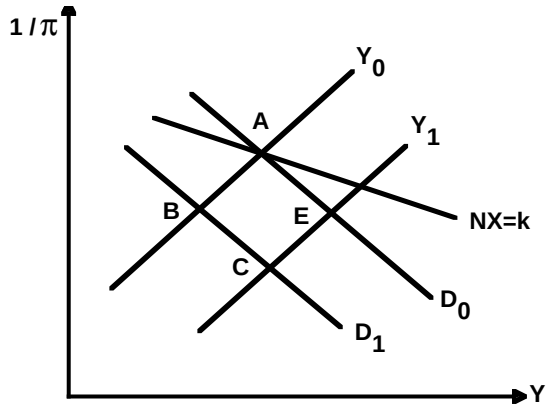
where I is a price index with weights a, 1-a; and ω is the real wage. The real wage cost per unit of output of the traded goods is then:

$$W/P = \omega[a + (1 - a)eP^*/P] \tag{A5}$$

Incorporating (A7) in the standard output supply function yields:

$$Y = Y(\underline{\pi}, \underline{\omega}) \tag{A6}$$

Figure A1



where π is the real exchange rate. Using the model and symbols of Part A, the effect of a changes in parameters which might affect the real exchange rate can be analysed in terms of the output of the home good and its relative price $1/\pi$. The demand curve for the home good D (from (2) to (5)) is negatively sloped and the supply curve Y is positively sloped in Figure A1. Depreciation of the real exchange rate will be produced by factors which shift the demand curve to the left and/or the supply curve to the right. An exogenous fall in investment produces a leftward shift in the D curve, moving the economy to B and so reducing output and depreciating the real exchange rate. This occurs *even with wages fully indexed*. The reason is that real wage costs per unit of output of the home good vary with the relative price of the home good, from (A6), even though the real wage in terms of the price index remains unchanged. Action to prevent wages rising fully with prices can be represented as a rightward shift of the supply curve, bringing the economy to C, which produces additional depreciation of the real exchange rate and limits the fall in output. In this case, an argument for restricting the adjustment of wages would be that it will help offset the fall in real output.

The $NX = k$ curve in Figure A1 is the locus of values of the relative price of home goods for which the trade surplus has a constant value k. It can be shown to have a negative slope and to be flatter than the demand curve. It follows that, *even with fully indexed wages*, the fall in investment and the real depreciation it induces (the move from A to B) produces a lower current account deficit.

Now, consider the effect of a reduction in the real wage measured in terms of the price index. In this model this will produce a fall in the trade deficit. A fall in the real wage ω, other things constant, results in a move from A to E and so a

reduction in the trade deficit. Hence an argument can be made for reduced real wages as a way of reducing the trade deficit. Incidentally, this also produces depreciation and higher output.

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